

## File S2:

### Supplementary Table S1: Predictive variables used for univariable analysis

**Table S1. Variables used for univariable analysis.**

Variables used for univariable analysis of the outcomes of (i) total number of problem behaviours per dog; (ii) SRB case; (iii) training methods used; owner expectations for (iv) behaviour and (v) training, and (vi) owner sources of advice for general behaviour and training queries †Categorical variable, binary. ‡Categorical variable, more than two categories. \*Continuous variable. •Responses from the 2020 survey of “I’m not sure”, “I can’t/don’t remember” or “No, not as yet but I plan to before my dog is 16 weeks old (if applicable)” recoded as missing data.

	Variable	Survey derived from	Outcome(s) Tested
<b>Owner/household demographics</b>	†First-time dog owner, binary	2020	All
	‡Owner age	2020	All
	†Owner gender	2020	All
	†Child ≤ 16 years in household	2020	All
	†•Employed in animal care/veterinary sector	2020	All
	†Another dog(s) in household	2020	All
	‡Current working location of owner	21 months	All
	‡Current working location of other household members	21 months	All
	†Owner lives alone/only adult in the household	2020	All
<b>Dog demographics</b>	†Dog sex	2020	All
	†Neuter status	2020, updated 21 months	All
	‡Breed purity categorisation	2020	All
	‡Top 12 most common breeds at 21 months	2020, analysed 21 months	All
	‡UK Kennel Club breed group	2020	All
	‡Typical adult bodyweight categorisation	2020	All
	†Insurance status	2020, updated 21 months	Advice source
<b>Purchase motivations for a dog/breed or crossbreed chosen</b>	†Dog to improve mental health	2020	All except problem behaviours and SRBs
	†Breed/crossbreed size suited to owner’s lifestyle	2020	All except problem behaviours and SRBs
	†Breed/crossbreed good with children	2020	All except problem behaviours and SRBs
	†Breed/crossbreed easy to train	2020	All except problem behaviours and SRBs
	†Friends or family own this breed/crossbreed	2020	All except problem behaviours and SRBs
	†Owner was driving force to get a dog	2020	All except problem behaviours and SRBs
	†Owner had more time to care for a dog due to COVID-19 pandemic	2020	All except problem behaviours and SRBs

Table S1. Contd.

	Variable	Survey derived from	Outcome(s) Tested
<b>Pre-purchase research</b>	†Research conducted	2020	All except problem behaviours and SRBs
<b>Purchase behaviours</b>	†Via animal-specific selling website	2020	All
	†Viewed in person prior to purchase	2020	All
<b>Potentially illegal sales indicators</b>	†•Sold without dam present	2020	All
	†Sold outside breeders' home	2020	All
	†•Sold without a microchip	2020	All
	†•Sold < 6 weeks of age	2020	All
	†•Sold with passport < 13 weeks of age	2020	All
<b>Owner expectations</b>	†Behaviour	21 months	Advice source and training methods
	†Training	21 months	Advice source and training methods
<b>Socialisation &lt; 16 weeks</b>	‡•Attended puppy classes	2020, updated 21 months	All
	†•Met any people from outside their household	2020	Problem behaviours
	†•Had visitors to their home	2020	Problem behaviours
	†•Walked in a public space	2020	Problem behaviours
	†•Walked near traffic	2020	Problem behaviours
<b>Socialisation &lt; 16 weeks</b>	†•Met any dogs from outside their household	2020	Problem behaviours
	†•Heard fireworks	2020	Problem behaviours
	†•Heard thunderstorm(s)	2020	Problem behaviours
	†•Visited a dog groomer	2020	Problem behaviours
	†•Deliberately left at home alone	2020	Problem behaviours and SRBs
<b>Adult management</b>	‡Attended adult classes	21 months	All
	‡Owner training method	21 months	All except training methods
	‡Owner response to SRB	21 months	SRBs
	‡Exercise frequency (walks)	21 months	All except advice source
	‡Exercise frequency (off lead)	21 months	All except advice source
	‡Time left alone	21 months	All except advice source
	‡Change in time left alone from <16 weeks	21 months	All
	‡Location left alone	21 months	All except advice source
	†General source of advice for training and behaviour	21 months	All except advice source
	†Respondent is primary carer for dog	2020	Training methods and expectations

**Table S1.**        **Contd.**

	<b>Variable</b>	<b>Survey derived from</b>	<b>Outcome(s) Tested</b>
<b>Dog behaviour</b>	*Total number of 'problem behaviours'	21 months	All except problem behaviours
	†Number of 'control behaviours'	21 months	All except problem behaviours
	†Number of 'attention-seeking behaviours'	21 months	All except problem behaviours
	†Number of 'aggressive behaviours'	21 months	All except problem behaviours
	†Number of 'fear/avoidance behaviours'	21 months	All except problem behaviours
	†Number of 'reaction to familiar people' behaviours	21 months	All except problem behaviours
	†Number of 'reaction to unfamiliar people' behaviours	21 months	All except problem behaviours
	†Number of 'reaction to dogs' behaviours	21 months	All except problem behaviours
	†SRB case	21 months	All except problem behaviours and SRBs

## Supplementary Table S2: Total number of owner-reported problem behaviours, univariable analysis

**Table S2.** Descriptive and univariable analysis of total number of owner-reported problem behaviours at 21 months.

Descriptive and univariable analysis (Mann-Whitney *U* or Kruskal-Wallis test as appropriate) of the total number of commonly reported problem behaviours per dog with no missing data based upon responses to the question “At any point since the last survey (in November/December 2020) have you considered that your dog has a problem with the following behaviours? Please select all options that apply.”. Owners who had answered “I’m not sure” were reclassified as missing data. Three behaviours from qualitative content analysis of free-text responses were included used along with a common separation-related behaviour which was only displayed in the presence of the owner and not the absence. Significant results are emboldened.

						Statistics		
	Variable	Category	%	Median*	IQR	<i>U</i>	<i>χ</i> <sup>2</sup>	<i>p</i> -Value
Owner/household demographics	First-time dog owner ( <i>n</i> = 787)	Yes	39.1	5.00	3.00 – 7.00	64425.000	N/A	<b>0.003</b>
		No	60.9	4.00	3.00 – 7.00			
	Owner age ( <i>n</i> = 787)	18-24 years	4.5	5.00	2.00 – 8.00	N/A	3.052	0.802
		25-34 years	19.4	5.00	3.00 – 7.00			
		35-44 years	19.4	4.00	3.00 – 6.00			
		45-54 years	28.1	5.00	3.00 – 7.00			
		55-64 years	18.2	5.00	3.00 – 7.00			
		65-74 years	9.3	5.00	3.00 – 7.00			
		≥ 75 years	1.1	4.00	3.50 – 6.50			
	Owner gender ( <i>n</i> = 787)	Female	91.1	5.00	3.00 – 7.00	25746.500	N/A	0.718
		Male	8.9	5.00	2.75 – 7.00			
	Child ≤ 16 years in household (in 2020) ( <i>n</i> = 787)	No	73.1	5.00	3.00 – 7.00	58201.500	N/A	0.329
		Yes	26.9	4.00	3.00 – 6.00			
	Employed in animal care/veterinary sector ( <i>n</i> = 788)	No	92.4	5.00	3.00 – 7.00	17230.000	N/A	<b>0.006</b>
		Yes	7.6	4.00	2.00 – 6.00			
Another dog(s) in household (in 2020) ( <i>n</i> = 788)	No	72.6	5.00	3.00 – 7.00	50486.500	N/A	< <b>0.001</b>	
	Yes	27.4	4.00	2.00 – 6.00				

\*Median number of total owner-reported problem behaviours.

Table S2. Contd...

	Variable	Category	%	Median*	IQR	Statistics		
						<i>U</i>	$\chi^2$	<i>p</i> -Value
Owner/household demographics	Current working location of owner ( <i>n</i> = 774)	At home	23.4	5.00	3.00 – 7.00	N/A	2.880	0.578
		Away from home	20.9	5.00	3.00 – 7.00			
		At and away from home	31.9	4.00	3.00 – 7.00			
		Unemployed	3.6	5.00	3.00 – 8.00			
		Retired	20.2	4.00	3.00 – 6.00			
	Current working location of other household members ( <i>n</i> = 675)	At home	19.0	5.00	3.00 – 6.00	N/A	5.347	0.254
		Away from home	32.7	4.00	3.00 – 7.00			
		At and away from home	31.4	5.00	3.00 – 7.00			
		Unemployed	1.5	6.50	3.75 – 10.00			
		Retired	15.4	4.00	3.00 – 6.00			
	Owner lives alone/only adult in the household ( <i>n</i> = 774)	No	86.6	5.00	3.00 – 7.00	33646.000	N/A	0.571
		Yes	13.4	4.00	3.00 – 7.00			
Dog demographics	Dog sex ( <i>n</i> = 787)	Female	46.9	4.00	3.00 – 7.00	69176.000	N/A	<b>0.012</b>
		Male	53.1	5.00	3.00 – 7.00			
	Neutered ( <i>n</i> = 788)	No	40.9	4.00	2.00 – 6.00	86871.000	N/A	< <b>0.001</b>
		Yes	59.1	5.00	3.00 – 7.00			
	Breed purity designation ( <i>n</i> = 788)	Crossbred	4.3	5.00	4.00 – 8.00	N/A	10.889	<b>0.004</b>
		Purebred	68.5	4.00	3.00 – 7.00			
		Designer Crossbred	27.2	5.00	3.00 – 7.00			
	Top 12 most common breeds at 21 months ( <i>n</i> = 788)	Crossbred	4.3	5.00	4.00 – 8.00	N/A	30.130	<b>0.003</b>
		Cockapoo	9.9	5.00	4.00 – 8.00			
		Labradoodle	2.8	5.50	3.00 – 8.25			
		Cavapoo	1.9	6.00	4.00 – 8.00			
		Labrador Retriever	10.3	4.00	2.00 – 6.00			
		Cocker Spaniel	6.9	5.00	3.00 – 7.00			
		Border Collie	3.4	5.00	4.00 – 8.00			
		Miniature Smooth-Haired Dachshund	2.8	5.50	2.75 – 9.25			
		Border Terrier	2.9	4.00	3.00 – 6.00			
		Golden Retriever	2.9	4.00	2.00 – 6.00			
		Whippet	2.4	4.00	2.00 – 7.00			
		English Springer Spaniel	2.0	3.00	2.25 – 4.00			
		Other	47.5	4.50	3.00 – 7.00			

\*Median number of total owner-reported problem behaviours.

Table S2. Contd...

		Category	%	Median*	IQR	Statistics		
Variable						<i>U</i>	$\chi^2$	<i>p</i> -Value
Dog demographics	Breed group ( <i>n</i> = 788)	Not KC recognised	32.3	5.00	3.00 – 7.00	N/A	24.579	< 0.001
		Gundog	28.7	4.00	2.00 – 6.00			
		Hound	9.3	5.00	3.00 – 8.00			
		Pastoral	7.1	5.00	3.00 – 8.00			
		Terrier	8.6	5.00	3.00 – 6.75			
		Toy	3.0	5.50	3.25 – 6.75			
		Utility	6.9	4.00	2.75 – 6.25			
		Working	4.1	3.50	2.00 – 6.75			
	Typical adult bodyweight ( <i>n</i> = 756)	≤ 10 kg	19.2	5.00	3.00 – 7.00	N/A	12.679	0.013
		10 to < 20 kg	41.1	5.00	3.00 – 7.00			
		20 to < 30 kg	22.8	4.00	2.25 – 6.00			
		30 to < 40 kg	15.2	4.00	2.00 – 6.00			
		≥ 40 kg	1.7	4.00	2.00 – 10.00			
Purchase behaviours	Via animal-specific selling website ( <i>n</i> = 787)	No	48.8	4.00	3.00 – 6.00	84928.000	N/A	0.017
		Yes	51.2	5.00	3.00 – 7.00			
	Viewed in person prior to purchase ( <i>n</i> = 788)	No	29.3	5.00	3.00 – 7.00	61852.500	N/A	0.391
		Yes	70.7	5.00	3.00 – 7.00			
Potentially illegal sales indicators	Sold without dam present ( <i>n</i> = 786)	No	22.1	4.00	3.00 – 7.00	48907.500	N/A	0.099
		Yes	77.9	5.00	3.00 – 7.00			
	Sold outside breeders' home ( <i>n</i> = 788)	No	63.2	5.00	3.00 – 7.00	70680.500	N/A	0.618
		Yes	36.8	5.00	3.00 – 7.00			
	Sold without a microchip ( <i>n</i> = 772)	No	95.7	5.00	3.00 – 7.00	10495.000	N/A	0.173
		Yes	4.3	6.00	3.50 – 8.00			
	Sold < 6 weeks of age ( <i>n</i> = 787)	No	99.7	5.00	3.00 – 7.00	1030.000	N/A	0.443
		Yes	0.3	6.50	4.00 – 9.00			
	Sold with passport < 13 weeks of age ( <i>n</i> = 714)	No	94.5	5.00	3.00 – 7.00	11786.500	N/A	0.269
		Yes	5.5	4.00	2.00 – 7.00			

\*Median number of total owner-reported problem behaviours.

