Linköping University | Department of Physics, Chemistry and Biology
Bachelor thesis, 16 hp | Educational Program: Physics, Chemistry and Biology
Spring term 2016 | LITH-IFM-x-EX—16/3189--SE

Scores on dog personality are dependent on questionnaire: A comparison of three questionnaires

Josefine Henriksson

Examinator: Hanne Løvlie
Supervisor: Per Jensen and Ann-Sofie Sundman

LINKÖPINGS UNIVERSITET

Avdelning, institution
Division, Department
Department of Physics, Chemistry and Biology
Linköping University

Datum
Date
2016-06-01

Språk
Language

☐ Svenska/Swedish
☒ Engelska/English

☐ _____

Rapporttyp
Report category

☐ Licentiatavhandling
☒ Examensarbete
☐ C-uppsats
☐ D-uppsats
☐ Övrig rapport

☐ _____

ISBN

ISRN: LITH-IFM-x-EX--16/3189--SE

Serietitel och serienummer
Title of series, numbering

ISSN
_____

URL för elektronisk version

Titel/ Title

Scores on dog personality are dependent on questionnaire: A comparison of three questionnaires

Författare/ Author

Josefine Henriksson

Sammanfattning/ Abstract

Personality in dogs have been studied relatively extensive the last couple of years with various methods. One of these methods is questionnaire for owners to fill in. A credible and well working questionnaire is characterized by a high reliability and validity. In this study three different questionnaires, MCPQ-R, DPQ and C-BARQ have been used and compared. Dog owners were asked to fill in all three questionnaires for their dog. Correlation between factors in the questionnaires and differences between age groups, breeds and sexes were analyzed to see if these questionnaires differed from each other. The result indicated various correlations that were both expected and unexpected as well as differences between age groups, breeds and sexes. Factors from all three questionnaires were sometimes considered more reliable than the other but DPQ had the most reliable ones. In the comparison between breeds no factor from C-BARQ was significant while several from the DPQ were. These factors also showed a similar result as a previous study. The C-BARQ factors contained a lot of unexpected correlations which lowered its reliability. MCPQ-R on the other hand was measuring personality in a very unspecific and broad way. Therefore, DPQ seem to be the most reliable questionnaire when taking all results from this study into consideration. However, improvements like clarify value-loaded words and perhaps by adding more aspects of dog personality needs to be done to minimize misunderstanding and lacking aspects.

Nyckelord/Keyword

Personality, Questionnaire, Dogs, Behaviour, *Canis lupus familiaris*, Validity, Reliability

Content

1 Abstract 4
2 Introduction 4
3 Material & methods 6
3.1 Questionnaires 6
3.1.1 MCPQ-R 6
3.1.2 C-BARQ 6
3.1.3 DPQ 7
3.2 Data analysis 7
4 Results 8
4.1 Relationship between factors 8
4.2 Differences between age groups 15
4.3 Differences between sexes 17
4.4 Differences between breeds 18
5 Discussion 20
5.1 Relationship between factors 20
5.2 Differences between age groups 25
5.3 Differences between sexes 25
5.4 Differences between breeds 25
5.5 General discussion 26
5.6 Societal & ethical considerations 28
6 Acknowledgement 28
7 References 28
8 Appendix 32

1 Abstract

Personality in dogs has been studied relatively extensive the last couple of years with various methods. One of these methods is questionnaire for owners to fill in. A credible and well working questionnaire is characterized by a high reliability and validity. In this study three different questionnaires, MCPQ-R, DPQ and C-BARQ have been used and compared. Dog owners were asked to fill in all three questionnaires for their dog. Correlation between factors in the questionnaires and differences between age groups, breeds and sexes were analyzed to see if these questionnaires differed from each other. The result indicated various correlations that were both expected and unexpected as well as differences between age groups, breeds and sexes. Factors from all three questionnaires were sometimes considered more reliable than the other but DPQ had the most reliable ones. In the comparison between breeds no factor from C-BARQ was significant while several from the DPQ were. These factors also showed a similar result as a previous study. The C-BARQ factors contained a lot of unexpected correlations which lowered its reliability. MCPQ-R on the other hand was measuring personality in a very unspecific and broad way. Therefore, DPQ seemed to be the most reliable questionnaire when taking all results from this study into consideration. However, improvements like clarify value-loaded words and perhaps by adding more aspects of dog personality needs to be done to minimize misunderstanding and lacking aspects.

2 Introduction

Personality has been studied in humans for a long time and it is nowadays common knowledge that it does exist in other species than humans as well (Gosling & Vazire 2002). What personality actually describes has been debated by various scientists. Personality has been described as an "underlying behavioural tendencies that differ across individuals, that are consistent within individuals over time, and that affect the behaviour that is expressed in different contexts" (Stamps & Groothuis 2010) and also as "those characteristics of individuals that describe and account for consistent patterns of feeling, thinking, and behaving" (Jones 2009).

Personality in domestic dogs (*Canis lupus familiaris)* have actually been studied relatively extensive the last couple of years. Why dogs have been the object for personality studies can be due to the fact that dogs are a common pet in our homes. Dogs also have a big function in the society as service dogs and for police work, for example drug detection (Johnston & Souter 2006 in Dunn & Degenhardt 2009). By having a valid and reliable tool to measure dog personality at an early stage, money and time can be saved. If only dogs with high potential for a work as a service dog are trained, no money will be wasted

on dogs without potential (Serpell & Hsu 2001). A valid and reliable tool also opens up for the opportunity to predict behaviour problems in an early stage and therefore being able to prevent them from developing further (Hsu & Serpell 2003). Behaviur problems in dogs can be for example fearfulness, distractibility and aggression (Goddard & Beilharz 1983).

Researchers have developed a series of methods to measure dog personality. These are for example personality studies at laboratories, personality questionnaires for dog owners and also personality studies in the dog's home environment (Diederich & Giffroy 2006). A credible and well working method is characterized by a high reliability and validity. A high validity means that the measurement actually measures what is being asked for while a high reliability means that the measurement is repeatable and consistent (Martin & Bateson 1993).

Personality traits can differ between dog breeds due to different selection pressure (Mehrkam & Wynne 2014). Mehrkam and Wynne (2014) did a review of earlier studies which had analyzed different breeds. They could confirm that differences between breeds exist, as well as within breeds. Different sexes (Gershman et al. 1994, Lund et al. 1995) and age groups (Chapman & Voith 1990) can also score higher on specific factors due to for example health, maturity or hormones. Lund et al (1995) found males to be more likely to show aggressive behaviour. Females however were instead more likely to develop general anxiety. According to Chapman and Voith (1990) some behavioural problems occur more frequently after 10 years of age. These behavioural problems can be for example separation anxiety or excessive vocalization. Differences between measurements can be analyzed by scoring the same group of dogs in several personality measurements and thereafter compare different dog breeds, sexes and age groups and also by looking for correlations between scored factors.

Various behaviour and personality questionnaires have been developed by scientists and widely used in research and by professional dog workers (Rayment et al. 2016). Three of these are the Dog Personality Questionnaire, the Monash Canine Personality Questionnaire-Revised and the Canine Behavioural Assessment and Research Questionnaire. All three of them have in previous studies been evaluated and also confirmed to be reliable tools for measuring personality in dogs (Rayment et al. 2016, Jones 2009).

The aim of this study was to compare and evaluate the Monash Canine Personality Questionnaire-Revised (MCPQ-R) (Ley et al. 2009a), the Canine Behavioural Assessment and Research Questionnaire (CBARQ) (Hsu & Serpell 2003) and the Dog Personality Questionnaire (DPQ) (Jones 2009). Do results from different questionnaires differ from each other or do they give the same

result? The evaluation was done in two ways. Firstly, questionnaires were tested against each other to find correlations between them. Secondly, the questionnaires were used to study differences between groups of dogs.

3 Material & methods

In this study 181 dog owners participated with their dogs. Age of the dogs ranged from 0-14 years (mean age 5.05 ± 0.261). Dog owners could express their interest to participate in the study over the internet, where they also gave information about breed, age and sex of the dog and their own email. Further, all participants were emailed links to three established questionnaires to measure dog behaviour and personality. These were MCPQ-R, C-BARQ and DPQ.

3.1 Questionnaires

3.1.1 MCPQ-R

MCPQ-R stands for Monash Canine Personality Questionnaire Review and has been developed by Ley, Bennett and Coleman (2007). The questionnaire consists of 26 adjectives which do or do not fit into the personality of the dog. All participants used a six-point scale to rate and describe how well each adjective fitted their dog. In this case 1 indicated that the adjective "do not fit at all" and 6 indicated "fits perfectly". The results are categorized into five different subscales, "Extraversion", "Self-Assuredness/Motivation", "Training/focus", "Amicability" and "Neuroticism", which are similar to the scales used in the common used human personality test, The Big Five Model (Digman 1990). MCPQ-R only has five factors and does therefore measure personality in a very broad context.

