

## Supplementary Materials

### Method: Determination of Pet Life Stage

#### *Dogs*

Figures for dogs' life stages were informed by dogs' size. The following figures on reaching adulthood were obtained from Paretts (2021), whilst figures on reaching elder status were obtained from Llera and Buzhardt (n.d.): Small-sized dogs were classified as reaching adulthood at one year and as reaching elder status at 11 years. Medium-sized dogs were classified as reaching adulthood at 15 months and as reaching elder status at 10 years. Large-sized dogs were classified as reaching adulthood at 18 months and as reaching elder status at eight years. Giant-sized dogs were classified as reaching adulthood at 18 months and as reaching elder status at seven years. Dogs of unknown size (e.g., crossbreeds; breeds which vary in size) were classified as reaching adulthood at 1.31 years (mean of all sizes) and as reaching elder status at nine years (mean of all sizes). Utilising average lifespan figures obtained from the Dog Aging Project (Urfer et al., 2020), the life stage figures were divided in relation to the dogs' average lifespan, based on size, of 16.2 (small), 15.9 (medium), 14.6 (large) and 13.4 (giant) years, giving numerical cut-off thresholds for each life stage as seen in Table S1.

**Table S1.**

*Cut-off thresholds for dog life stages*

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Life Stage	Small	Medium	Large	Giant
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Juvenile	$\leq .062$	$\leq .079$	$\leq .103$	$\leq .112$
Elder	$\geq .679$	$\geq .629$	$\geq .548$	$\geq .522$

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*Note.* Figures in between the above values would be classed as ‘adult’

To obtain individual dogs' lifespan ‘number’, each individual dogs’ age was divided by their average lifespan, and this lifespan number was then compared against the above cut-off thresholds in Table 1 to classify each dog, depending on their size, into one of the three life stages: juvenile, adult, elder. Each dogs’ average lifespan was informed by figures from the American Kennel Club (AKC) based on the dog’s breed. As AKC provides a lifespan range instead of one figure, the median of this range was used. Where the dog was a crossbreed between two established breeds, the median of each breeds’ lifespan range was combined and averaged to create a mean. For crossbreeds mixed with an established breed and another unknown breed (e.g., lurchers) or crossbreeds mixed from two or more unknown breeds, the average dog lifespan of 15.4 years was used instead (Urfer et al., 2020).

## ***Cats***

Due to less clearly defined breeds for cats (as compared to dogs), baseline figures of 18 months for reaching adulthood (Grieves, 2019), 11 years for reaching elder status (labelled as ‘senior’/‘geriatric’ cats; Pittari et al, 2009) and 14 years as the average lifespan (O’Neill et al., 2015) were utilised for most cats. We utilised different figures for the following cat breeds due to differences in average lifespan and/or in developmental stages: ragdoll (average lifespan of 15 years and maturity at four years, with no difference in elder status; PetPlan,

n.d.), Persian (average lifespan of 13.5 years with no difference in life stages; O'Neill et al., 2019), Russian blue and Egyptian Mau (both average lifespan of 15 years with no difference in life stages; PetPlan, n.d.), Siamese (average lifespan of 15 years and reach elder status at 12 years with no difference in maturity; PetPlan, n.d.) and Maine coon (average lifespan of 12.5 years due to being purebred and maturity at two years with no difference in elder status; Grieves, 2019; O'Neill et al., 2015). See Table S2 for the numerical cut-off thresholds for each life stage.

**Table S2**

*Cut-off thresholds for cat life stages*

Life stage	Most cats (e.g., crossbreeds)	Ragdoll	Persian	Russian blue and Egyptian Mau	Siamese	Maine coon
Juvenile	$\leq .107$	$\leq .267$	$\leq .111$	$\leq .1$	$\leq .1$	$\leq .16$
Elder	$\geq .786$	$\geq .733$	$\geq .815$	$\geq .733$	$\geq .8$	$\geq .88$

*Note.* Figures in between the above values would be classed as 'adult'

To obtain individual cats' lifespan 'number', each individual cats' age was divided by their average lifespan, and this lifespan number was then compared against the above cut-off thresholds in Table 2 to classify each cat, depending on their breed, into one of the three life stages: juvenile, adult, elder. The average lifespan figures of 14 years for crossbreeds (e.g.,

most cats), 15 years for ragdoll, Russian blue, Egyptian Mau and Siamese cats, 13.5 years for Persian cats and 12.5 years for Maine coon cats were utilised per the above sources.