Table S2. Contd...

	Variable	Category	%	Median*	IQR	Statistics		
						<i>U</i>	$\chi^2$	<i>p</i> -Value
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes ( <i>n</i> = 787)	No	56.8	5.00	3.00 – 7.00	N/A	0.398	0.820
		Yes, in person	35.5	5.00	3.00 – 7.00			
		Yes, online	7.8	4.00	3.00 – 7.00			
	Met any people from outside their household ( <i>n</i> = 733)	No	2.9	4.00	1.00 – 7.50	8090.500	N/A	0.518
		Yes	97.1	5.00	3.00 – 7.00			
	Had visitors to their home ( <i>n</i> = 707)	No	8.6	4.00	3.00 – 7.00	20412.000	N/A	0.640
		Yes	91.4	5.00	3.00 – 7.00			
	Walked in a public space ( <i>n</i> = 623)	No	8.3	6.00	3.25 – 8.00	12214.000	N/A	<b>0.033</b>
		Yes	91.7	5.00	3.00 – 7.00			
	Walked near traffic ( <i>n</i> = 637)	No	9.1	5.00	3.00 – 8.00	15263.000	N/A	0.250
		Yes	90.9	4.00	3.00 – 7.00			
	Met any dogs from outside their household ( <i>n</i> = 666)	No	11.4	4.00	2.25 – 7.75	23128.000	N/A	0.652
		Yes	88.6	5.00	3.00 – 7.00			
	Fireworks ( <i>n</i> = 715)	No	39.2	5.00	3.00 – 7.00	60217.500	N/A	0.799
		Yes	60.8	5.00	3.00 – 7.00			
	Thunderstorms ( <i>n</i> = 643)	No	63.8	5.00	3.00 – 7.00	41007.500	N/A	<b>0.003</b>
		Yes	36.2	4.00	2.00 – 6.00			
	Dog groomer ( <i>n</i> = 652)	No	79.0	4.00	3.00 – 6.00	38854.000	N/A	0.066
		Yes	21.0	5.00	3.00 – 7.00			
<b>Adult management</b>	Deliberately left at home alone ( <i>n</i> = 681)	No	15.9	5.00	3.00 – 8.00	26429.500	N/A	<b>0.016</b>
		Yes	84.1	4.00	3.00 – 6.00			
	Attended adult classes ( <i>n</i> = 788)	No	54.7	4.00	3.00 – 6.00	N/A	7.421	<b>0.024</b>
		Yes, in person	41.6	5.00	3.00 – 7.00			
		Yes, online	3.7	5.00	3.00 – 8.50			
	Owner training method ( <i>n</i> = 762)	Rewards-based only	17.6	3.00	2.00 – 5.00	N/A	38.081	< <b>0.001</b>
		Rewards-based & 1 aversive	20.3	5.00	3.00 – 6.00			
		Rewards-based & > 1 aversive	62.1	5.00	3.00 – 7.00			
		Aversive only	0.0	/	/			

\*Median number of total owner-reported problem behaviours.

Table S2. Contd...

		Category	%	Median*	IQR	Statistics		
Variable						<i>U</i>	$\chi^2$	<i>p</i> -Value
Adult management	Exercise frequency (walks) ( <i>n</i> = 784)	Never	0.1	4.00	<i>n</i> = 1	N/A	1.947	0.924
		< Once a week	0.3	4.00	0.00 – 8.00			
		Once a week	0.3	4.50	0.00 – 9.00			
		Several times per week	5.5	5.00	3.00 – 8.00			
		Once per day	27.2	4.00	3.00 – 7.00			
		Twice per day	45.9	5.00	3.00 – 7.00			
		> Twice per day	20.8	4.00	3.00 – 7.00			
	Exercise frequency (off lead) ( <i>n</i> = 782)	Never	5.6	5.00	3.00 – 8.75	N/A	22.435	<b>0.001</b>
		< Once a week	3.2	6.00	3.50 – 9.50			
		Once a week	3.3	6.50	3.75 – 9.25			
		Several times per week	16.0	5.00	3.00 – 8.00			
		Once per day	32.1	5.00	3.00 – 7.00			
		Twice per day	25.1	4.00	3.00 – 6.00			
		> Twice per day	14.7	4.00	2.00 – 6.00			
	Time left alone ( <i>n</i> = 788)	Never	10.2	6.00	3.00 – 8.00	N/A	7.835	<b>0.050</b>
		Up to 1 hour	18.7	5.00	3.00 – 6.00			
		1 to 4 hours	58.1	4.00	3.00 – 7.00			
		Over 4 hours	13.1	5.00	3.00 – 7.00			
	Change in time left alone from < 16 weeks ( <i>n</i> = 772)	Same amount of time	41.6	5.00	3.00 – 6.00	N/A	4.899	0.179
		Less time	2.8	4.50	2.75 – 8.25			
		More time ≤ 4 hours	43.5	4.00	3.00 – 7.00			
		More time > 4 hours	12.0	5.00	3.00 – 8.00			
	Location left alone ( <i>n</i> = 770)	A crate/indoor kennel (door closed)	15.2	5.00	3.00 – 8.00	N/A	6.573	0.254
		Loose in a single room	28.2	5.00	3.00 – 7.00			
		Loose in multiple rooms	56.2	4.00	3.00 – 7.00			
		Outdoor kennel (door closed)	0.1	/	/			
		Outdoor kennel (door open)	0.1	/	/			
		Loose in an enclosed outdoor space	0.1	/	/			
	General advice source for training and behaviour ( <i>n</i> = 781)	Non-professional	29.7	4.00	2.00 – 6.00	78581.500	N/A	< <b>0.001</b>
		Professional	70.3	5.00	3.00 – 7.00			

\*Median number of total owner-reported problem behaviours.



## Supplementary Table S3: Total number of owner-reported separation-related behaviours, univariable analysis

**Table S3.** Descriptive and univariable analysis of owner-reported separation-related behaviour cases at 21 months.

Descriptive and univariable binary logistic regression analysis of the binary categorisation of separation-related behaviour cases based upon nine commonly reported separation-related behaviours presented to owners. Dogs not displaying individual behaviour(s) in either context were coded as '0'; those who only displayed an individual behaviour(s) whilst left alone were coded as '1'. Dogs displaying individual behaviour(s) in both contexts were coded as '2', whilst those dogs only displaying individual behaviour(s) whilst relaxing were coded as '3'. To be coded as a 'case' at least one behaviour was a '1', any/all of the remaining behaviours could be a '2' or a '3'. \*95% confidence interval. Significant results are emboldened. ~ No analysis possible.

	Variable	Category	<i>n</i> (not a case; case)	% (case)	Odds Ratio	95% CI*	<i>p</i> -Value
Owner/ household demographics	First-time dog owner ( <i>n</i> = 788)	No	359; 125	25.8		Ref	
		Yes	<b>185; 119</b>	<b>39.1</b>	<b>1.847</b>	<b>1.359 – 2.512</b>	<b>&lt; 0.001</b>
	Owner age ( <i>n</i> = 788)	18-24 years	23; 13	36.1	1.422	0.677 – 2.990	0.353
		<b>25-34 years</b>	<b>85; 65</b>	<b>43.3</b>	<b>1.925</b>	<b>1.239 – 2.989</b>	<b>0.004</b>
		35-44 years	103; 50	32.7	1.222	0.778 – 1.918	0.384
		45-54 years	151; 60	28.4		Ref	
		55-64 years	111; 39	26.0	0.884	0.552 – 1.417	0.609
		65-74 years	64; 16	20.0	0.629	0.337 – 1.174	0.146
		≥ 75 years	7; 1	12.5	0.360	0.043 – 2.985	0.343
	Owner gender ( <i>n</i> = 789)	Female	493; 223	31.1		Ref	
		Male	52; 21	28.8	0.893	0.525 – 1.518	0.675
	Child ≤ 16 years in household (in 2020) ( <i>n</i> = 788)	No	397; 174	30.5		Ref	
		Yes	148; 69	31.8	1.064	0.760 – 1.490	0.719
	Employed in animal care/veterinary sector ( <i>n</i> = 789)	No	505; 229	31.2		Ref	
		Yes	40; 15	27.3	0.827	0.448 – 1.527	0.544
	Another dog(s) in household (in 2020) ( <i>n</i> = 781)	No	361; 202	35.9		Ref	
		Yes	<b>177; 41</b>	<b>18.8</b>	<b>0.414</b>	<b>0.283 – 0.606</b>	<b>&lt; 0.001</b>
	Current working location of owner ( <i>n</i> = 778)	At home	116; 59	33.7	0.893	0.595 – 1.341	0.585
		Away from home	123; 46	27.2	0.657	0.429 – 1.006	0.053
		At and away from home	158; 90	36.3		Ref	
		Unemployed	17; 9	34.6	0.929	0.398 – 2.171	0.866
		<b>Retired</b>	<b>124; 36</b>	<b>22.5</b>	<b>0.510</b>	<b>0.324 – 0.801</b>	<b>0.004</b>

Table S3. Contd...

	Variable	Category	n (not a case; case)	% (case)	Odds Ratio	95% CI*	p-Value
<b>Owner/ household demographics</b>	Current working location of other household members (n = 674)	At home	84; 42	33.3	1.075	0.671 – 1.720	0.764
		Away from home	147; 75	33.8	1.097	0.734 – 1.639	0.653
		At and away from home	144; 67	31.8		Ref	
		Unemployed	7; 3	30.0	0.921	0.231 – 3.673	0.907
		<b>Retired</b>	<b>89; 16</b>	<b>15.2</b>	<b>0.386</b>	<b>0.211 – 0.708</b>	<b>0.002</b>
	Owner lives alone/only adult in the household (n = 778)	No	469; 201	30.0		Ref	
		Yes	69; 39	36.1	1.319	0.861 – 2.019	0.203
<b>Dog demographics</b>	Dog sex (n = 788)	Female	263; 108	29.1		Ref	
		Male	281; 136	32.6	1.179	0.870 – 1.596	0.289
	Neutered (n = 789)	No	234; 89	27.6		Ref	
		Yes	311; 155	33.3	1.310	0.960 – 1.788	0.088
	Breed designation (n = 789)	Crossbred	24; 10	29.4		Ref	
		Purebred	391; 153	28.1	0.939	0.439 – 2.010	0.872
		Designer Crossbred	130; 81	38.4	1.495	0.680 – 3.289	0.317
	Breed (n = 789)	Other Crossbred	87; 45	34.1		Ref	
		Cockapoo	45; 31	40.8	1.332	0.744 – 2.384	0.335
		Labradoodle	14; 9	39.1	1.243	0.500 – 3.092	0.640
		Cavapoo	8; 6	42.9	1.450	0.474 – 4.435	0.515
		Labrador Retriever	61; 22	26.5	0.697	0.380 – 1.278	0.243
		Cocker Spaniel	35; 21	37.5	1.160	0.606 – 2.222	0.654
		Border Collie	18; 11	37.9	1.181	0.514 – 2.715	0.694
		Miniature Smooth-Haired Dachshund	18; 7	28.0	0.752	0.292 – 1.933	0.554
		Border Terrier	14; 7	33.3	0.967	0.364 – 2.566	0.946
		Golden Retriever	20; 5	20.0	0.483	0.170 – 1.373	0.172
		Whippet	12; 7	36.8	1.128	0.415 – 3.063	0.814
		English Springer Spaniel	12; 6	33.3	0.967	0.340 – 2.746	0.949
		Other Purebred	201; 67	25.0	0.644	0.409 – 1.015	0.058

Table S3. Contd...