3.1.2 C-BARQ

C-BARQ stands for Canine Behavioral Assessment and Research Questionnaire and is a questionnaire developed by the scientists Yuying Hsu and James A. Serpell (2003). It consists of 78 questions concerning personality. Dog owners were asked to rate their dog on a five point scale based on how strong the dog would react to different every-day situations with, for example, aggressive behavioiur. In some questions the scale was instead rated from "never" to "always". The result are categorized into 14 different factors, these are "Owner-directed aggression", "Stranger-directed aggression", "Dog directed aggression", "Dog directed fear", "Dog rivalry", "Trainability", "Chasing", "Stranger-directed fear", "Nonsocial fear", "Separation-related behaviour/problems", "Touch sensitivity", "Excitability", "Attachment/Attention-seeking" and "Energy" (Hsu & Serpell 2003).

3.1.3 DPQ

DPQ stands for Dog Personality Questionnaire and have been developed by Amanda Jones (2009). The questionnaire consists of 75 statements on how a dog would react in different situations. All participants used a seven-point scale to rate and describe how much they agreed with the statement. In this case 1 indicated that the owner "Disagree strongly" and 7 indicated "Agree strongly". 4 indicated that the owner "Neither agree nor disagreed" to the statement. Jones wanted to create a questionnaire that could analyze dog personality easy, fast and reliable for both pet dogs and working dogs. The results are categorized into five different factors, namely "Fearfulness", "Aggression towards people", "Activity/Excitability", "Responsiveness to training" and "Aggression towards animals". These five factors are thereafter divided into subcategories. "Fearfulness" is divided into "Fear of people", "Nonsocial fear", "Fear of dogs" and "Fear of handling". "Aggression towards people" is divided into "General aggression" and "Situational aggression". "Activity/Excitability" is divided into "Excitability", "Playfulness", "Active engagement" and "Companionability". "Responsiveness to training" is divided into "Trainability" and "Controllability". The last factor, "Aggression towards animals", is divided into "Aggression towards Dogs", "Prey Drive" and "Dominance over Other Dogs" (Jones 2009).

3.2 Data analysis

All factors were scored according to published guidelines. To compare the results from the three questionnaires, correlations between different factors from different questionnaires were analyzed. The data was considered sufficiently normally distributed for parametric testing and therefore Pearson's test were used.

Age, breed and sex differences were analyzed to see if the results differed between the questionnaires. Dogs were divided into two different age groups, to analyze whether there were any differences between older and younger dogs. Data were split in two half to create these groups, 0-4 years (N=91) and 5-14 years (N=90). Males (N=100) and females (N=81) were compared to analyze whether there were any differences between sexes. The breeds that were the most popular in this study were used to compare breeds. These breeds were Nova Scotia Duck Tolling Retriever (N=9) and Labrador Retriever (N=8). General linear models were used to analyze differences between age groups, breeds and sexes.

P-values below 0.05 were considered significant. All data was analyzed using IBM SPSS 23.0.

4 Results

4.1 Relationship between factors

Correlations have been analyzed between questionnaires, in order to compare them. Due to the high amount of correlations found, all of them will not be mentioned here but can instead be found in the Appendix.

All three questionnaires have one factor measuring the trainability. For a complete version of correlations, see table 1 in the Appendix. DPQ also have one factor measuring controllability which is related to trainability and also has a positive correlation with it (see figure 1). "Controllability" includes questions about for example dominance, destructiveness, how the dog act on and off leash and sneaking behaviours. Correlations between these four factors from the three questionnaires can be found in table 1.

The trainability factors further correlated positively with factors regarding for example engagement and attachment/attention seeking and negative correlations were instead found with factors related to for example chasing. "Controllability" from DPQ had further negative correlations with for example the C-BARQ factors "Energy" and "Separation-related behavior/problems".

Table 1 Persons correlation coefficient between factors from DPQ, MCPQ-R and C-BARQ with a significant difference. Factors are related to trainability, focus and controllability in the domestic dog.

	MCPQ-Training/focus	**DPQ-Trainability**	**C-BARQ-Trainability**	**DPQ-Controllability**
MCPQ-Training/focus		0.672	0.652	0.427
DPQ-Trainability	0.672		0.763	
C-BARQ-Trainability	0.652	0.763		0.521
DPQ-Controllability	0.427		0.521	

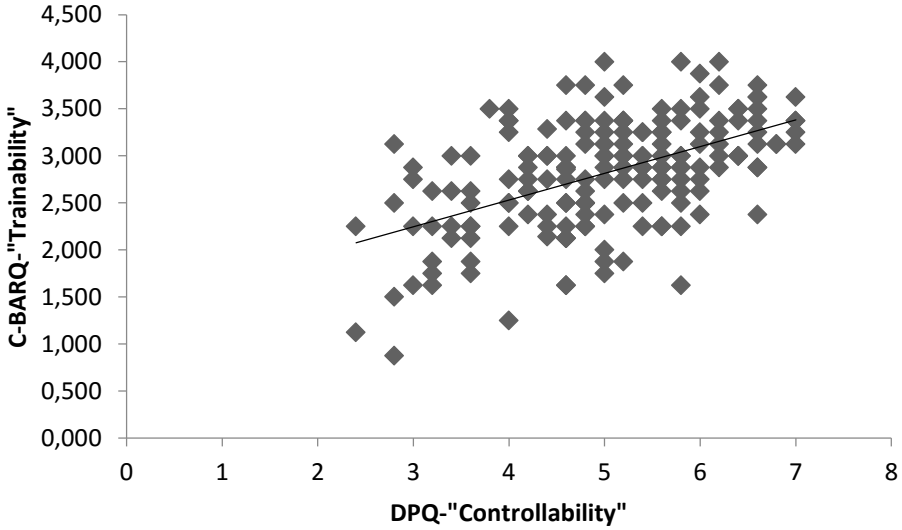

Figure 1 The correlation between the C-BARQ factor "Trainability" and the DPQ factor "Controllability" in the domestic dog

"Amicability" from MCPQ-R refers to how tolerating a dog is to other individuals, regardless if they are humans or animals (Ley et al. 2007). Similar, DPQ and C-BARQ factors refer instead to aggression and dominance. Factors from DPQ are "Situational aggression", "General aggression", "Dominance over other dogs" and "Aggression towards dogs" while corresponding factors from C-BARQ are "Stranger-directed aggression", "Owner-directed aggression", "Dog-directed aggression" and "Dog rivalry". "Amicability" has a negative correlation with factors related to aggression as expected (see for example figure 2). Correlations between these factors can be found in table 2 while a complete version of correlations can be found in table 2 in Appendix.

The MCPQ-R factor "Amicability" further correlated positively with "Companionability" from DPQ and negatively with several factors referring to fear. Aggression-related factors from both C-BARQ and DPQ correlated positively with factors related to for example self-assuredness/motivation, neuroticism and chasing and negative with for example fear, companionability and trainability. The expectation was to find a correlation between "Dog rivalry" and "Self-assuredness/motivation", which was not met.

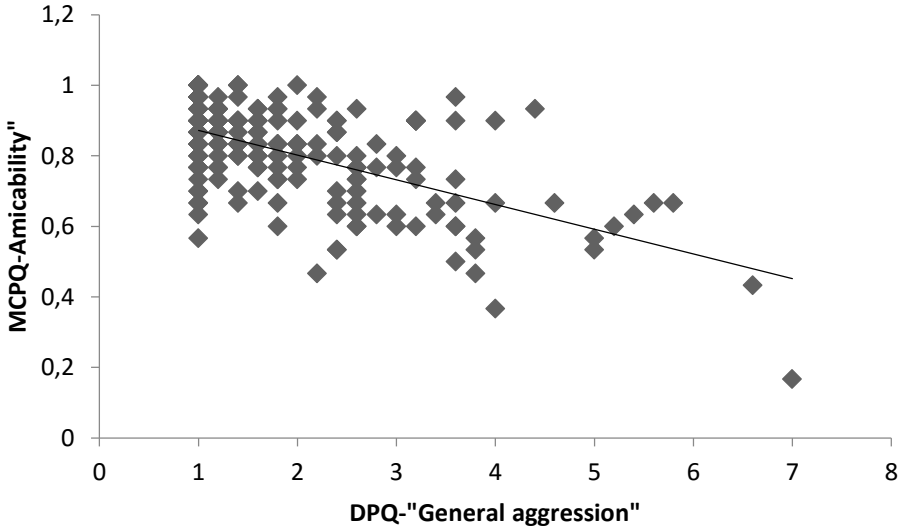

Figure 2 The correlation between the MCPQ-R factor "Amicability" and the DPQ factor "General aggression" in the domestic dog.