## **Results: Assumption Checks**

### ***Regressions for Overall Perceived Pet Play***

For all regressions, residuals were normally distributed (assessed by inspection of histograms and P-P plots) and there were no outliers (defined as points more than three standard deviations away from the mean), extreme leverage values (defined as values which were more than three times the mean leverage value) nor highly influential points (defined as Cook's distance values which were greater than one). There was also no multicollinearity as assessed by Pearson correlations between the predictor variables (all below .9) and VIFs (all below five). As assessed by inspection of scatterplots of residuals, the assumption of homoscedasticity was met, whilst the linearity assumption was approximately met for the combined outcome variables and predictor variables and for the relationships between individual predictor variables and the outcome variables. There was independence of errors as assessed by Durbin-Watson statistics (within the acceptable range of 1.5 to 2.5): 1.92 for wellbeing day one, 1.74 for COVID-19 anxiety day one, 2.18 for wellbeing five-day sample, and 2.01 for COVID-19 anxiety five-day sample.

### ***ANOVAs for Pet Life Stage and Perceived Pet Play***

For both day one and across all days, normality was sometimes violated per Kolmogorov-Smirnov tests of normality,  $ps < .05$ . However, skewness was within acceptable range (-2 to 2; Kim, 2013; West et al., 1995), suggesting acceptable normality. Additionally, ANOVAs are robust to normality violations (Blanca et al., 2017). We therefore proceeded with the

ANOVAs. ANOVAs had homogeneity of variances, per Levene's test for equality of variances,  $ps > .05$ . Both ANOVAs had univariate outliers. For day one, running analyses with and without outliers did not change conclusions. We therefore report this ANOVA in the paper including outliers. For the five-day sample, running analyses with and without outliers made the Bonferroni post-hoc analysis between perceived play in elderly and juvenile pets non-significant. This change is likely due to a very small number of juvenile pets within the ANOVA when excluding outliers ( $n = 4$ ). We therefore report this ANOVA including outliers within the paper, though note that the ANOVA including outliers still had a small number of juvenile pets ( $n = 7$ ).

### ***Regressions for Personal Playfulness and Perceived Pet Play***

The relationship between personal playfulness and pets' perceived play was approximately linear and there was independence of errors as assessed by Durbin-Watson statistics of 1.73 (day one; within the acceptable range of 1.5 to 2.5) and 2 (five-day). The assumptions of homoscedasticity (assessed through scatterplots) and normality (assessed by inspection of histograms and P-P plots) were approximately met. Both regressions had univariate outliers, but conclusions did not change depending on whether the outliers were included or excluded. We therefore report these regressions including outliers.

### ***ANOVAs for Species and Perceived Pe Play***

For day one, normality was violated in the dog condition per Kolmogorov-Smirnov test of normality,  $p = .02$ , whilst the normality assumption was met in the cat condition,  $p = .2$ . For the five-day sample, the normality assumption was met in the dog condition per Kolmogorov-Smirnov test of normality,  $p = .07$ , but was violated in the cat condition,  $p = .02$ . Despite normality sometimes being violated, skewness was within acceptable range (-2 to 2; Kim, 2013; West et al., 1995) across conditions and samples, suggesting acceptable normality.

Additionally, ANOVAs are robust to normality violations (Blanca et al., 2017). We therefore proceeded with the ANOVAs. ANOVAs had homogeneity of variances, per Levene's test for equality of variances,  $ps > .05$ . Both ANOVAs had univariate outliers. For day one and five days, running analyses with and without outliers did not change conclusions. We therefore report these ANOVAs in the paper including outliers.

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