	Variable	Category	n (not a case; case)	% (case)	Odds Ratio	95% CI*	p-Value
<b>Dog demographics</b>	Breed group (n = 789)	Not KC recognised	161; 91	36.1		Ref	
		<b>Gundog</b>	<b>169; 64</b>	<b>27.5</b>	<b>0.670</b>	<b>0.456 – 0.985</b>	<b>0.042</b>
		Hound	49; 25	33.8	0.903	0.523 – 1.558	0.713
		Pastoral	41; 17	29.3	0.734	0.394 – 1.365	0.328
		Terrier	47; 15	24.2	0.565	0.299 – 1.066	0.078
		Toy	14; 7	33.3	0.885	0.345 – 2.271	0.799
		Utility	42; 15	26.3	0.632	0.332 – 1.202	0.162
		Working	22; 10	31.3	0.804	0.365 – 1.773	0.589
	Typical adult bodyweight (n = 758)	≤ 10 kg	99; 41	29.3	0.740	0.481 – 1.139	0.171
		10 to < 20 kg	202; 113	35.9		Ref	
		20 to < 30 kg	126; 50	28.4	0.709	0.475 – 1.059	0.093
		<b>30 to &lt; 40 kg</b>	<b>90; 24</b>	<b>21.1</b>	<b>0.477</b>	<b>0.287 – 0.790</b>	<b>0.004</b>
		≥ 40 kg	9; 4	30.8	0.794	0.239 – 2.638	0.707
<b>Purchase behaviours</b>	Via animal-specific selling website (n = 788)	No	278; 97	25.9		Ref	
		<b>Yes</b>	<b>266; 147</b>	<b>35.6</b>	<b>1.584</b>	<b>1.166 – 2.152</b>	<b>0.003</b>
	Viewed in person prior to purchase (n = 789)	No	164; 69	29.6		Ref	
		Yes	381; 175	31.5	1.092	0.782 – 1.524	0.606
<b>Potentially illegal sales indicators</b>	Sold without dam present (n = 788)	No	431; 189	30.5		Ref	
		Yes	113; 55	32.7	1.110	0.771 – 1.599	0.575
	Sold outside breeders' home (n = 789)	No	337; 164	32.7		Ref	
		Yes	208; 80	27.8	0.790	0.575 – 1.087	0.147
	Sold without a microchip (n = 775)	No	509; 232	31.3		Ref	
		Yes	25; 9	26.5	0.790	0.363 – 1.719	0.552
	Sold < 6 weeks of age (n = 788)	No	544; 243	30.9		Ref	
		Yes	0; 1	100.0	~	~	~
	Sold with passport < 13 weeks of age (n = 719)	No	467; 213	31.3		Ref	
		Yes	28; 11	28.2	0.861	0.421 – 1.763	0.683
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes (n = 788)	No	318; 138	30.3		Ref	
		Yes, in person	186; 86	31.6	1.065	0.770 – 1.474	0.702
		Yes, online	41; 19	31.7	1.068	0.598 – 1.906	0.824
	Deliberately left at home alone (n = 691)	No	68; 41	62.4; 37.6		Ref	
		Yes	414; 168	71.1; 28.9	0.673	0.439 – 1.032	0.069

Table S3. Contd...

	Variable	Category	<i>n</i> (not a case; case)	% (case)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Adult management</b>	Attended adult classes ( <i>n</i> = 789)	No	290; 148	33.8		Ref	
		Yes, in person	234; 90	27.8	0.754	0.551 – 1.031	0.077
		Yes, online	21; 6	22.2	0.560	0.221 – 1.417	0.221
	Owner training method ( <i>n</i> = 766)	Rewards-based only	98; 39	28.5		Ref	
		Rewards-based & 1 aversive	106; 44	29.3	1.043	0.626 – 1.739	0.872
		Rewards-based & > 1 aversive	321; 158	33.0	1.237	0.815 – 1.877	0.318
		Aversive only	0; 0	0.0	~	~	~
	Owner response to SRB ( <i>n</i> = 212)	No response	32; 73	69.5		Ref	
		Positive response	26; 56	68.3	0.944	0.506 – 1.762	0.857
		Aversive response	7; 13	65.0	0.814	0.297 – 2.232	0.689
		Mixed response	1; 4	80.0	1.753	0.188 – 16.312	0.622
	Exercise frequency (walks) ( <i>n</i> = 785)	Never	0; 0	0.0	~	~	~
		< Once a week	0; 2	100.0	~	~	~
		Once a week	1; 0	0.0	~	~	~
		Several times per week	26; 18	40.9	1.594	0.839 – 3.028	0.154
		Once per day	146; 71	32.7	1.120	0.780 – 1.608	0.540
		Twice per day	251; 109	30.3		Ref	
		> Twice per day	118; 43	26.7	0.839	0.554 – 1.271	0.408
	Exercise frequency (off lead) ( <i>n</i> = 783)	Never	28; 14	33.3	0.970	0.485 – 1.941	0.932
		< Once a week	20; 8	28.6	0.776	0.328 – 1.836	0.564
		Once a week	19; 8	29.6	0.817	0.343 – 1.944	0.648
		Several times per week	93; 36	27.9	0.751	0.471 – 1.197	0.229
		Once per day	163; 84	34.0		Ref	
		Twice per day	134; 61	31.3	0.883	0.591 – 1.319	0.545
		> Twice per day	83; 32	27.8	0.784	0.460 – 1.216	0.241
	Time left alone ( <i>n</i> = 789)	Never	48; 34	41.5		Ref	
		Up to 1 hour	89; 53	37.3	0.841	0.482 – 1.465	0.540
		<b>1 to 4 hours</b>	<b>333; 129</b>	<b>27.9</b>	<b>0.547</b>	<b>0.337 – 0.887</b>	<b>0.015</b>
		<b>Over 4 hours</b>	<b>75; 28</b>	<b>27.2</b>	<b>0.527</b>	<b>0.284 – 0.977</b>	<b>0.042</b>

Table S3. Contd...

	Variable	Category	n (not a case; case)	% (case)	Odds Ratio	95% CI*	p-Value
<b>Adult management</b>	Change in time left alone from < 16 weeks (n = 774)	Same amount of time	218; 96	30.6		Ref	
		<b>Less time</b>	<b>9; 15</b>	<b>62.5</b>	<b>3.785</b>	<b>1.601 – 8.949</b>	<b>0.002</b>
		More time ≤ 4 hours	239; 101	29.7	0.960	0.687 – 1.341	0.809
		More time > 4 hours	69; 27	28.1	0.889	0.536 – 1.473	0.647
	Location left alone (n = 768)	A crate/indoor kennel (door closed)	85; 30	26.1	0.747	0.470 – 1.186	0.215
		Loose in a single room	152; 66	30.3	0.918	0.646 – 1.306	0.636
		Loose in multiple rooms	294; 139	32.1		Ref	
		Outdoor kennel (door closed)	1; 0	0.0	~	~	~
		Outdoor kennel (door open)	0; 0	0.0	~	~	~
		Loose in an enclosed outdoor space	1; 0	0.0	~	~	~
	General advice source for training and behaviour (n = 778)	Non-professional	176; 58	24.8		Ref	
		<b>Professional</b>	<b>364; 180</b>	<b>33.1</b>	<b>1.501</b>	<b>1.061 – 2.122</b>	<b>0.022</b>
<b>Dog behaviour</b>	Total number of owner-reported undesirable behaviours (n = 726)	/	/	/	<b>1.126</b>	<b>1.069 – 1.186</b>	<b>&lt; 0.001</b>
	Control behaviour score (n = 769)	0	95; 28	22.8		Ref	
		<b>1+</b>	<b>436; 210</b>	<b>32.5</b>	<b>1.634</b>	<b>1.039 – 2.569</b>	<b>0.033</b>
	Attention seeking behaviour score (n = 765)	0	145; 28	16.2		Ref	
		<b>1+</b>	<b>389; 203</b>	<b>34.3</b>	<b>2.702</b>	<b>1.743 – 4.191</b>	<b>&lt; 0.001</b>
	Aggressive behaviour score (n = 779)	0	415; 172	29.3		Ref	
		<b>1+</b>	<b>124; 68</b>	<b>35.4</b>	<b>1.323</b>	<b>0.937 – 1.868</b>	<b>0.112</b>
	Fear/avoidance behaviour score (n = 776)	0	340; 121	26.2		Ref	
		<b>1+</b>	<b>197; 118</b>	<b>37.5</b>	<b>1.683</b>	<b>1.236 – 2.291</b>	<b>&lt; 0.001</b>
	Reaction to familiar people (n = 783)	0	515; 224	30.3		Ref	
		<b>1+</b>	<b>28; 16</b>	<b>36.4</b>	<b>1.314</b>	<b>0.697 – 2.477</b>	<b>0.399</b>
	Reaction to unfamiliar people (n = 782)	0	435; 181	29.4		Ref	
		<b>1+</b>	<b>106; 60</b>	<b>36.1</b>	<b>1.360</b>	<b>0.948 – 1.952</b>	<b>0.095</b>
	Reaction to other dogs (n = 780)	0	427; 183	30.0		Ref	
		<b>1+</b>	<b>113; 57</b>	<b>33.5</b>	<b>1.177</b>	<b>0.819 – 1.691</b>	<b>0.378</b>

## Supplementary Table S4: Owner training method score, descriptive and univariable analysis

**Table S4.** Descriptive and univariable analysis of owner training methods at 21 months.

Descriptive and univariable analysis of the binary categorisation of 27 training methods/aids presented to participants in response to the question “*Have you or anyone in your household ever used any of the following aids or methods on/with your dog, to try and change any aspect of their behaviour?*”. Methods/aids were allocated to the four quadrants of operant conditioning and categorised as rewards-based (positive reinforcement/negative punishment) or aversive (negative reinforcement/positive punishment). An additional reward method/aid and an additional aversive method/aid from qualitative content analysis of free-text responses was also included. Owners who reported using only positive reinforcement or negative punishment aids/methods were categorised as rewards-based only. Those using a mix of all four operant conditioning quadrants were categorised as mixed. No respondents reported using only negative reinforcement or positive punishment (aversive only). Significant results are emboldened. ~ No analysis possible.

Variable	Category	<i>n</i> (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Owner/ household demographics</b>	First-time dog owner ( <i>n</i> = 895)	No	92; 455	83.2	Ref	
		Yes	65; 283	81.3	0.880	0.620 – 1.250
	Owner age ( <i>n</i> = 894)	18-24 years	5; 32	86.5	1.108	0.405 – 3.031
		25-34 years	31; 139	81.8	0.776	0.459 – 1.313
		35-44 years	37; 131	78.0	0.613	0.369 – 1.019
		45-54 years	36; 208	85.2	Ref	
		55-64 years	32; 135	80.8	0.730	0.433 – 1.232
		65-74 years	13; 81	86.2	1.078	0.544 – 2.138
		≥ 75 years	2; 12	85.7	1.038	0.223 – 4.835
	Owner gender ( <i>n</i> = 895)	Female	145; 666	82.1	Ref	
		Male	11; 73	86.9	1.445	0.748 – 2.792
	Child ≤ 16 years in household (in 2020) ( <i>n</i> = 895)	No	114; 539	82.5	Ref	
		Yes	43; 199	82.2	0.979	0.665 – 1.441
	Employed in animal care/veterinary sector ( <i>n</i> = 896)	No	147; 684	82.3	Ref	
		Yes	10; 55	84.6	1.182	0.589 – 2.373
	Another dog(s) in household (in 2020) ( <i>n</i> = 886)	No	110; 540	83.1	Ref	
		Yes	43; 193	81.8	0.914	0.620 – 1.349

Table S4. Contd...