Table 2 Persons correlation coefficient between factors from DPQ, MCPQ-R and C-BARQ with a significant difference. Factors are related to amicability, aggression and dominance in the domestic dog. The marker ns indicate a non-significant result.

	MCPQ-Amicability	DPQ-Situational aggression	DPQ-General aggression	DPQ-Aggression towards dogs	DPQ-Dominance over other dogs	C-BARQ-Stranger-directed aggression	C-BARQ-Owner-directed aggression	C-BARQ-Dog-directed aggression	C-BARQ- Dog rivalry
MCPQ-Amicability		-0.477	-0.592	-0.562	-0.204	-0.581	-0.247	-0.468	-0.208
DPQ-Situational aggression	-0.447					0.490	0.515	0.370	0.281
DPQ-General aggression	-0.592					0.759	0.160	0.478	0.175
DPQ-Aggression towards dogs	-0.562					0.406	ns	0.787	0.300
DPQ-Dominance over other dogs	-0.204					ns	0.315	0.285	0.583
C-BARQ-Stranger-directed aggression	-0.581	0.490	0.759	0.406	ns				
C-BARQ-Owner-directed aggression	-0.247	0.515	0.160	ns	0.315				
C-BARQ-Dog-directed aggression	-0.468	0.370	0.478	0.787	0.285				
C-BARQ-Dog rivalry	-0.208	0.281	0.175	0.300	0.583				

Fearful behaviour in dogs only has one dimension named “Neuroticism” in MCPQ-R. On the contrary, in both DPQ and C-BARQ several different dimensions are studied. In DPQ, these are “Nonsocial fear”, “Fear of people”, “Fear of handling” and “Fear of dogs”. Similar factors found in C-BARQ are “Nonsocial fear”, “Stranger-directed fear”, “Touch sensitivity” and “Dog-directed fear”. Correlations between all these factors can be found in table 3 and complete results of the correlations can be found in table 3 in the appendix.

Further, positive correlations for fear-related factors were found with for example factors referring to aggression, separation-related behavior/problems, excitability and chasing. Negative correlations for these fear-related factors could be found with factors referring to playfulness, trainability, self-assuredness/motivation and amicability.

Table 3 Persons correlation coefficient between factors from DPQ, MCPQ-R and C-BARQ with a significant difference. Factors are related to fear in the domestic dog.

	MCPQ- Neuroticism	**DPQ- Nonsocial fear**	**DPQ- Fear of people**	**DPQ- Fear of handling**	**DPQ- Fear of dogs**	**C-BARQ- Nonsocial fear**	**C-BARQ- Stranger-directed fear**	**C-BARQ- Touch sensitivity**	**C-BARQ- Dog-directed fear**
MCPQ- Neuroticism		0.788	0.611	0.440	0.639	0.497	0.534	0.177	0.479
DPQ- Nonsocial fear	0.788					0.548	0.454	0.207	0.415
DPQ- Fear of people	0.611					0.409	0.715	0.170	0.439
DPQ- Fear of handling	0.440					0.447	0.241	0.557	0.180
DPQ- Fear of dogs	0.639					0.550	0.488	0.239	0.649
C-BARQ- Nonsocial fear	0.497	0.548	0.409	0.447	0.550				
C-BARQ- Stranger-directed fear	0.534	0.454	0.715	0.241	0.488				
C-BARQ- Touch sensitivity	0.177	0.207	0.170	0.557	0.239				
C-BARQ- Dog-directed fear	0.479	0.415	0.439	0.180	0.649				

“Extraversion” in MCPQ-R reflects a dog that is lively, energetic and excited (Let et al. 2009b). C-BARQ has two similar factors named “Energy” and “Excitability” while DPQ has three named “Playfulness”, “Active engagement” and “Excitability”. Correlations between these six factors can be found in table 4. A complete version of the correlations can be found in table 4 in the appendix. The MCPQ factor only correlated negative with the DPQ factor measuring controllability. Positive correlations were contrariwise plenty. These

correlations were with for example “Separation-related behavior/problems”, “Fear of dogs” and “Companionability”.

The C-BARQ factor “Energy” refers to the general level of energy within the dog while “Excitability” refers to the dog’s level of excitement during special situations, like when the doorbell rings (Hsu & Serpell 2003). The DPQ factor ”Playfulness” refers to the dog’s willingness to play, “Active engagement” describes dog’s interest in their environment and physical activity and “Excitability” refers to the dog’s level of excitement during special situations (Jones 2009).

Further correlations for these factors can be found positive with factors referring to for example trainability, self-assuredness/motivation and attachment/attention seeking and negative with factors referring to for example controllability, chasing, amicability and touch sensitivity.

Table 4 Persons correlation coefficient between factors from DPQ, MCPQ-R and C-BARQ with a significant difference. Factors are related to excitement, energy, playfulness and extraversion in the domestic dog. The marker ns indicate a non-significant result.

	MCPQ-Extraversion	**C-BARQ-Energy**	**C-BARQ-Excitability**	**DPQ-Active engagement**	**DPQ-Playfulness**	**DPQ-Excitability**
MCPQ-Extraversion		0.707	0.391	0.514	0.398	0.731
C-BARQ-Energy	0.707			0.443	0.386	0.603
C-BARQ-Excitability	0.391			0.157	ns	0.351
DPQ-Active engagement	0.514	0.443	0.157			
DPQ-Playfulness	0.398	0.386	ns			
DPQ-Excitability	0.731	0.603	0.351			

C-BARQ-“Chasing” and DPQ-“Prey drive” describes chasing and predatory behaviour towards smaller animals (Jones 2009, Hsu & Serpell 2003). Both of them correlated positive with each other (see figure 3) and also with factors referring to for example aggression, dominance and self-assuredness/motivation. Negative correlations could instead be found with factors referring to amicability, trainability and controllability. A complete version of correlations can be found in table 5 in appendix.

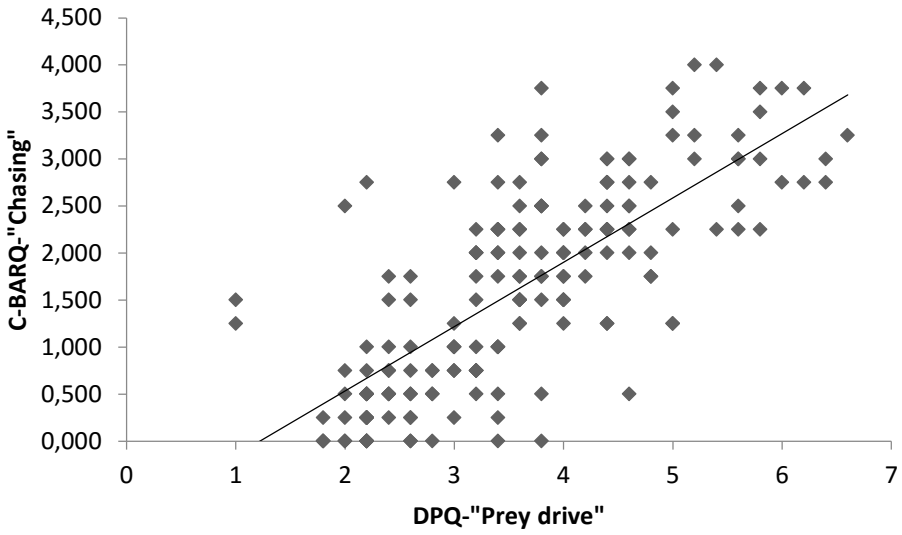

Figure 3 The correlation between the C-BARQ factor "Chasing" and the DPQ factor "Prey drive" in the domestic dog.

The factor “Self-assuredness/Motivation” from the MCPQ-R reflects a dog that might show a tendency to be competitive aggressive and show social confidence such as assertiveness, perseverance and also tenacity (Ley et al. 2007). This factor shows several correlations but none of them are especially high. Negative correlations could be found with for example factors referring to fear and controllability. Further, “Self-assuredness/Motivation” correlated positively with for example “Dominance over other dogs”, “Prey drive”, “Active engagement” and “Owner-directed aggression”. For more information see table 6 in the Appendix.

C-BARQ factor “Attachment/attention-seeking” and DPQ factor “Companionability” are both supposed to measure to which extend dogs are attached to and seek companionship with humans. The highest correlations were found with each other for both factors (see figure 4). A complete result of the correlations for these factors can be found in table 7 in appendix. Positive correlations for these factors were found with factors referring to for example fear, trainability, excitability and extraversion. Negative correlations could be found with factors referring to for example aggression and fear.

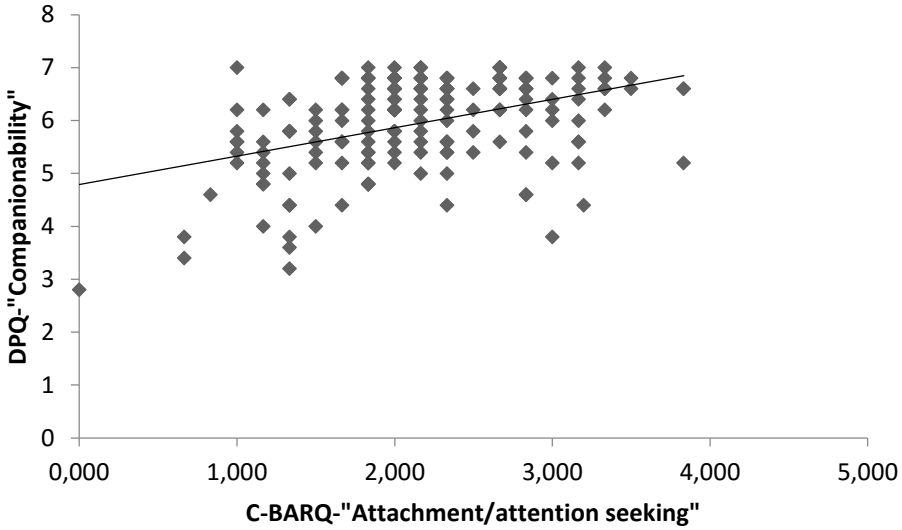

Figure 4 The correlation between the C-BARQ factor "Attachment/attention seeking" and the DPQ factor "Companionability" in the domestic dog.

The C-BARQ factor “Separation-related behavior/problems” does not have any correspondent factor in neither DPQ nor MCPQ-R. Negative correlations could however be found with “Amicability”, “Self-assuredness/motivation and “Controllability” and positive correlations with “Situational aggression”, “Excitability”, “Fear of dogs”, “Nonsocial fear”, “Extraversion” and “Neuroticism”. For more info see table 8 in Appendix.

4.2 Differences between age groups

The comparison between the two different age groups found differences in several of the categories, these are displayed in figure 5. Younger dogs showed higher “Companionability” ($F_{(1.177)}$=13.408, P=0.000), “Energy” ($F_{(1.177)}$= 10.304, P=0.002), “Excitability” ($F_{(1.177)}$= 11.445, P=0.001), “Playfulness” ($F_{(1.177)}$= 20,939, P=0,000), “Active engagement” ($F_{(1.177)}$= 7.889, P=0.006) and “Extraversion” ($F_{(1.177)}$= 13.585, P=0.000) while older showed higher “Touch sensitivity” ($F_{(1.177)}$= 8.992, P=0.003), “Fear of handling” ($F_{(1.177)}$= 9.343, P=0.003) and “Aggression towards dogs” ($F_{(1.177)}$= 11.871, P=0.001)(see figure 5).

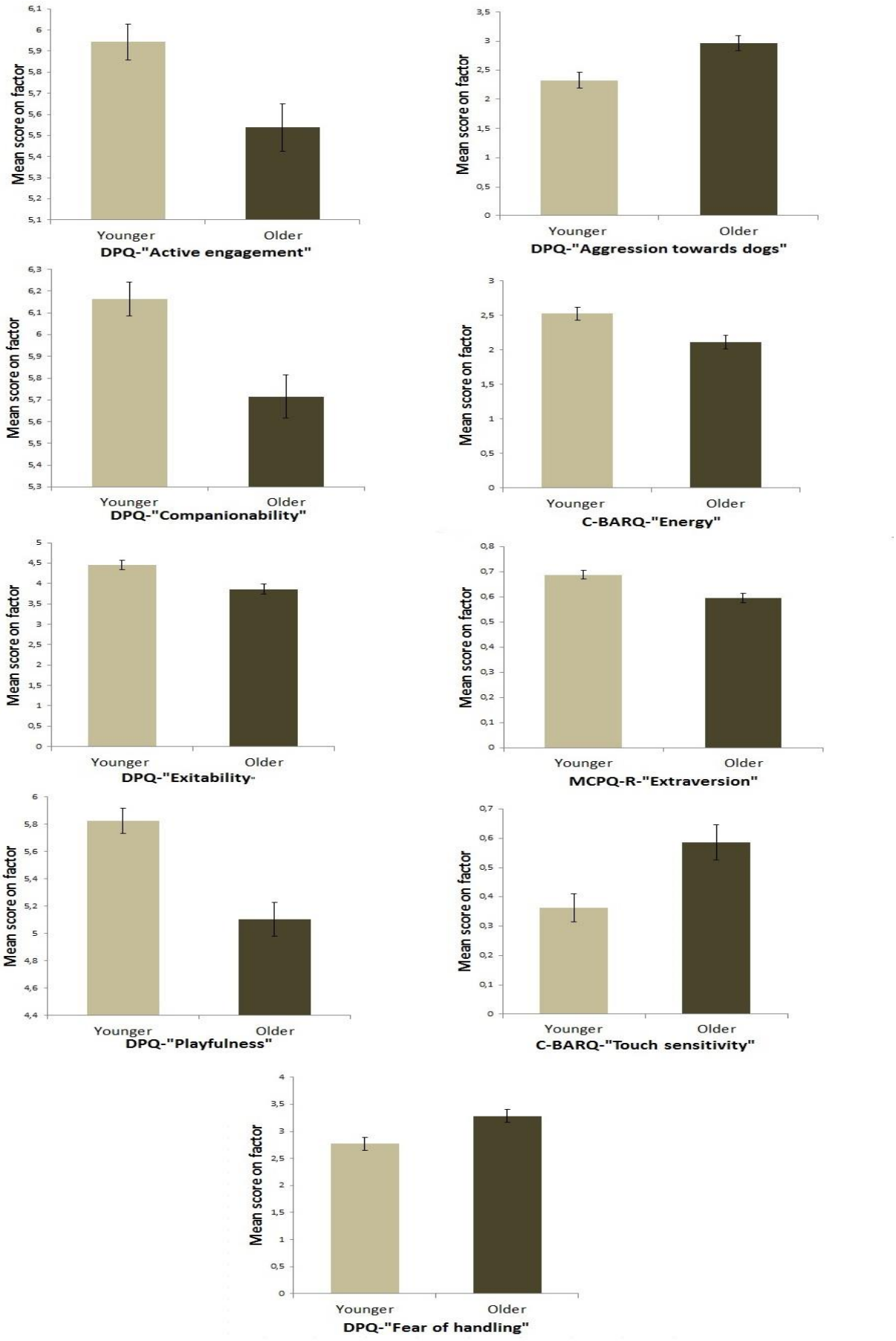

Figure 5 Mean scores (±SE) for factors showing a significant difference between older (5-14 years) and younger (0-4 years) dogs.

4.3 Differences between sexes

In the comparison between males and females, the result indicated that female dogs had a higher "Fear of dogs" ($F_{(1.177)}$= 4.240, P=0.041), lower "Dominance over other dogs" ($F_{(1.177)}$= 10.527, P=0.001) and a higher "Training/Focus" ($F_{(1.177)}$= 4.255, P=0.041) than male dogs (see figure 6).

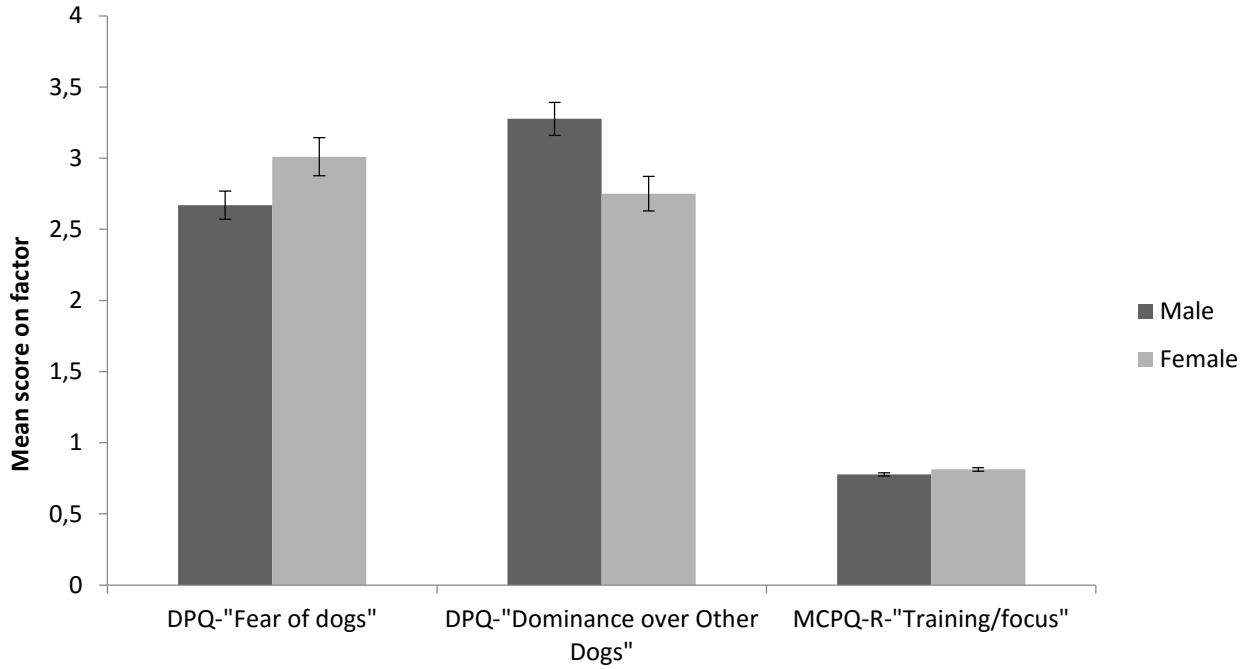

Figure 6 Mean scores (±SE) for factors with a significant difference between males and females in the domestic dog.