	Variable	Category	<i>n</i> (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Owner/ household demographics</b>	Current working location of owner ( <i>n</i> = 848)	At home	28; 169	85.8	1.360	0.818 – 2.260	0.235
		Away from home	35; 142	80.2	0.914	0.563 – 1.484	0.717
		At and away from home	48; 213	81.6	Ref		
		Unemployed	5; 22	81.5	0.992	0.357 – 2.751	0.987
		Retired	33; 153	82.3	1.045	0.640 – 1.705	0.861
	Current working location of other household members ( <i>n</i> = 741)	At home	24; 119	83.2	0.887	0.501 – 1.570	0.681
		Away from home	51; 193	83.2	0.677	0.420 – 1.092	0.110
		At and away from home	34; 190	84.8	Ref		
		Unemployed	1; 9	90.0	1.611	0.198 – 13.125	0.656
		Retired	18; 102	85.0	1.014	0.546 – 1.885	0.965
	Owner lives alone/only adult in the household ( <i>n</i> = 849)	No	126; 609	82.9	Ref		
		Yes	23; 91	79.8	0.819	0.498 – 1.344	0.429
<b>Dog demographics</b>	Dog sex ( <i>n</i> = 895)	Female	84; 345	80.4	Ref		
		Male	73; 393	84.3	1.311	0.928 – 1.851	0.125
	Neutered ( <i>n</i> = 896)	No	69; 301	81.4	Ref		
		Yes	88; 438	83.3	1.141	0.806 – 1.615	0.457
	Breed purity designation ( <i>n</i> = 896)	Crossbred	6; 33	84.6	Ref		
		Purebred	104; 514	83.2	0.899	0.367 – 2.199	0.815
		Designer Crossbred	47; 192	80.3	0.743	0.294 – 1.876	0.529
	Top 12 most common breeds at 21 months ( <i>n</i> = 896)	Crossbred	6; 33	84.6	Ref		
		Cockapoo	15; 73	83.0	0.885	0.315 – 2.484	0.816
		Labradoodle	5; 20	80.0	0.727	0.196 – 2.696	0.634
		Cavapoo	3; 13	81.3	0.788	0.171 – 3.629	0.760
		Labrador Retriever	9; 88	90.7	1.778	0.587 – 5.382	0.309
		Cocker Spaniel	11; 52	82.5	0.860	0.290 – 2.547	0.785
		Border Collie	2; 29	93.5	2.636	0.493 – 14.093	0.257
		Miniature Smooth-Haired Dachshund	8; 18	69.2	0.409	0.123 – 1.364	0.146
		Border Terrier	2; 23	92.0	2.091	0.387 – 11.292	0.391
		Golden Retriever	3; 24	88.9	1.455	0.330 – 6.404	0.620
		Whippet	6; 13	68.4	0.394	0.107 – 1.447	0.160
		English Springer Spaniel	1; 19	95.0	3.455	0.386 – 30.897	0.267
		Other	86; 334	79.5	0.706	0.287 – 1.740	0.449

Table S4. Contd...

	Variable	Category	<i>n</i> (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Dog demographics</b>	Breed group ( <i>n</i> = 896)	Not KC recognised	55; 231	80.8		Ref	
		<b>Gundog</b>	<b>31; 235</b>	<b>88.3</b>	<b>1.805</b>	<b>1.121 – 2.906</b>	<b>0.015</b>
		Hound	20; 62	75.6	0.738	0.412 – 1.323	0.308
		<b>Pastoral</b>	<b>5; 58</b>	<b>92.1</b>	<b>2.762</b>	<b>1.058 – 7.211</b>	<b>0.038</b>
		Terrier	15; 63	80.8	1.000	0.530 – 1.888	1.000
		Toy	8; 16	66.7	0.476	0.194 – 1.169	0.105
		Utility	13; 50	79.4	0.916	0.465 – 1.803	0.799
		Working	10; 24	70.6	0.571	0.258 – 1.264	0.167
	Typical adult bodyweight ( <i>n</i> = 863)	≤ 10 kg	43; 128	74.9	0.671	0.432 – 1.041	0.075
		10 to < 20 kg	64; 284	81.6		Ref	
		20 to < 30 kg	29; 171	85.5	1.329	0.824 – 2.143	0.244
		<b>30 to &lt; 40 kg</b>	<b>13; 115</b>	<b>89.8</b>	<b>1.993</b>	<b>1.057 – 3.759</b>	<b>0.033</b>
		≥ 40 kg	4; 12	75.0	0.676	0.211 – 2.164	0.510
<b>Purchase motivations for a dog/for breed chosen</b>	Dog to improve mental health ( <i>n</i> = 896)	No	87; 363	80.7		Ref	
		Yes	70; 376	84.3	1.287	0.911 – 1.820	0.153
	Breed size suited to my lifestyle ( <i>n</i> = 896)	No	44; 234	84.2		Ref	
		Yes	113; 505	81.7	0.840	0.574 – 1.230	0.371
	Breed good with children ( <i>n</i> = 896)	No	78; 413	84.1		Ref	
		Yes	79; 326	80.5	0.779	0.552 – 1.100	0.157
	Breed easy to train ( <i>n</i> = 896)	No	97; 372	79.3		Ref	
		<b>Yes</b>	<b>60; 367</b>	<b>85.9</b>	<b>1.595</b>	<b>1.121 – 2.270</b>	<b>0.009</b>
	Friends or family own this breed/crossbreed ( <i>n</i> = 896)	No	120; 562	82.4		Ref	
		Yes	37; 177	82.7	1.021	0.681 – 1.532	0.918
	Respondent driving force to get a dog ( <i>n</i> = 878)	No	86; 428	83.3		Ref	
		Yes	69; 295	81.0	0.859	0.606 – 1.219	0.395
	Had more time for a dog due to COVID-19 pandemic ( <i>n</i> = 372)	No	10; 39	79.6		Ref	
		Yes	54; 269	83.3	1.277	0.601 – 2.714	0.524
<b>Pre-purchase research</b>	Research conducted ( <i>n</i> = 895)	No	59; 312	84.1		Ref	
		Yes	98; 426	81.3	0.822	0.577 – 1.172	0.278
<b>Purchase behaviours</b>	Via animal-specific selling website ( <i>n</i> = 895)	No	81; 362	81.7		Ref	
		Yes	76; 376	83.2	1.107	0.784 – 1.563	0.563
	Viewed in person prior to purchase ( <i>n</i> = 896)	No	53; 219	80.5		Ref	
		Yes	104; 520	83.3	1.210	0.839 – 1.746	0.308



Table S4. Contd...

	Variable	Category	<i>n</i> (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Potentially illegal sales indicators</b>	Sold without dam present ( <i>n</i> = 895)	No	127; 577	82.0		Ref	
		Yes	30; 161	84.3	1.181	0.765 – 1.824	0.453
	Sold outside breeders' home ( <i>n</i> = 896)	No	109; 452	80.6		Ref	
		Yes	48; 287	85.7	1.442	0.996 – 2.088	0.053
	Sold without a microchip ( <i>n</i> = 879)	No	150; 691	82.2		Ref	
		Yes	5; 33	86.8	1.433	0.550 – 3.731	0.461
	Sold < 6 weeks of age ( <i>n</i> = 895)	No	157; 736	82.4		Ref	
		Yes	0; 2	100.0	~	~	~
<b>Owner expectations</b>	Behaviour ( <i>n</i> = 860)	As expected/better	135; 593	81.5		Ref	
		Worse	17; 115	87.1	1.540	0.895 – 2.649	0.119
	Training/maintaining obedience ( <i>n</i> = 889)	As expected/easier	118; 471	80.0		Ref	
		<b>Harder</b>	<b>38; 262</b>	<b>87.3</b>	<b>1.727</b>	<b>1.163 – 2.565</b>	<b>0.007</b>
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes ( <i>n</i> = 895)	No	82; 431	84.0		Ref	
		Yes, in person	52; 260	83.3	0.951	0.651 – 1.391	0.797
		<b>Yes, online</b>	<b>23; 47</b>	<b>67.1</b>	<b>0.389</b>	<b>0.224 – 0.675</b>	<b>&lt; 0.001</b>
<b>Adult management</b>	Attended adult classes ( <i>n</i> = 896)	No	96; 395	80.4		Ref	
		Yes, in person	54; 315	85.4	1.418	0.984 – 2.042	0.061
		Yes, online	7; 29	80.6	1.007	0.428 – 2.367	0.987
	Exercise frequency (walks) ( <i>n</i> = 860)	Never	0; 1	100.0	~	~	~
		< Once a week	0; 3	100.0	~	~	~
		Once a week	1; 2	66.7	0.426	0.038 – 4.764	0.488
		Several times per week	9; 36	80.0	0.852	0.392 – 1.850	0.685
		Once per day	43; 186	81.2	0.921	0.604 – 1.404	0.703
		Twice per day	69; 324	82.4		Ref	
		> Twice per day	31; 155	83.3	1.065	0.669 – 1.695	0.791
	Exercise frequency (off lead) ( <i>n</i> = 858)	Never	12; 38	76.0	0.619	0.299 – 1.280	0.196
		< Once a week	3; 26	89.7	1.694	0.491 – 5.848	0.404
		Once a week	3; 24	88.9	1.564	0.451 – 5.425	0.481
		Several times per week	26; 115	81.6	0.865	0.506 – 1.478	0.595
		Once per day	43; 220	83.7		Ref	
		Twice per day	41; 178	81.3	0.849	0.530 – 1.359	0.495
		> Twice per day	25; 104	80.6	0.813	0.471 – 1.403	0.457

Table S4. Contd...

	Variable	Category	n (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	p-Value
Adult management	Time left alone (n = 869)	Never	17; 83	83.0		Ref	
		Up to 1 hour	36; 121	77.1	0.688	0.363 – 1.307	0.254
		1 to 4 hours	91; 411	81.9	0.925	0.524 – 1.634	0.788
		Over 4 hours	10; 100	90.9	2.048	0.890 – 4.714	0.092
	Location left alone (n = 833)	<b>A crate/indoor kennel (door closed)</b>	<b>16; 114</b>	<b>87.7</b>	<b>1.800</b>	<b>1.018 – 3.184</b>	<b>0.043</b>
		Loose in a single room	37; 197	84.2	1.345	0.866 – 2.043	0.164
		Loose in multiple rooms	94; 372	79.8		Ref	
		Outdoor kennel (door closed)	0; 1	100.0	~	~	~
		Outdoor kennel (door open)	0; 1	100.0	~	~	~
		Loose in an enclosed outdoor space	0; 1	100.0	~	~	~
	Change in time left alone from < 16 weeks (n = 840)	Same amount of time	67; 282	80.8		Ref	
		Less time	4; 23	85.2	1.366	0.457 – 4.082	0.576
		More time ≤ 4 hours	66; 298	81.9	1.073	0.736 – 1.564	0.715
		<b>More time &gt; 4 hours</b>	<b>10; 90</b>	<b>90.0</b>	<b>2.138</b>	<b>1.056 – 4.330</b>	<b>0.035</b>
	General advice source for training and behaviour (n = 864)	Non-professional	48; 204	81.0		Ref	
		Professional	107; 505	82.5	1.111	0.761 – 1.620	0.586
	Respondent primary carer for dog (n = 895)	Shares care	60; 328	84.5		Ref	
		No	1; 3	75.0	0.549	0.056 – 5.364	0.606
		Yes	95; 408	81.1	0.786	0.551 – 1.120	0.182
Dog behaviour	Total number of owner-reported undesirable behaviours (n = 762)	/	/	/	<b>1.217</b>	<b>1.129 – 1.311</b>	<b>&lt; 0.001</b>
		/	/	/			
	Control behaviour score (n = 854)	0	45; 89	66.4		Ref	
		<b>1+</b>	<b>107; 613</b>	<b>85.1</b>	<b>2.897</b>	<b>1.916 – 4.379</b>	<b>&lt; 0.001</b>
	Attention seeking behaviour score (n = 812)	0	45; 137	75.3		Ref	
		<b>1+</b>	<b>97; 533</b>	<b>84.6</b>	<b>1.805</b>	<b>1.210 – 2.693</b>	<b>0.004</b>
	Aggressive behaviour score (n = 866)	0	127; 523	80.5		Ref	
		<b>1+</b>	<b>25; 191</b>	<b>88.4</b>	<b>1.855</b>	<b>1.171 – 2.938</b>	<b>0.008</b>
	Fear/avoidance behaviour score (n = 861)	0	98; 402	80.4		Ref	
		<b>1+</b>	<b>54; 307</b>	<b>85.0</b>	<b>1.386</b>	<b>0.963 – 1.994</b>	<b>0.079</b>
	Reaction to familiar people (n = 868)	0	151; 667	81.5		Ref	
		<b>1+</b>	<b>2; 48</b>	<b>96.0</b>	<b>5.433</b>	<b>1.306 – 22.601</b>	<b>0.020</b>

Table S4. Contd...