Additionally, there was also a significant interaction between sex and age. In the C-BARQ factor "Energy", younger female showed more energy than males while it was the opposite in the older age group ($F_{(1.177)}$=4.695, P=0.032) (See figure 7).

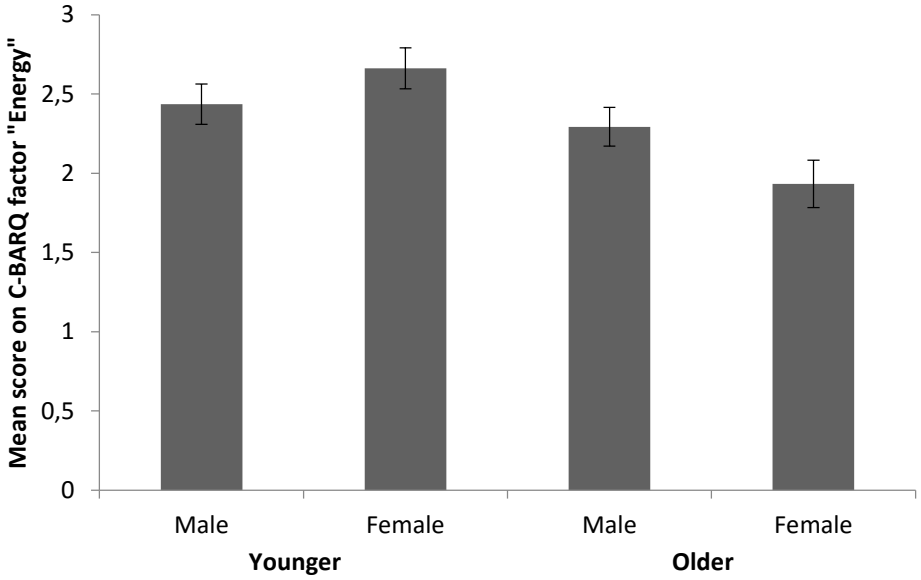

Figure 7 Mean score (±SE) on C-BARQ factor "Energy" for younger (0-4 years) and older (5-14 years) depending on sex in the domestic dog.

4.4 Differences between breeds

When comparing Nova Scotia Duck Tolling Retrievers and Labrador Retrievers differences between breeds could be found in six factors. Nova Scotia Duck Tolling Retrievers showed higher "Nonsocial Fear" ($F_{(1.15)}$= 4.900, P=0.043), "Fear of dogs" ($F_{(1.15)}$= 6.811, P=0.020), "Fear of Handling" ($F_{(1.15)}$= 5.376, P=0.035), "Dominance over Other Dogs" ($F_{(1.15)}$= 7.569, P=0.015) and "Neuroticism" ($F_{(1.15)}$= 5.535, P=0.033). Labrador Retrievers instead showed higher "Amicability" ($F_{(1.15)}$ = 6.843, P=0.019) (see figure 8).

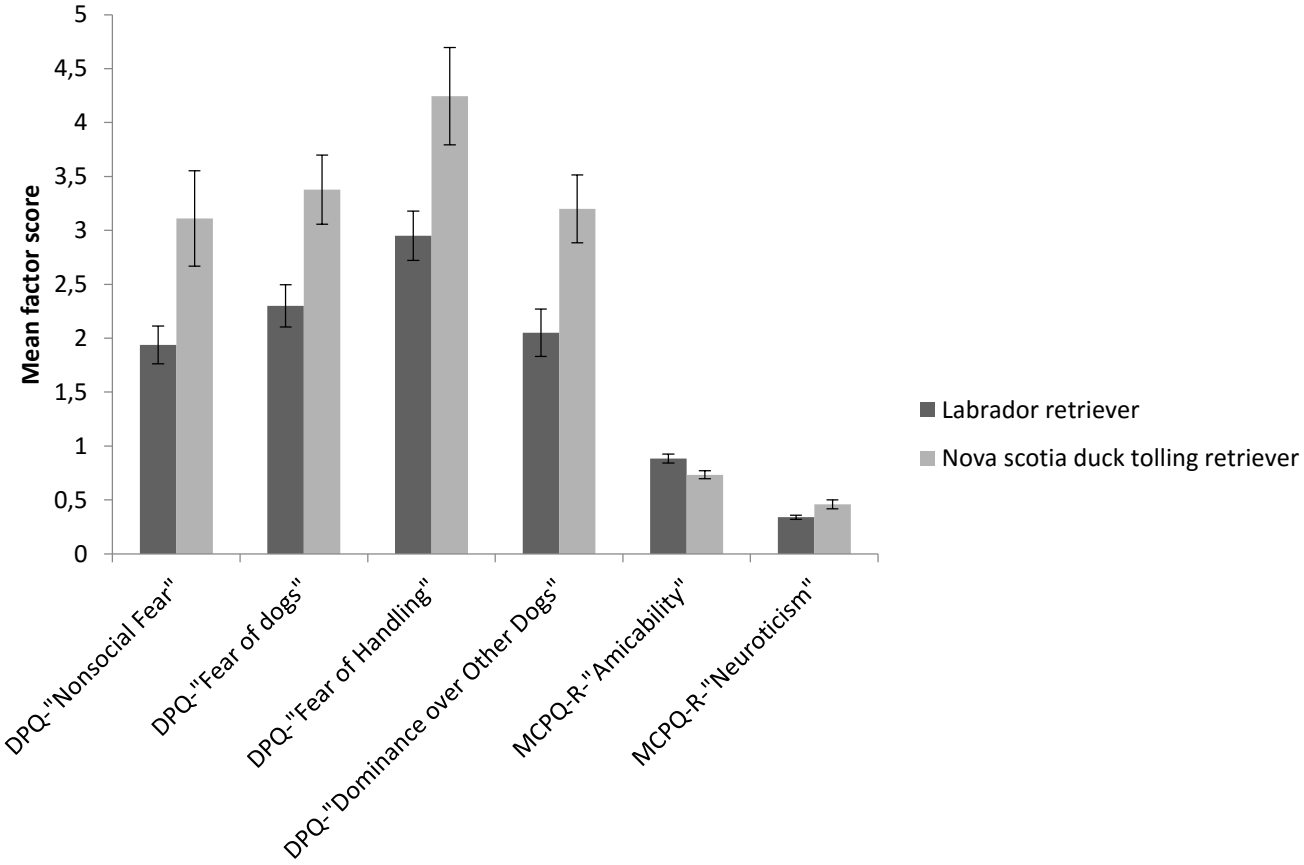

Figure 8 Mean scores (±SE) for factors with a significant difference between Nova Scotia Duck Tolling Retriever and Labrador Retriever.

5 Discussion

The aim of this study was to compare and evaluate the Monash Canine Personality Questionnaire-Revised (MCPQ-R) (Ley et al. 2009a), the Canine Behavioural Assessment and Research Questionnaire (CBARQ) (Hsu & Serpell 2003) and the Dog Personality Questionnaire (DPQ) (Jones 2009). Differences between questionnaires were analyzed in two ways. Firstly, questionnaires were tested against each other to find correlations between them. Secondly, the questionnaires were used to study differences between groups of dogs.

The results from the correlation between factors varied. Almost all factors contained both expected and unexpected correlations. Corresponding factors mostly had the highest correlation with each other, which gives them a good validity. According to all the questionnaires, younger dogs were significantly more energetic and extroversive compared to older dogs. The group consisting of older dogs was confirmed in both C-BARQ and DPQ to be significantly more likely to be fearful towards handling (see figure 5). DPQ also found older dogs to be more aggressive, while the corresponding factor in C-BARQ was not significant. Lack of significance could be found in the C-BARQ factor "Excitability" while the corresponding factor from DPQ was significant. Differences between sexes were limited. Females were more likely to be fearful towards dogs and less likely to be dominant, compared to males (see figure 6) in DPQ but not in C-BARQ. According to MCPQ-R females scored significantly higher on "Training/focus", something that was not confirmed in the two other questionnaires. The comparing of breeds indicated that Nova Scotia Duck Tolling Retrievers were significantly more fearful and less friendly compared to Labrador Retrievers (see figure 8). These results could be found in both DPQ and MCPQ-R but not in C-BARQ. The results from this study indicated that all three of the questionnaires worked mostly as expected. However, smaller problems have occurred within all of them. Corresponding factors did not always correlate with same factors, which were not expected.

5.1 Relationship between factors

A lot of correlations between factors could be found in the statistical analysis. Some of them are logical while some of them need some more reflections.

The highest correlations for the three trainability factors were with each other, which strengthen the validity for these three factors. A trait related to trainability is "Controllability", which is measured in the DPQ and describes if the dog is easy to control or if it, for example, often runs away (Jones 2009). The trait correlated negatively with factors related to chasing, excitability, energy, separation-related problems, extraversion and self-assuredness/motivation which

mostly were expected. The positive correlations with all trainability related factors strengthen the reliability for the DPQ factor “Controllability”.

The MCPQ-R factor “Amicability” only correlated positively with DPQ “Companionability”. This factor however correlated negatively with a lot of factors. What these factors have in common is that they are based on behaviours like aggression, fear and uncontrollability. These findings are logical since Ley et. al (2009a, 2009b) have defined “Amicability” as how a dog react to other individuals, both considering pro-social behaviour and lack of aggressive behaviour.

Neither DPQ nor C-BARQ has a directly corresponding factor to amicability. Instead, these measure aggression and dominance. The C-BARQ factor “Dog-directed aggression” and the DPQ factor “Aggression towards dogs” correlated positive and highest with each other as expected. No expected correlation was missing and none of them correlated with unexpected factors either.

Aggression towards people has been measured in a number of ways. DPQ has named it “General aggression” and “Situational aggression”. “General aggression” describes a dog that is aggressive towards people in general while “Situational aggression” describes a dog that is aggressive towards people in special situations, for example when disturbed, threatened or during visits to the veterinarian (Jones 2009). C-BARQ on the other hand has chosen to call it “Owner-directed aggression” and “Stranger-directed aggression” instead. The difference between these questionnaires is that C-BARQ is focusing on who the aggression turns against (Hsu & Serpell 2003). Expected correlations with aggression, fear and excitement could be found as well as no unexpected correlations.

C-BARQ factor “Dog rivalry” reflects to a dog that acts aggressively towards familiar dogs in the same household (Hsu & Serpell 2003). “Dog rivalry” correlated positive with several factors related to aggression and dominance. Further, it did not correlate with “Self-assuredness/motivation” which is in line with previous studies (Rayment et al. 2016). This is unexpected since this factor is supposed to measure protection of resources and competitive aggression. No correlation between these factors might indicate that the behaviour measured in “Dog rivalry” might be influenced by context-specific factors (Rayment et al. 2016). This means that the description of the factor “Dog rivalry” from C-BARQ might have been influenced by other behaviour factors as well. DPQ have a similar factor named “Dominance over other dogs”. This factor includes for example guarding of food and toys and dominant and pushy behaviour (Jones 2009). Both “Dominance over other dogs” and “Dog rivalry” have the highest correlation with each other which is expected and strengthening for the validity of the factors. “Dominance over other dogs” on the other hand has a

positive correlation with “Self-assuredness/motivation”. A dog who acts dominant towards other dogs is likely to act guarding and protective of resources (Borchelt 1983).

The factor “Neuroticism” in MCPQ-R is considered to describe nervousness, emotional instability and negative affect in a dog’s behaviour (Ley et al. 2009b). “Neuroticism” correlated with every factor that are relating to some kind of fear in both DPQ and C-BARQ, but also some factors related to aggression. This is similar to earlier results from a study made by Rayment et al (2016) in which they compared MCPQ and C-BARQ. Rayment et al (2016) discusses that the result could indicate that factors from C-BARQ show different behaviour manifestations of a pre-disposition of behaviours like fearfulness, emotional reactivity and neophobia. This study indicates that DPQ might have similar results as C-BARQ.

Compared to MCPQ-R, both DPQ and C-BARQ have several factors describing fear. MCPQ-R have measured this personality dimension in a much broader way while the other two are more specific on whom the fearful behaviour are turned against. Factors describing fear of dogs can be found in both C-BARQ and DPQ. The highest correlations for both factors can be found with each other. This strengthens the possibility that these two factors are measuring the same behaviour. All correlations for the C-BARQ factor except for “Training/Focus” and “Excitability” are expected to be found. The DPQ factor for measuring fear of dogs correlated positively with factors referring to an extroversive personality. A fearful dog can act stressed (Dreschel 2010) which can explain the correlation with excitability (Hiby et al. 2006). Extraversion however is difficult to explain. It seems like both questionnaires have a similar way of measuring fear of dogs.

DPQ-“Fear of handling” and C-BARQ-“Touch sensitivity” are supposed to measure the potential a dog has to act fearful when handled or groomed. These factors’ similarity is confirmed because their highest correlation is with each other. Both behavioural traits correlated positively with several factor relating to fear, aggression and neuroticism. Negative correlations could be found with factors like “Playfulness” and “Companionability” from DPQ. A dog who is scared of physical contact can be expected to be unwilling to play with and seek contact with humans. However, an insecure dog is also expected to show a negative correlation with “Self-assuredness/motivation”. The DPQ factor correlated negatively with “Self-assuredness/motivation” as expected. On the other hand, no negative correlation could be found with “Attachment/attention-seeking”.

Fear of people has been measured in slightly different ways. C-BARQ has chosen to call it “Stranger-directed fear” while DPQ has chosen to call it “Fear

of people". The difference between these factors is that DPQ does no define whether it concerns familiar or unfamiliar people while C-BARQ only concerns strangers. The highest correlations for both factors can be found with each other, this could strengthens the validity for both questionnaires since it looks like they are measuring the same behaviour. The C-BARQ factor correlated with expected factors and does not have any unexpected correlations either. From this point of view, C-BARQ seems to have a reliable way of measuring fear of people. The fear of human-factor in the DPQ correlated unexpectedly with "Separation-related behavior/problems" and "Chasing". Both questionnaires seem to have a valid method to measure fear of humans, also, all expected correlations could be found.

Both C-BARQ and DPQ have a factor named "Nonsocial fear". These factors are supposed to describe neophobia and should therefore correlate with factors like "Neuroticism". Results indicate that they both correlate with each other and with "Neuroticism". They also correlate with the same type of factors describing a dog that is fearful, unsecure, difficult to train and unwilling to play.

"Extraversion" in MCPQ-R reflects to a dog that is lively, energetic and excited (Let et al. 2009b). However, it unexpectedly correlated positive with the DPQ factor "Fear of dogs". C-BARQ has two factors similar to "Extraversion" named "Energy" and "Excitability". "Energy" refers to the general level of energy within the dog while "Excitability" refers to the dog's level of excitement during special situations, like when the doorbell rings (Hsu & Serpell 2003). DPQ has three factors related to "Extraversion". These are "Playfulness", "Active engagement" and "Excitability". "Playfulness" refers to the dog's willingness to play, "Active engagement" describes dog's interest in their environment and physical activity and "Excitability" refers to the dog's level of excitement during special situations (Jones 2009). All factors describing energy, excitement, activity and playfulness seems to be reliable. The only unexpected correlation is a negative correlation with "Amicability" for the C-BARQ factor "Energy".

C-BARQ-"Chasing" and DPQ-"Prey drive" describes chasing and predatory behaviour towards smaller animals (Jones 2009, Hsu & Serpell 2003). Both of them have as expected the highest correlation with each other. The DPQ factor correlated negatively with factors related to training. This is the opposite of what Svartberg (2005) found in his study. Svartberg (2005) evaluated the validity of a behavioural and personality test, "Dog Mentality Assessment", on dogs by comparing its results with C-BARQ. Svartberg (2005) could not find any significance between factors describing trainability and factors describing chasing and predatory behaviour towards smaller animals. Further, positive correlation could be found with "Dog-directed aggression" and "Self-assuredness/motivation". The correlation with "Self-assuredness/motivation is expected since a confident dog is more likely to act predatory (Hsu & Serpell

2003). A correlation with an aggressive behaviour towards dogs is expected since a dog who is predatory aggressive is likely to also be aggressive towards unfamiliar dogs (Cháveza & Opazob 2012). The C-BARQ factor shows similar correlation as the DPQ factor in most cases. It however shows positive correlations with "General aggression" and "Fear of people" as well. The correlation with "Fear of people" is difficult to explain.