	Variable	Category	<i>n</i> (reward only; mixed)	% (mixed)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Dog behaviour</b>	Reaction to unfamiliar people ( <i>n</i> = 872)	0	134; 555	80.6		Ref	
		1+	<b>20; 163</b>	<b>89.1</b>	<b>1.968</b>	<b>1.192 – 3.248</b>	<b>0.008</b>
	Reaction to other dogs ( <i>n</i> = 869)	0	131; 547	80.7		Ref	
		1+	<b>23; 168</b>	<b>88.0</b>	<b>1.749</b>	<b>1.087 – 2.815</b>	<b>0.021</b>
	SRB case ( <i>n</i> = 766)	No	998; 427	81.3		Ref	
		Yes	39; 202	83.8	1.189	0.791 – 1.786	0.405

## Supplementary Table S5: Owner sources of advice for general training and behaviour queries, descriptive and univariate logistic regression analysis

**Table S5. Descriptive and univariable analysis of categorical variables and owner sources of advice for their dog's behaviour and training queries during the first 21 months.**

Descriptive and univariable binary logistic regression analysis of dogs whose owners responded to the question “Where have you sought information about any aspect of your dog's general behaviour or training since the last survey?”. Responses were categorised as a binary outcome as to whether they sought professional advice where “A veterinary professional (e.g., veterinary surgeon, veterinary nurse)”, “Dog trainer” or “Dog behaviourist” were coded separately from all other advice sources, which were coded together as one outcome along with four additional sources from qualitative content analysis of free-text responses. Owners who had answered “I can't remember” were reclassified as missing data. \*95% confidence interval. Significant results are emboldened. ~ No analysis possible.

	Variable	Category	n (professional; other)	% (professional)	Odds Ratio	95% CI*	p-Value
Owner/ household demographics	First-time dog owner (n = 890)	No	359; 189	65.5		Ref	
		Yes	<b>267; 75</b>	<b>78.1</b>	<b>1.874</b>	<b>1.373 – 2.558</b>	<b>&lt; 0.001</b>
	Owner age (n = 889)	18-24 years	30; 7	81.1	1.661	0.697 – 3.959	0.252
		25-34 years	125; 44	74.0	1.101	0.708 – 1.713	0.669
		35-44 years	121; 44	73.3	1.066	0.684 – 1.660	0.777
		45-54 years	178; 69	72.1		Ref	
		55-64 years	109; 53	67.3	0.797	0.519 – 1.226	0.302
		<b>65-74 years</b>	<b>53; 43</b>	<b>55.2</b>	<b>0.478</b>	<b>0.293 – 0.779</b>	<b>0.003</b>
		≥ 75 years	9; 4	69.2	0.872	0.260 – 2.925	0.825
	Owner gender (n = 890)	Female	575; 233	71.2		Ref	
		Male	51; 31	62.2	0.667	0.416 – 1.068	0.092
	Child ≤ 16 years in household (in 2020; n = 890)	No	458; 193	70.4		Ref	
		Yes	168; 71	70.3	0.997	0.721 – 1.379	0.986
	Employed in animal care/veterinary sector (n = 891)	No	579; 250	69.8		Ref	
		Yes	48; 14	77.4	1.480	0.802 – 2.734	0.210
	Another dog(s) in household (in 2020) (n = 881)	No	465; 174	72.8		Ref	
		Yes	<b>157; 85</b>	<b>64.9</b>	<b>0.691</b>	<b>0.504 – 0.948</b>	<b>0.022</b>

Table S5. Contd...

	Variable	Category	<i>n</i> (professional; other)	% (professional)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Owner/ household demographics</b>	Current working location of owner ( <i>n</i> = 863)	At home	149; 49	75.3	1.119	0.733 – 1.706	0.603
		Away from home	126; 58	68.5	0.799	0.529 – 1.208	0.288
		At and away from home	193; 71	73.1		Ref	
		Unemployed	23; 7	76.7	1.209	0.497 – 2.940	0.676
		<b>Retired</b>	<b>120; 67</b>	<b>64.2</b>	<b>0.659</b>	<b>0.440 – 0.987</b>	<b>0.043</b>
	Current working location of other household members ( <i>n</i> = 751)	At home	103; 39	72.5	0.886	0.551 – 1.424	0.616
		Away from home	174; 73	70.4	0.799	0.533 – 1.199	0.279
		At and away from home	170; 57	74.9		Ref	
		Unemployed	7; 3	70.0	0.782	0.196 – 3.127	0.728
		Retired	83; 42	66.4	0.663	0.411 – 1.068	0.091
<b>Dog demographics</b>	Owner lives alone/only adult in the household ( <i>n</i> = 864)	No	532; 213	71.4		Ref	
		Yes	79; 40	66.4	0.791	0.524 – 1.194	0.264
	Dog sex ( <i>n</i> = 890)	Female	290; 131	68.9		Ref	
		Male	336; 28.4	71.6	1.141	0.856 – 1.522	0.369
	Neutered ( <i>n</i> = 891)	No	247; 122	66.9		Ref	
		Yes	380; 142	72.8	1.322	0.898 – 1.767	0.060
	Breed purity designation ( <i>n</i> = 891)	Crossbred	26; 12	68.4		Ref	
		Purebred	440; 176	71.4	1.154	0.570 – 2.042	0.691
		Designer Crossbred	161; 76	67.9	0.978	0.468 – 2.042	0.952
	Top 12 most common breeds at 21 months ( <i>n</i> = 891)	Crossbred	26; 12	68.4		Ref	
		Cockapoo	62; 22	73.8	1.301	0.562 – 3.011	0.539
		Labradoodle	16; 10	61.5	0.738	0.260 – 2.100	0.570
		Cavapoo	14; 4	77.8	1.615	0.438 – 5.956	0.471
		Labrador Retriever	72; 23	75.8	1.445	0.630 – 3.312	0.385
		Cocker Spaniel	44; 18	71.0	1.128	0.470 – 2.711	0.787
		Border Collie	24; 8	75.0	1.385	0.483 – 3.967	0.545
		Miniature Smooth-Haired Dachshund	19; 8	70.4	1.096	0.375 – 3.204	0.867
		Border Terrier	16; 10	61.5	0.738	0.260 – 2.100	0.570
		Golden Retriever	22; 5	81.5	2.031	0.619 – 6.660	0.242
		Whippet	16; 5	76.2	1.477	0.438 – 4.978	0.529
		English Springer Spaniel	18; 0	100.0	~	~	~
		Other	278; 139	66.7	0.923	0.452 – 1.884	0.826

Table S5. Contd...

	Variable	Category	<i>n</i> (professional; other)	% (professional)	Odds Ratio	95% CI*	<i>p</i> -Value
Dog demographics	Breed group ( <i>n</i> = 891)	Not KC recognised	195; 88	68.9		Ref	
		<b>Gundog</b>	<b>199; 60</b>	<b>76.8</b>	<b>1.497</b>	<b>1.021 – 2.195</b>	<b>0.039</b>
		Hound	58; 26	69.0	1.007	0.595 – 1.705	0.980
		Pastoral	44; 18	71.0	1.103	0.603 – 2.017	0.750
		Terrier	54; 29	65.1	0.840	0.501 – 1.409	0.509
		Toy	16; 8	66.7	0.903	0.372 – 2.187	0.820
		Utility	39; 23	62.9	0.765	0.431 – 1.358	0.360
		Working	22; 12	64.7	0.827	0.392 – 1.746	0.619
	Typical adult bodyweight ( <i>n</i> = 860)	≤ 10 kg	123; 51	70.7	1.042	0.699 – 1.553	0.839
		10 to < 20 kg	243; 105	69.8		Ref	
		20 to < 30 kg	146; 53	73.4	1.190	0.807 – 1.756	0.380
		30 to < 40 kg	89; 36	71.2	1.068	0.681 – 1.675	0.774
		≥ 40 kg	7; 7	50.0	0.432	0.148 – 1.263	0.125
	Insured ( <i>n</i> = 891)	No	76; 36	67.9		Ref	
		Yes	551; 228	70.7	1.145	0.748 – 1.752	0.534
Purchase motivations for a dog/for breed chosen	Dog to improve mental health ( <i>n</i> = 891)	No	307; 143	68.2		Ref	
		Yes	320; 121	72.6	1.232	0.923 – 1.644	0.156
	Breed size suited to my lifestyle ( <i>n</i> = 891)	No	190; 94	66.9		Ref	
		Yes	437; 170	72.0	1.272	0.938 – 1.724	0.121
	Breed good with children ( <i>n</i> = 891)	No	347; 142	71.0		Ref	
		Yes	280; 122	69.7	0.939	0.704 – 1.254	0.670
	Breed easy to train ( <i>n</i> = 891)	No	313; 153	67.2		Ref	
		<b>Yes</b>	<b>314; 111</b>	<b>73.9</b>	<b>1.383</b>	<b>1.034 – 1.848</b>	<b>0.029</b>
	Friends or family own this breed/crossbreed ( <i>n</i> = 891)	No	468; 210	69.0		Ref	
		Yes	159; 54	74.6	1.321	0.932 – 1.873	0.118
Pre-purchase research	Respondent driving force to get a dog ( <i>n</i> = 873)	No	353; 161	68.7		Ref	
		Yes	263; 96	73.3	1.249	0.927 – 1.685	0.144
	Had more time for a dog due to COVID-19 pandemic ( <i>n</i> = 363)	No	26; 24	52.0		Ref	
		<b>Yes</b>	<b>243; 70</b>	<b>77.6</b>	<b>3.204</b>	<b>1.732 – 5.928</b>	<b>&lt; 0.001</b>
Pre-purchase research	Research conducted ( <i>n</i> = 889)	No	233; 142	62.1		Ref	
		<b>Yes</b>	<b>392; 122</b>	<b>76.3</b>	<b>1.958</b>	<b>1.463 – 2.620</b>	<b>&lt; 0.001</b>

Table S5. Contd...

	Variable	Category	<i>n</i> (professional; other)	% (professional)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Purchase behaviours</b>	Via animal-specific selling website ( <i>n</i> = 890)	No	312; 123	71.7		Ref	
		Yes	314; 141	69.0	0.878	0.658 – 1.171	0.376
	Viewed in person prior to purchase ( <i>n</i> = 891)	No	189; 84	69.2		Ref	
		Yes	438; 180	70.9	1.081	0.793 – 1.475	0.621
<b>Potentially illegal sales indicators</b>	Sold without dam present ( <i>n</i> = 889)	No	481; 219	68.7		Ref	
		<b>Yes</b>	<b>145; 44</b>	<b>76.7</b>	<b>1.500</b>	<b>1.033 – 2.179</b>	<b>0.033</b>
	Sold outside breeders' home ( <i>n</i> = 891)	No	392; 165	70.4		Ref	
		Yes	235; 99	70.4	0.999	0.742 – 1.345	0.996
	Sold without a microchip ( <i>n</i> = 874)	No	593; 243	70.9		Ref	
		Yes	22; 16	57.9	0.563	0.291 – 1.091	0.089
	Sold < 6 weeks of age ( <i>n</i> = 890)	No	624; 264	70.3		Ref	
		Yes	2; 0	100.0	~	~	~
<b>Owner expectations</b>	Behaviour ( <i>n</i> = 876)	As expected/better	500; 244	67.2		Ref	
		<b>Worse</b>	<b>115; 17</b>	<b>87.1</b>	<b>3.301</b>	<b>1.940 – 5.619</b>	<b>&lt; 0.001</b>
	Training/maintaining obedience ( <i>n</i> = 886)	As expected/easier	371; 219	62.9		Ref	
		<b>Harder</b>	<b>252; 44</b>	<b>85.1</b>	<b>3.381</b>	<b>2.356 – 4.851</b>	<b>&lt; 0.001</b>
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes ( <i>n</i> = 890)	No	311; 202	60.6		Ref	
		<b>Yes, in person</b>	<b>255; 52</b>	<b>83.1</b>	<b>3.185</b>	<b>2.252 – 4.506</b>	<b>&lt; 0.001</b>
		<b>Yes, online</b>	<b>61; 9</b>	<b>87.1</b>	<b>4.402</b>	<b>2.139 – 9.062</b>	<b>&lt; 0.001</b>
<b>Adult management</b>	Attended adult classes ( <i>n</i> = 891)	No	262; 228	53.5		Ref	
		<b>Yes, in person</b>	<b>332; 34</b>	<b>90.7</b>	<b>8.498</b>	<b>5.724 – 12.614</b>	<b>&lt; 0.001</b>
		<b>Yes, online</b>	<b>33; 2</b>	<b>94.3</b>	<b>14.359</b>	<b>3.408 – 60.500</b>	<b>&lt; 0.001</b>
	Owner training method ( <i>n</i> = 864)	Rewards-based only	107; 48	69.0		Ref	
		Rewards-based & 1 aversive	125; 56	69.1	1.001	0.630 – 1.592	0.996
		Rewards-based & > 1 aversive	612; 252	72.0	1.152	0.780 – 1.701	0.477
		Aversive only	0; 0	0.0	~	~	~
	Change in time left alone from < 16 weeks ( <i>n</i> = 856)	Same amount of time	233; 122	65.6		Ref	
		Less time	21; 6	77.8	1.833	0.721 – 4.660	0.203
		<b>More time ≤ 4 hours</b>	<b>272; 98</b>	<b>73.5</b>	<b>1.453</b>	<b>1.057 – 1.998</b>	<b>0.021</b>
		<b>More time &gt; 4 hours</b>	<b>79; 25</b>	<b>76.0</b>	<b>1.655</b>	<b>1.003 – 2.729</b>	<b>0.049</b>

Table S5. Contd...

	Variable	Category	<i>n</i> (professional; other)	% (professional)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Dog behaviour</b>	Total number of owner-reported undesirable behaviours ( <i>n</i> = 781)	/	/	/	<b>1.162</b>	<b>1.097 – 1.230</b>	<b>&lt; 0.001</b>
	Control behaviour score ( <i>n</i> = 868)	0 <b>1+</b>	80; 55 <b>530; 203</b>	59.3 <b>72.3</b>	<b>1.795</b>	Ref <b>1.228 – 2.623</b>	<b>0.003</b>
	Attention seeking behaviour score ( <i>n</i> = 829)	0 <b>1+</b>	114; 74 <b>468; 173</b>	60.6 <b>73.0</b>	<b>1.756</b>	Ref <b>1.249 – 2.469</b>	<b>0.001</b>
	Aggressive behaviour score ( <i>n</i> = 880)	0 <b>1+</b>	447; 211 <b>173; 49</b>	67.9 <b>77.9</b>	<b>1.667</b>	Ref <b>1.166 – 2.381</b>	<b>0.005</b>
	Fear/avoidance behaviour score ( <i>n</i> = 875)	0 <b>1+</b>	342; 171 <b>277; 85</b>	66.7 <b>76.5</b>	<b>1.629</b>	Ref <b>1.202 – 2.210</b>	<b>0.002</b>
	Reaction to familiar people ( <i>n</i> = 881)	0 <b>1+</b>	582; 247 41; 11	70.2 78.8	1.582	Ref 0.800 – 3.129	0.188
	Reaction to unfamiliar people ( <i>n</i> = 886)	0 <b>1+</b>	484; 216 141; 45	69.1 75.8	1.398	Ref 0.964 – 2.028	0.077
	Reaction to other dogs ( <i>n</i> = 882)	0 <b>1+</b>	472; 220 <b>149; 41</b>	68.2 <b>78.4</b>	<b>1.694</b>	Ref <b>1.157 – 2.479</b>	<b>0.007</b>
	SRB case ( <i>n</i> = 778)	No <b>Yes</b>	364; 176 <b>180; 58</b>	67.4 <b>75.6</b>	<b>1.501</b>	Ref <b>1.061 – 2.122</b>	<b>0.022</b>



## Supplementary Table S6: Owner expectations of behaviour, descriptive and univariate logistic regression analysis

**Table S6.** Descriptive and univariable analysis of categorical variables and owner expectations of their dog's behaviour at acquisition versus at 21 months.

Descriptive and univariable binary logistic regression analysis of dogs whose owners responded to the question “Compared to my expectations when I first acquired my dog, their behaviour since the last survey (in November/December 2020) has been...”. Responses were categorised as a binary outcome as to whether expectations had been met where “Worse than expected” were coded separately from “As expected” and “Better than expected”, which were coded together as one outcome. Owners who had answered “I’m not sure” were reclassified as missing data. \*95% confidence interval. Significant results are emboldened. ~ No analysis possible.

	Variable	Category	n (worse; better/as)	% (worse)	Odds Ratio	95% CI*	p-Value
Owner/ household demographics	First-time dog owner (n = 886)	No	72; 474	13.2		Ref	
		Yes	60; 280	17.6	1.411	0.971 – 2.049	0.071
	Owner age (n = 885)	18-24 years	8; 29	21.6	1.986	0.831 – 4.745	0.123
		<b>25-34 years</b>	<b>36; 131</b>	<b>21.6</b>	<b>1.979</b>	<b>1.164 – 3.365</b>	<b>0.012</b>
		35-44 years	20; 145	12.1	0.993	0.543 – 1.816	0.982
		45-54 years	30; 216	12.2		Ref	
		55-64 years	26; 138	15.9	1.357	0.770 – 2.391	0.292
		65-74 years	8; 85	8.6	0.678	0.299 – 1.537	0.352
		≥ 75 years	4; 9	30.8	3.200	0.928 – 11.038	0.066
	Owner gender (n = 886)	Female	122; 682	15.2		Ref	
		Male	10; 72	12.2	0.776	0.390 – 1.546	0.472
	Child ≤ 16 years in household (in 2020; n = 886)	No	100; 548	15.4		Ref	
		Yes	31; 207	13.0	0.821	0.532 – 1.266	0.372
	Employed in animal care/veterinary sector (n = 887)	No	123; 702	14.9		Ref	
		Yes	9; 53	14.5	0.969	0.466 – 2.015	0.933
	Another dog(s) in household (in 2020) (n = 877)	No	103; 532	16.2		Ref	
		Yes	29; 213	12.0	0.703	0.452- 1.094	0.118
	Current working location of owner (n = 864)	At home	30; 169	15.1	1.094	0.650 – 1.842	0.736
		Away from home	24; 158	13.2	0.936	0.539 – 1.626	0.815
		At and away from home	37; 228	14.0		Ref	
		Unemployed	7; 23	23.3	1.875	0.751 – 4.681	0.178
		Retired	31; 157	16.5	1.217	0.724 – 2.044	0.459

Table S6. Contd...

	Variable	Category	<i>n</i> (worse; better/as)	% (worse)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Owner/ household demographics</b>	Current working location of other household members ( <i>n</i> = 755)	At home	21; 124	14.5	0.792	0.446 – 1.407	0.426
		Away from home	31; 216	12.6	0.671	0.404 – 1.115	0.124
		At and away from home	40; 187	17.6	Ref		
		Unemployed	2; 8	20.0	1.169	0.239 – 5.712	0.847
		Retired	18; 108	14.3	0.779	0.426 – 1.426	0.419
	Owner lives alone/only adult in the household ( <i>n</i> = 865)	No	109; 640	14.6	Ref		
		Yes	20; 96	17.2	1.223	0.725 – 2.063	0.450
<b>Dog demographics</b>	Dog sex ( <i>n</i> = 886)	Female	50; 365	12.0	Ref		
		<b>Male</b>	<b>82; 289</b>	<b>17.4</b>	<b>1.539</b>	<b>1.053 – 2.249</b>	<b>0.026</b>
	Neutered ( <i>n</i> = 887)	No	49; 318	13.4	Ref		
		Yes	83; 437	16.0	1.233	0.842 – 1.805	0.283
	Breed purity designation ( <i>n</i> = 887)	Crossbred	8; 31	20.5	Ref		
		Purebred	93; 516	15.3	0.698	0.311 – 1.567	0.384
		Designer Crossbred	31; 208	13.0	0.578	0.243 – 1.370	0.213
	Top 12 most common breeds at 21 months ( <i>n</i> = 887)	Crossbred	8; 31	20.5	Ref		
		Cockapoo	10; 74	11.9	0.524	0.189 – 1.452	0.214
		Labradoodle	5; 21	19.2	0.923	0.265 – 3.211	0.899
		Cavapoo	1; 17	5.6	0.228	0.026 – 1.979	0.180
		Labrador Retriever	13; 82	13.7	0.614	0.232 – 1.625	0.326
		<b>Cocker Spaniel</b>	<b>4; 57</b>	<b>6.6</b>	<b>0.272</b>	<b>0.076 – 0.976</b>	<b>0.046</b>
		Border Collie	8; 24	25.0	1.292	0.423 – 3.941	0.653
		Miniature Smooth-Haired Dachshund	5; 21	19.2	0.923	0.265 – 3.211	0.899
		Border Terrier	2; 23	8.0	0.337	0.065 – 1.738	0.194
		Golden Retriever	4; 24	14.3	0.646	0.174 – 2.401	0.514
		Whippet	1; 20	4.8	0.194	0.022 – 1.669	0.135
		English Springer Spaniel	2; 18	10.0	0.431	0.082 – 2.253	0.318
		Other	69; 343	16.7	0.780	0.344 – 1.768	0.551

Table S6. Contd...

	Variable	Category	<i>n</i> (worse; better/as)	% (worse)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Dog demographics</b>	Breed group ( <i>n</i> = 887)	Not KC recognised	44; 244	14.7		Ref	
		Gundog	30; 230	11.5	0.758	0.459 – 1.252	0.279
		Hound	13; 68	16.0	1.111	0.564 – 2.187	0.761
		Pastoral	15; 48	23.8	1.815	0.933 – 3.533	0.079
		Terrier	13; 67	16.3	1.127	0.572 – 2.221	0.729
		Toy	5; 19	20.8	1.529	0.541 – 4.317	0.423
		Utility	8; 51	13.6	0.911	0.404 – 2.057	0.823
		Working	6; 28	17.6	1.245	0.486 – 3.189	0.648
	Typical adult bodyweight ( <i>n</i> = 853)	≤ 10 kg	28; 138	16.9	1.371	0.821 – 2.289	0.228
		10 to < 20 kg	45; 304	12.9		Ref	
		20 to < 30 kg	28; 170	14.1	1.113	0.670 – 1.849	0.680
		30 to < 40 kg	21; 105	16.7	1.351	0.769 – 2.374	0.295
		≥ 40 kg	5; 9	35.7	3.753	1.204 – 11.702	0.023
<b>Purchase motivations for a dog/for breed chosen</b>	Dog to improve mental health ( <i>n</i> = 887)	No	63; 384	14.1		Ref	
		Yes	69; 371	15.7	1.134	0.783 – 1.641	0.507
	Breed size suited to my lifestyle ( <i>n</i> = 887)	No	42; 240	14.9		Ref	
		Yes	90; 515	14.9	0.999	0.671 – 1.485	0.995
	Breed good with children ( <i>n</i> = 887)	No	76; 411	15.6		Ref	
		Yes	56; 344	14.0	0.880	0.606 – 1.279	0.504
	Breed easy to train ( <i>n</i> = 887)	No	67; 394	14.5		Ref	
		Yes	65; 361	15.3	1.059	0.731 – 1.533	0.762
	Friends or family own this breed/crossbreed ( <i>n</i> = 887)	No	103; 571	15.3		Ref	
		Yes	29; 184	13.6	0.874	0.560 – 1.362	0.552
	Respondent driving force to get a dog ( <i>n</i> = 869)	No	69; 444	13.5		Ref	
		Yes	61; 295	17.1	1.331	0.915 – 1.935	0.135
<b>Pre-purchase research</b>	Research conducted ( <i>n</i> = 885)	No	8; 41	16.3		Ref	
		Yes	53; 259	17.0	1.049	0.465 – 2.365	0.909
<b>Purchase behaviours</b>	Research conducted ( <i>n</i> = 885)	No	46; 327	12.3		Ref	
		Yes	86; 426	16.8	1.435	0.976 – 2.111	0.067
	Via animal-specific selling website ( <i>n</i> = 886)	No	64; 368	14.8		Ref	
		Yes	68; 386	15.0	1.013	0.700 – 1.466	0.946
	Viewed in person prior to purchase ( <i>n</i> = 887)	No	35; 235	13.0		Ref	
		Yes	97; 520	15.7	1.252	0.826 – 1.899	0.289

Table S6. Contd...