The factor "Self-assuredness/Motivation" from the MCPQ-R reflects a dog that might show a tendency to be competitive aggressive and show social confidence such as assertiveness, perseverance and also tenacity (Ley et al. 2007). It is not surprising that "Self-assuredness/Motivation" show a negative correlation with factors describing fear. Positive correlations with the factors "Prey drive" and "Chasing" strengthens the reliability of the factor "Self-assuredness/Motivation". No correlation is especially high, which probably is due to the fact that neither DPQ nor C-BARQ has a factor which is completely corresponding.

C-BARQ factor "Attachment/attention-seeking" and DPQ factor "Companionability" are both supposed to measure to which extend dogs are attached to and seek companionship with humans. The DPQ factor correlated negatively with factors related to aggression and fear while the corresponding C-BARQ factor did not have any negative correlations. Why the C-BARQ factor did not correlate negatively with factors related to aggression and fear while the corresponding DPQ factor did can be due to the fact that they do not measure exactly the same behaviour. The DPQ includes questions about affection that C-BARQ lack which may have an effect.

C-BARQ factor "Separation-related behavior/problems" does not have any correspondent factor in neither DPQ nor MCPQ-R. The expectation was that a dog that has problems with being alone might be very attached to humans. This was however not the case since no significant correlations could be found to those factors. Most of the correlating factors were expected except the positive correlation with the DPQ factor referring to fearfulness towards people. A dog that finds loneliness frightening should not be fearful towards people as well. This correlations were however not as unexpected as first thought. The correlation is probably due to the fact that DPQ does not define who the fearful behaviour are turned against. A dog that is fear of strangers is not necessarily fear of familiar people as well and a dog with separation problems can be fearful towards strangers. In conclusion, "Separation-related behavior/problems" seem to be a reliable way of measuring this behaviour. The validity of this factor is however difficult to evaluate since no corresponding factor is to be found.

5.2 Differences between age groups

It is not surprising that older dogs show lower scores on factors referring to energy and playfulness. Baranyiová and colleagues (2004) could see the same result in their study, older dogs were less active. A higher level of "Touch sensitivity" and "Fear of handling" can be due to the fact that dogs, just like humans, might have a deteriorating hearing, sight and olfaction (Baranyiová et al. 2004). Also health problems like pain might cause this behaviour (Hellyer 2007). Another study made by Chapman and Voith (1990) saw that some behavioural problems occur more frequently after 10 years of age. These behavioural problems were for example separation anxiety or excessive vocalization. These results were however not found in this study. This can probably be due to the fact that the older age group in this study included dogs from 5 years of age instead of 10.

When using DPQ there is a difference between the age groups in aggression towards dogs, while in C-BARQ, the corresponding factor is not significant. This is surprising since these factors are supposed to measure the same thing and the correlation analysis show a high correlation between the two.

5.3 Differences between sexes

The result also indicated that female dogs have a higher fear of dogs and lower dominance over other dogs in DPQ and higher trainability in MCPQ but not in the corresponding factors in C-BARQ. However, earlier studies have found results that indicated that males have a higher potential to be aggressive (Gershman et al. 1994). A study made by Wilson and Sundgren (1997) indicated that males had a significantly higher score on courage, prey drive and defense. In this study males have a significant higher score on "Dominance over other dogs" instead. "Dominance over other dogs" strongly correlates positively with several factor describing aggressions and negatively with factors describing fear and amicability. It is not surprising that female dogs scored significantly higher on fear of dogs since that factor correlated negative with "Dominance over other dogs". Why MCPQ-R-"Training/focus" showed a significant difference while none of C-BARQ or DPQ did on the same factor can be due to the fact that MCPQ-R measures personality in a much broader way.

5.4 Differences between breeds

The results indicated that Nova Scotia Duck Tolling Retriever scored significantly higher on several factors describing fear, dominance and neuroticism. They also scored lower on MCPQ-R-"Amicability". However, no significant differences could be found in any factors from C-BARQ. Earlier

studies have shown that Labrador Retrievers scored lower on factors regarding aggressive (Duffy et al. 2008) and fearful (Svartberg 2006) personality compared to Nova Scotia Duck Tolling Retriever. In a study by Svartberg (2006), Nova Scotia Duck Tolling Retriever scored low on a fearless while Labrador Retriever scored high, indicating that Nova Scotia Duck Tolling Retriever is more fearful than Labrador Retrievers. In Svartberg's (2006) study fearfulness was measured by ten subtests. These tests included variables like social contact, playing, chasing, sudden appearance, metallic noise, ghosts and gunshots. DPQ found similar results as those from Svartberg (2006).

5.5 General discussion

DPQ seemed to be the most reliable questionnaire when taking all results from this study into consideration. However, further evaluations like behaviour tests needs to be done as well on this questionnaire to be able to confirm this. C-BARQ show a more reliable result on a few factors as well but DPQ has less unexpected results. The results from DPQ can also mostly be confirmed by earlier studies. Problems that occur with C-BARQ are a lot of unexpected correlations and un-significant results on factors that were expected to be significant. MCPQ-R gives a much broader picture of personality, but it is also very unspecific at the same time. It seems like MCPQ-R is reliable as long as the low number of dimensions is enough for the purpose. The validity of the DPQ and C-BARQ seems slightly similar. MCPQ-R on the other hand is a bit more difficult to evaluate because of the broad personality dimension. Further, results from both the comparison between breeds and the comparison between age groups might strengthen the reliability of DPQ over both C-BARQ and MCPQ-R.

In a previous study made by Rayment et al (2016), relationships between personality and behavioural traits in pet dogs were investigated. This was done by investigating the correlations between factors from three different questionnaires. Two factors from C-BARQ were proved to be unstable depending on the owners' previous experiences of dogs. These were "Dog rivalry" and "Owner-directed aggression". None of the MCPQ-R factors indicated a similar sensitivity. DPQ on the other hand were not evaluated in the study made by Rayment (2016). Results from this study confirm Rayment's(2016) findings on the C-BARQ factor "Dog rivalry".

The reliability of the factor referring to stranger-directed aggression in C-BARQ has been evaluated independently of the other factors. Van den Berg and colleagues (2010) scored 1000 dogs of three different breeds to evaluate how reliable this factor was. The results indicated that the factor was a reliable way of measuring aggression towards strangers regardless of breed, sex or neutering status (van den Berg 2010).

The inter-rater and test–retest reliability of the MCPQ-R have been studied by Ley et al (2009b). Intra-class correlations, which measure the degree of within cluster dependence for a variable, were analyzed for the five dimensions of personality in 65 dogs to test the reliability. The results supported the use of MCPQ as a measurement of dog personality. However, "Training/focus" and "Neuroticism" showed a lower correlation compared to the other factors. A low correlation might indicate that the score on these factors have been affected by for example dog-handling skills or due to the fact that dogs can behave differently in their interaction with different people (Ley et al. 2009b). This study found a significant difference between males and females in the MCPQ-R factor "Training/focus". No earlier studies were found to confirm this difference. The results from Ley et al (2009b) together with the fact that no studies could confirm the difference might strengthen the thought that this factor is not reliable.

Amanda Jones (2009), who developed DPQ made some evaluation studies to confirm the reliability and validity of the questionnaire. Three aspects of reliability were confirmed to be reliable as well as three aspects of validity. The questionnaire showed a relatively high convergent validity on factor level for example. This means that the factors correlated with expected behaviours. Jones (2009) found weaknesses with DPQ as well. The meaning of several questions was not completely clear to the owners, which lowered the reliability correlations. Also, DPQ is limited since it does not purport to asses all behaviours that might affect personality and individual differences (Jones 2009).

DPQ seems to be the most reliable and trustworthy questionnaire of the three questionnaires evaluated in this study. Problems that might occur with DPQ are that the test might use behaviour descriptions that the owner does not usually use. Further, DPQ uses a lot of value-loaded words that owners can interpret differently. By having a greater understanding of dog personality, questions can be formulated in a way that fits all dogs without being misunderstood. DPQ lack questions about some aspects of dog personality that C-BARQ includes, for example "Separation-related problems". Pure impulsivity, which some people consider as a problematic behaviour, has not been measured either (Wright et al. 2011). The questionnaires also use behaviour description that can both fit and not fit an individual. Some dogs can act aggressive or fearful towards certain people or even gender even if they are not aggressive or fearful in general. It is not obvious that an individual behave exactly the same towards everyone. Lastly, the fact that dog owners might underestimate or overestimate the behaviour of their dog might have disturbed the results. It is a probability that owner experience an aggressive behaviour as less aggressive than an unfamiliar person would.

In conclusion, DPQ is the most reliable questionnaire for measuring dog personality. However, improvement can be done by clarify value-loaded words and perhaps by adding more aspects of dog personality.