	Variable	Category	<i>n</i> (worse; better/as)	% (worse)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Potentially illegal sales indicators</b>	Sold without dam present ( <i>n</i> = 885)	No	97; 599	13.9		Ref	
		Yes	35; 154	18.5	1.403	0.917 – 2.147	0.118
	Sold outside breeders' home ( <i>n</i> = 887)	No	77; 480	13.8		Ref	
		Yes	55; 275	16.7	1.247	0.856 – 1.817	0.251
	Sold without a microchip ( <i>n</i> = 870)	No	121; 710	14.6		Ref	
		Yes	8; 31	20.5	1.514	0.680 – 3.373	0.310
	Sold < 6 weeks of age ( <i>n</i> = 886)	No	132; 752	14.9		Ref	
		Yes	0; 2	0.0	~	~	~
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes ( <i>n</i> = 886)	No	115; 642	15.2		Ref	
		Yes	8; 39	17.0	1.145	0.522 – 2.514	0.735
		Yes, in person	50; 254	16.4	1.225	0.827 – 1.816	0.311
		Yes, online	11; 58	15.9	1.181	0.591 – 2.358	0.638
<b>Adult management</b>	Attended adult classes ( <i>n</i> = 887)	No	50; 439	10.2		Ref	
		Yes, in person	71; 292	19.6	2.135	1.444 – 3.156	< 0.001
		Yes, online	11; 24	31.4	4.024	1.861 – 8.702	< 0.001
	Owner training method ( <i>n</i> = 860)	Rewards-based only	17; 135	11.2		Ref	
		Rewards-based & 1 aversive	20; 160	11.1	0.993	0.500 – 1.971	0.983
		Rewards-based & > 1 aversive	95; 433	18.0	1.742	1.004 – 3.023	0.048
		Aversive only	0; 0	0.0	~	~	~
	Exercise frequency (walks) ( <i>n</i> = 876)	Never	0; 1	0.0	~	~	~
		< Once a week	1; 2	33.3	2.508	0.224 – 28.058	0.456
		Once a week	0; 3	0.0	~	~	~
		Several times per week	5; 42	10.6	0.597	0.228 – 1.566	0.294
		Once per day	38; 196	16.2	0.972	0.628 – 1.504	0.900
		Twice per day	66; 331	16.6		Ref	
		> Twice per day	20; 171	10.5	0.587	0.344 – 1.000	0.050
	Exercise frequency (off lead) ( <i>n</i> = 874)	Never	11; 40	21.6	1.400	0.667 – 2.939	0.374
		< Once a week	5; 24	17.2	1.061	0.384 – 2.930	0.910
		Once a week	8; 19	29.6	2.144	0.883 – 5.204	0.092
		Several times per week	28; 116	19.4	1.229	0.728 – 2.076	0.441
		Once per day	44; 224	16.4		Ref	
		Twice per day	24; 198	10.8	0.617	0.362 – 1.051	0.076
		> Twice per day	9; 124	6.8	0.370	0.175 – 0.782	0.009

Table S6. Contd...

	Variable	Category	n (worse; better/as)	% (worse)	Odds Ratio	95% CI*	p-Value
Adult management	Time left alone (n = 886)	Never	24; 81	22.9		Ref	
		Up to 1 hour	32; 127	20.1	0.850	0.468 – 1.547	0.595
		<b>1 to 4 hours</b>	<b>65; 445</b>	<b>12.7</b>	<b>0.493</b>	<b>0.292 – 0.833</b>	<b>0.008</b>
		<b>Over 4 hours</b>	<b>10; 102</b>	<b>8.9</b>	<b>0.331</b>	<b>0.150 – 0.731</b>	<b>0.006</b>
	Change in time left alone from < 16 weeks (n = 856)	Same amount of time	57; 297	16.1		Ref	
		<b>Less time</b>	<b>9; 18</b>	<b>33.3</b>	<b>2.605</b>	<b>1.115 – 6.088</b>	<b>0.027</b>
		More time ≤ 4 hours	51; 322	13.7	0.825	0.548 – 1.243	0.358
		More time > 4 hours	12; 90	11.8	0.695	0.357 – 1.352	0.284
	Location left alone (n = 849)	A crate/indoor kennel (door closed)	22; 109	16.8	1.232	0.728 – 2.085	0.437
		Loose in a single room	36; 203	15.1	1.083	0.698 – 1.679	0.723
		Loose in multiple rooms	67; 409	14.1		Ref	
		Outdoor kennel (door closed)	0; 1	0.0	~	~	~
		Outdoor kennel (door open)	0; 1	0.0	~	~	~
		Loose in an enclosed outdoor space	0; 1	0.0	~	~	~
	General advice source for training and behaviour (n = 876)	Non-professional	17; 244	6.5		Ref	
		<b>Professional</b>	<b>115; 500</b>	<b>18.7</b>	<b>3.301</b>	<b>1.940 – 5.619</b>	<b>&lt; 0.001</b>
	Respondent primary carer for dog (n = 886)	Shares care	50; 333	13.1		Ref	
		No	2; 2	50.0	6.660	0.917 – 48.352	0.061
		Yes	80; 419	16.0	1.272	0.868 – 1.862	0.217
Dog behaviour	Total number of owner-reported undesirable behaviours (n = 784)	/	/	/	<b>1.374</b>	<b>1.282 – 1.472</b>	<b>&lt; 0.001</b>
		/	/	/			
	Control behaviour score (n = 863)	0	5; 132	3.6		Ref	
		<b>1+</b>	<b>123; 603</b>	<b>16.9</b>	<b>5.385</b>	<b>2.159 – 13.429</b>	<b>&lt; 0.001</b>
	Attention seeking behaviour score (n = 829)	0	11; 178	5.8		Ref	
		<b>1+</b>	<b>114; 526</b>	<b>17.8</b>	<b>3.507</b>	<b>1.846 – 6.663</b>	<b>&lt; 0.001</b>
	Aggressive behaviour score (n = 874)	0	59; 598	9.0		Ref	
		<b>1+</b>	<b>72; 145</b>	<b>33.2</b>	<b>5.003</b>	<b>3.411 – 7.427</b>	<b>&lt; 0.001</b>
	Fear/avoidance behaviour score (n = 870)	0	47; 462	9.2		Ref	
		<b>1+</b>	<b>82; 279</b>	<b>22.7</b>	<b>2.889</b>	<b>1.960 – 4.259</b>	<b>&lt; 0.001</b>
	Reaction to familiar people (n = 876)	0	107; 718	13.0		Ref	
		<b>1+</b>	<b>24; 27</b>	<b>47.1</b>	<b>5.965</b>	<b>3.319 – 10.719</b>	<b>&lt; 0.001</b>
	Reaction to unfamiliar people (n = 880)	0	82; 612	11.8		Ref	
		<b>1+</b>	<b>49; 137</b>	<b>26.3</b>	<b>2.669</b>	<b>1.790 – 3.980</b>	<b>&lt; 0.001</b>

Table S6. Contd...

	Variable	Category	<i>n</i> (worse; better/as)	% (worse)	Odds Ratio	95% CI*	<i>p</i> -Value
Dog behaviour	Reaction to other dogs ( <i>n</i> = 877)	0	63; 624	9.2		Ref	
		1+	<b>67; 123</b>	<b>35.3</b>	<b>5.395</b>	<b>3.636 – 8.005</b>	<b>&lt; 0.001</b>
	SRB case ( <i>n</i> = 781)	No	71; 469	13.1		Ref	
		Yes	42; 199	17.4	1.394	0.920 – 2.113	0.117

## Supplementary Table S7: Owner expectations of training, descriptive and univariate logistic regression analysis

**Table S7.** Descriptive and univariable analysis of categorical variables and owner expectations of training and maintaining obedience training with their dog at acquisition versus at 21 months.

Descriptive and univariable binary logistic regression analysis of dogs whose owners responded to the question “Compared to my expectations when I first acquired my dog, training and ongoing maintenance of their basic obedience since the last survey (in November/December 2020) has been...”. Responses were categorised as a binary outcome as to whether expectations had been met where “Harder than expected” were coded separately from “As expected” and “Easier than expected”, which were coded together as one outcome. Owners who had answered “I’m not sure” were reclassified as missing data. \*95% confidence interval. Significant results are emboldened. ~ No analysis possible.

	Variable	Category	n (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	p-Value
Owner/ household demographics	First-time dog owner (n = 917)	No	162; 401	28.8		Ref	
		Yes	<b>142; 212</b>	<b>40.1</b>	<b>1.658</b>	<b>1.253 – 2.194</b>	<b>&lt; 0.001</b>
	Owner age (n = 916)	18-24 years	13; 24	35.1	1.096	0.532 – 2.261	0.804
		<b>25-34 years</b>	<b>76; 96</b>	<b>44.2</b>	<b>1.602</b>	<b>1.075 – 2.387</b>	<b>0.020</b>
		35-44 years	45; 128	26.0	0.711	0.463 – 1.092	0.120
		45-54 years	84; 170	33.1		Ref	
		55-64 years	53; 117	31.2	0.917	0.604 – 1.391	0.683
		65-74 years	26; 70	27.1	0.752	0.447 – 1.265	0.283
		≥ 75 years	6; 8	42.9	1.518	0.510 – 4.516	0.453
	Owner gender (n = 917)	Female	276; 555	33.2		Ref	
		Male	27; 59	31.4	0.920	0.571 – 1.484	0.733
	Child ≤ 16 years in household (in 2020; n = 917)	No	231; 437	34.6		Ref	
		Yes	73; 176	29.3	0.785	0.572 – 1.076	0.133
	Employed in animal care/veterinary sector (n = 918)	No	284; 570	33.3		Ref	
		Yes	20; 44	31.3	0.912	0.528 – 1.577	0.742
	Another dog(s) in household (in 2020) (n = 908)	No	247; 417	37.2		Ref	
		Yes	<b>56; 188</b>	<b>23.0</b>	<b>0.503</b>	<b>0.359 – 0.705</b>	<b>&lt; 0.001</b>
	Current working location of owner (n = 870)	At home	83; 118	41.3	1.383	0.947 – 2.020	0.093
		Away from home	47; 136	25.7	0.680	0.448 – 1.032	0.070
		At and away from home	90; 177	33.7		Ref	
		Unemployed	11; 18	37.9	1.202	0.544 – 2.653	0.649
		Retired	59; 131	31.1	0.886	0.595 – 1.319	0.551

Table S7. Contd...

	Variable	Category	<i>n</i> (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Owner/ household demographics</b>	Current working location of other household members ( <i>n</i> = 760)	At home	44; 103	29.9	0.838	0.536 – 1.310	0.438
		Away from home	85; 163	34.3	1.023	0.700 – 1.495	0.908
		At and away from home	77; 151	33.8	Ref		
		Unemployed	6; 4	60.0	2.942	0.806 – 10.735	0.102
		Retired	37; 90	29.1	0.806	0.503 – 1.291	0.370
	Owner lives alone/only adult in the household ( <i>n</i> = 871)	No	247; 506	32.8	Ref		
		Yes	43; 75	36.4	1.175	0.784 – 1.760	0.436
<b>Dog demographics</b>	Dog sex ( <i>n</i> = 917)	Female	118; 314	27.3	Ref		
		<b>Male</b>	<b>186; 299</b>	<b>38.4</b>	<b>1.655</b>	<b>1.251 – 2.190</b>	<b>&lt; 0.001</b>
	Neutered ( <i>n</i> = 918)	No	126; 256	33.0	Ref		
		Yes	178; 358	33.2	1.010	0.764 – 1.335	0.943
	Breed purity designation ( <i>n</i> = 918)	Crossbred	12; 26	31.6	Ref		
		Purebred	214; 418	33.9	1.109	0.549 – 2.242	0.773
		Designer Crossbred	78; 170	31.5	0.994	0.477 – 2.072	0.987
	Top 12 most common breeds at 21 months ( <i>n</i> = 918)	Crossbred	12; 26	31.6	Ref		
		Cockapoo	35; 53	39.8	1.432	0.639 – 3.204	0.384
		Labradoodle	10; 18	35.7	1.204	0.429 – 3.379	0.725
		Cavapoo	5; 13	27.8	0.833	0.242 – 2.873	0.773
		Labrador Retriever	31; 67	31.6	1.002	0.448 – 2.244	0.995
		Cocker Spaniel	21; 42	33.3	1.083	0.458 – 2.564	0.856
		Border Collie	11; 21	34.4	1.135	0.418 – 3.085	0.804
		Miniature Smooth-Haired Dachshund	11; 18	37.9	1.324	0.480 – 3.654	0.588
		Border Terrier	8; 18	30.8	0.963	0.328 – 2.829	0.945
		Golden Retriever	12; 16	42.9	1.625	0.590 – 4.479	0.348
		Whippet	6; 16	27.3	0.813	0.254 – 2.595	0.726
		English Springer Spaniel	7; 13	35.0	1.167	0.371 – 3.668	0.792
		Other Purebred	135; 293	31.5	0.998	0.489 – 2.038	0.996



Table S7. Contd...

	Variable	Category	<i>n</i> (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	<i>p</i> -Value
<b>Dog demographics</b>	Breed group ( <i>n</i> = 918)	Not KC recognised	94; 200	32.0		Ref	
		Gundog	91; 178	33.8	1.088	0.765 – 1.547	0.640
		Hound	28; 60	31.8	0.993	0.596 – 1.655	0.978
		Pastoral	22; 42	34.4	1.114	0.630 – 1.973	0.710
		Terrier	26; 55	32.1	1.006	0.594 – 1.704	0.983
		Toy	8; 17	32.0	1.001	0.417 – 2.403	0.998
		Utility	24; 39	38.1	1.309	0.745 – 2.302	0.349
		Working	11; 23	32.4	1.018	0.476 – 2.174	0.964
	Typical adult bodyweight ( <i>n</i> = 883)	≤ 10 kg	61; 117	34.3	1.131	0.772 – 1.657	0.527
		10 to < 20 kg	112; 243	31.5		Ref	
		20 to < 30 kg	67; 137	32.8	1.061	0.734 – 1.533	0.752
		30 to < 40 kg	50; 80	38.5	1.356	0.893 – 2.060	0.154
		≥ 40 kg	7; 9	43.8	1.687	0.613 – 4.646	0.311
<b>Purchase motivations for a dog/for breed chosen</b>	Dog to improve mental health ( <i>n</i> = 918)	No	133; 326	29.0		Ref	
		Yes	<b>171; 62.7</b>	<b>37.3</b>	<b>1.455</b>	<b>1.104 – 1.919</b>	<b>0.008</b>
	Breed size suited to my lifestyle ( <i>n</i> = 918)	No	100; 189	34.6		Ref	
		Yes	204; 425	32.4	0.907	0.676 – 1.218	0.517
	Breed good with children ( <i>n</i> = 918)	No	175; 328	34.8		Ref	
		Yes	129; 286	31.1	0.845	0.641 – 1.116	0.235
	Breed easy to train ( <i>n</i> = 918)	No	162; 320	33.6		Ref	
		Yes	142; 294	32.6	0.954	0.724 – 1.257	0.738
	Friends or family own this breed/crossbreed ( <i>n</i> = 918)	No	231; 470	33.0		Ref	
		Yes	73; 144	33.6	1.031	0.747 – 1.424	0.851
	Respondent driving force to get a dog ( <i>n</i> = 900)	No	167; 361	31.6		Ref	
		Yes	132; 240	35.5	1.189	0.898 – 1.574	0.227
<b>Pre-purchase research</b>	Research conducted ( <i>n</i> = 916)	No	96; 286	25.1		Ref	
		Yes	<b>207; 327</b>	<b>38.8</b>	<b>1.886</b>	<b>1.412 – 2.519</b>	<b>&lt; 0.001</b>
<b>Purchase behaviours</b>	Via animal-specific selling website ( <i>n</i> = 917)	No	145; 305	32.2		Ref	
		Yes	158; 309	33.8	1.076	0.817 – 1.417	0.604
	Viewed in person prior to purchase ( <i>n</i> = 918)	No	95; 184	34.1		Ref	
		Yes	209; 430	32.7	0.941	0.699 – 1.268	0.691

Table S7. Contd...

	Variable	Category	n (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	p-Value
<b>Potentially illegal sales indicators</b>	Sold without dam present (n = 916)	No	230; 491	31.9		Ref	
		Yes	74; 121	37.9	1.306	0.940 – 1.814	0.112
	Sold outside breeders' home (n = 918)	No	185; 392	32.1		Ref	
		Yes	119; 222	34.9	1.136	0.856 – 1.508	0.378
	Sold without a microchip (n = 901)	No	279; 580	32.5		Ref	
		Yes	19; 23	45.2	1.717	0.920 – 3.206	0.090
	Sold < 6 weeks of age (n = 917)	No	304; 611	33.2		Ref	
		Yes	0; 2	0.0	~	~	~
<b>Socialisation &lt; 16 weeks</b>	Attended puppy classes (n = 917)	No	159; 369	30.1		Ref	
		<b>Yes, in person</b>	<b>119; 197</b>	<b>37.3</b>	<b>1.402</b>	<b>1.045 – 1.881</b>	<b>0.024</b>
		Yes, online	26; 47	35.6	1.284	0.768 – 2.146	0.341
<b>Adult management</b>	Attended adult classes (n = 918)	No	128; 379	25.2		Ref	
		<b>Yes, in person</b>	<b>159; 216</b>	<b>42.4</b>	<b>2.180</b>	<b>1.637 – 2.903</b>	<b>&lt; 0.001</b>
		<b>Yes, online</b>	<b>17; 19</b>	<b>47.2</b>	<b>2.649</b>	<b>1.336 – 5.252</b>	<b>0.005</b>
	Owner training method (n = 889)	Rewards-based only	38; 118	24.4		Ref	
		Rewards-based & 1 aversive	56; 132	29.8	1.317	0.814 – 2.131	0.261
		<b>Rewards-based &amp; &gt; 1 aversive</b>	<b>206; 339</b>	<b>37.8</b>	<b>1.887</b>	<b>1.259 – 2.828</b>	<b>0.002</b>
		Aversive only	0; 0	0.0	~	~	~
	Exercise frequency (walks) (n = 882)	Never	0; 1	0.0	~	~	~
		< Once a week	1; 2	33.3	0.926	0.083 – 10.296	0.950
		Once a week	1; 2	33.3	0.926	0.083 – 10.296	0.950
		Several times per week	17; 30	36.2	1.049	0.559 – 1.968	0.882
		Once per day	75; 160	31.9	0.868	0.616 – 1.222	0.416
		Twice per day	141; 261	35.1		Ref	
		> Twice per day	57; 134	29.8	0.787	0.543 – 1.142	0.207
	Exercise frequency (off lead) (n = 880)	<b>Never</b>	<b>26; 24</b>	<b>52.0</b>	<b>1.852</b>	<b>1.009 – 3.400</b>	<b>0.047</b>
		<b>&lt; Once a week</b>	<b>5; 26</b>	<b>16.1</b>	<b>0.329</b>	<b>0.122 – 0.884</b>	<b>0.027</b>
		Once a week	12; 15	44.4	1.368	0.616 – 3.039	0.442
		Several times per week	53; 91	36.8	0.996	0.655 – 1.514	0.985
		Once per day	100; 171	36.9		Ref	
		Twice per day	64; 160	28.6	0.684	0.467 – 1.001	0.051
		<b>&gt; Twice per day</b>	<b>31; 102</b>	<b>23.3</b>	<b>0.520</b>	<b>0.324 – 0.833</b>	<b>0.007</b>

Table S7. Contd...

	Variable	Category	n (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	p-Value
Adult management	Time left alone (n = 892)	Never	43; 62	41.0		Ref	
		Up to 1 hour	60; 999	37.7	0.874	0.528 – 1.447	0.600
		<b>1 to 4 hours</b>	<b>150; 366</b>	<b>29.1</b>	<b>0.591</b>	<b>0.383 – 0.911</b>	<b>0.017</b>
		Over 4 hours	41; 71	36.6	0.833	0.482 – 1.439	0.512
	Change in time left alone from < 16 weeks (n = 862)	Same amount of time	108; 251	30.1		Ref	
		Less time	11; 16	40.7	1.598	0.718 – 3.556	0.251
		More time ≤ 4 hours	123; 251	32.9	1.139	0.834 – 1.556	0.414
		<b>More time &gt; 4 hours</b>	<b>46; 56</b>	<b>45.1</b>	<b>1.909</b>	<b>1.217 – 2.996</b>	<b>0.005</b>
	Location left alone (n = 855)	<b>A crate/indoor kennel (door closed)</b>	<b>56; 77</b>	<b>42.1</b>	<b>1.581</b>	<b>1.065 – 2.346</b>	<b>0.023</b>
		Loose in a single room	74; 169	30.5	0.952	0.681 – 1.330	0.772
		Loose in multiple rooms	150; 326	31.5		Ref	
		Outdoor kennel (door closed)	0; 1	0.0	~	~	~
		Outdoor kennel (door open)	0; 1	0.0	~	~	~
		Loose in an enclosed outdoor space	0; 1	0.0	~	~	~
	General advice source for training and behaviour (n = 886)	Non-professional	44; 219	16.7		Ref	
		<b>Professional</b>	<b>252; 371</b>	<b>40.4</b>	<b>3.381</b>	<b>2.356 – 4.851</b>	<b>&lt; 0.001</b>
	Respondent primary carer for dog (n = 917)	Shares care	129; 269	32.4		Ref	
		No	2; 2	50.0	2.085	0.290 – 14.970	0.465
		Yes	172; 343	33.4	1.046	0.791 – 1.382	0.753
Dog behaviour	Total number of owner-reported undesirable behaviours (n = 784)	/	/	/	<b>1.301</b>	<b>1.230 – 1.377</b>	<b>&lt; 0.001</b>
		/	/	/			
	Control behaviour score (n = 876)	0	23; 115	16.7		Ref	
		<b>1+</b>	<b>269; 469</b>	<b>36.4</b>	<b>2.868</b>	<b>1.789 – 4.598</b>	<b>&lt; 0.001</b>
	Attention seeking behaviour score (n = 834)	0	30; 159	15.9		Ref	
		<b>1+</b>	<b>248; 397</b>	<b>38.4</b>	<b>3.311</b>	<b>2.173 – 5.045</b>	<b>&lt; 0.001</b>
	Aggressive behaviour score (n = 888)	0	186; 480	27.9		Ref	
		<b>1+</b>	<b>106; 116</b>	<b>47.7</b>	<b>2.358</b>	<b>1.724 – 3.225</b>	<b>&lt; 0.001</b>
	Fear/avoidance behaviour score (n = 883)	0	137; 379	26.6		Ref	
		<b>1+</b>	<b>157; 210</b>	<b>42.8</b>	<b>2.068</b>	<b>1.556 – 2.749</b>	<b>&lt; 0.001</b>
	Reaction to familiar people (n = 890)	0	260; 578	31.0		Ref	
		<b>1+</b>	<b>35; 17</b>	<b>67.3</b>	<b>4.577</b>	<b>2.518 – 8.320</b>	<b>&lt; 0.001</b>
	Reaction to unfamiliar people (n = 894)	0	215; 491	30.5		Ref	
		<b>1+</b>	<b>80; 108</b>	<b>42.6</b>	<b>1.692</b>	<b>1.215 – 2.354</b>	<b>0.002</b>

Table S7. Contd...

	Variable	Category	<i>n</i> (harder; easier/as)	% (harder)	Odds Ratio	95% CI*	<i>p</i> -Value
Dog behaviour	Reaction to other dogs ( <i>n</i> = 891)	0	197; 501	28.2		Ref	
		1+	98; 95	50.8	2.623	1.892 – 3.638	< 0.001
	SRB case ( <i>n</i> = 786)	No	150; 392	27.7		Ref	
		Yes	99; 145	40.6	1.784	1.299 – 2.451	< 0.001