5.6 Societal & ethical considerations

Dogs have not been exposed to any kind of test that they may experience as unpleasant during this study. Dog owners reply to the questionnaires on the basis of earlier experiences, therefore, there are no major ethical dilemmas with this study.

An aggressive behaviour is more or less natural in dogs. If the level of aggression is too high problems might occur for people in direct contact with the dog and for the society (Netto & Plana 1997). It is not rare that dogs that are involved in accidents due to their aggressive personality are killed. This is something that we should be able to prevent. Other behaviour problems in dogs, seen from a welfare perspective, are for example fear, like for example separation problems. Separation-related problems in dogs often lead to rehoming and behaviour treatment (Blackwell et al. 2016). Unfortunately, separation-related behaviour problems appear to be a cause of both abandonment of dogs and failure of rehoming (Herron et al. 2014).

Future behavioural problems can be prevented by having a well working method to analyze personality early in dogs. A reliable method can also be used to predict potential in dogs for special tasks, like guide dogs. The society can save money by only spending money on dogs with potential.

6 Acknowledgement

My warmest thanks to all dog owners who participated in this study. Thanks to Ann-Sofie Sundman for guidance and help with all parts of the study. Thanks to teachers at Linköping University, and especially Hanne Løvlie for a better understanding in scientific writing and work. Last but not least, thanks to Per Jensen for guidance and for making this project possible.

7 References

Baranyiová E, Holub A, Tyrlík M, Janáâková B, Ernstová M (2004) Behavioural Differences of Dogs of Various Ages in Czech Households. Acta Veterinaria Brno 73, 229-233
http://dx.doi.org/10.2754/avb200473020229

Blackwell EJ, Casey RA, Bradshaw JWS (2016) Efficacy of written behavioral advice for separation-related behavior problems in dogs newly adopted from a

rehoming center. Journal of Veterinary Behavior: Clinical Applications and Research 12, 13-19
http://dx.doi.org/10.1016/j.jveb.2016.01.001

Borchelt PL (1983) Aggressive behavior of dogs kept as companion animals: classification and influence of sex, reproductive status
and breed. Applied Animal Ethology 10, 45-61
http://dx.doi.org/10.1016/0304-3762(83)90111-6

Chapman BL, Voith VL (1990) Behavioral problems in old dogs: 26 cases (1984-1987). Journal of the American Veterinary Medical Association 196, 944-946

Cháveza GA, Opazob ÁJ (2012) Predatory aggression in a German shepherd dog. Journal of Veterinary Behavior: Clinical Applications and Research 7, 386-389
http://dx.doi.org/10.1016/j.jveb.2012.02.004

Duffy DL, Hsu Y, Serpell JA (2008) Breed differences in canine aggression. Applied Animal Behaviour Science 114, 441-460
http://dx.doi.org/10.1016/j.applanim.2008.04.006

Diederich C, Giffroy J-M (2006) Behavioural testing in dogs: A review of methodology in search for standardization. Applied Animal Behaviour Science 97, 51-72
http://dx.doi.org/10.1016/j.applanim.2005.11.018

Digman JM (1990) Personality structure: Emergence of the big five-factor model. Annual Review of Psychology 41, 417-440
http://dx.doi.org/10.1146/annurev.ps.41.020190.002221

Dreschel NA (2010) The effects of fear and anxiety on health and lifespan in pet dogs. Applied Animal Behaviour Science 125, 157-162
http://dx.doi.org/10.1016/j.applanim.2010.04.003

Dunn M, Degenhardt L (2009) The use of drug detection dogs in Sydney, Australia. Drug Alcohol Review 28, 658-662
http://dx.doi.org/10.1111/j.1465-3362.2009.00065.x

Gershman KA, Sacks JJ, Wright JC (1994) Which Dogs Bite? A Case-Control Study of Risk Factors. Pediatrics 93, 913-916

Goddard ME, Beilharz RG (1983) Genetics of traits which determine the suitability of dogs as guide-dogs for the blind. Applied Animal Ethology 9, 299-315
http://dx.doi.org/10.1016/0304-3762(83)90010-X

Gosling SD, Vazire S (2002) Are we barking up the right tree? Evaluating a comparative approach to personality. Journal of Research in Personality 36, 607–614
http://dx.doi.org/10.1016/S0092-6566(02)00511-1

Hellyer P, Rodan I, Brunt J, Downing R, Hagedorn JE, Robertson SA (2007) AAHA/AAFP pain management guidelines for dogs and cats. Journal of Feline Medicine & Surgery 9, 466-480
http://dx.doi.org/10.1016/j.jfms.2007.09.001

Herron ME, Lord LK, Husseini SE (2014) Effects of preadoption counseling on the prevention of separation anxiety in newly adopted shelter dogs. Journal of Veterinary Behavior 9, 13-21
http://dx.doi.org/10.1016/j.jveb.2013.09.003

Hsu Y, Serpell JA (2003) Development and validation of a questionnaire for measuring behavior and temperament traits in pet dogs. Journal of the American Veterinary Medical Association 223, 1293-1300
http://dx.doi.org/10.2460/javma.2003.223.1293

Jones AC (2009) Development of a Dog Personality Questionnaire. PhD thesis. University of Texas, Austin

Ley JM, Bennett P, Coleman GJ (2007) Personality dimensions that emerge in companion canines. Applied Animal Behaviour Science 110, 305-317
http://dx.doi.org/10.1016/j.applanim.2007.04.016

Ley JM, Bennett P, Coleman GJ (2009a) A refinement and validation of the Monash Canine Personality Questionnaire (MCPQ). Applied Animal Behaviour Science 116, 220–227
http://dx.doi.org/10.1016/j.applanim.2008.09.009

Ley JM, McGreevy P, Bennett PC (2009b) Inter-rater and test–retest reliability of the Monash Canine Personality Questionnaire-Revised (MCPQ-R). Applied Animal Behaviour Science 119, 85–90
http://dx.doi.org/10.1016/j.applanim.2009.02.027

Lund JD, Agger JF, Vestergaard KS (1995) Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. Preventive Veterinary Medicine 28, 33-48
http://dx.doi.org/10.1016/0167-5877(96)01015-X

Martin P, Bateson P (1993) Measuring Behaviour: An Introductory Guide. 2nd edition. Cambridge university press, 114-115

Mehrkam LR, Wynne CD (2014) Behavioral differences among breeds of domestic dogs (*Canis lupus familiaris*). Applied Animal Behaviour Science 155, 12-27
http://dx.doi.org/10.1016/j.applanim.2014.03.005
Netto WJ, Planta DJU (1997) Behavioural testing for aggression in the domestic dog. Applied Animal Behaviour Science 52, 243-263 http://dx.doi.org/10.1016/S0168-1591(96)01126-4

Rayment DJ, Peters RA, Marston LC, De Groef B (2016) Investigating canine personality structure using owner questionnaire measuring pet dog behaviour and personality. Applied Animal Behaviour Science. Accepted manuscript
http://dx.doi.org/10.1016/j.applanim.2016.04.002

Serpell JA, Hsu Y (2001) Development and validation of a novel method for evaluating behavior and temperament in guide dogs. Applied Animal Behaviour Science 72, 347-364

Stamps J, Groothuis TGG (2010) The development of animal personality: relevance, concepts and perspectives. Biological Reviews 85, 301-325
http://dx.doi.org/10.1111/j.1469-185X.2009.00103.x

Svartberg K (2005) A comparison of behaviour in test and in everyday life: evidence of three consistent boldness-related personality traits in dogs. Applied Animal Behaviour Science 91,103-128
http://dx.doi.org/10.1016/j.applanim.2004.08.030

Svartberg K (2006) Breed-typical behaviour in dogs—Historical remnants or recent constructs? Applied Animal Behaviour Science 96, 293-313
http://dx.doi.org/10.1016/j.applanim.2005.06.014

Van den Berg SM, Heuven HCM, Van den Berg L, Duffy DL, Serpell JA (2010) Evaluation of the C-BARQ as a measure of stranger-directed aggression in three common dog breeds. Applied Animal Behaviour Science 124, 136-141
http://dx.doi.org/10.1016/j.applanim.2010.02.005

Wilsson E, Sundgren P-E (1997) The use of a behaviour test for the selection of dogs for service and breeding, I: Method of testing and evaluating test results in the adult dog, demands on different kinds of service dogs, sex and breed differences. Applied Animal Behaviour Science 53, 279-295 http://dx.doi.org/10.1016/S0168-1591(96)01174-4

Wright HF, Mills DS, Pollux PMJ (2011) Development and Validation of a Psychometric Tool for Assessing Impulsivity in the Domestic Dog (*Canis familiaris*). International Journal of Comparative Psychology 24, 210-225

8 Appendix

Table 1 Significant correlations between factors relating to trainability and controllability in dogs

Factor 1	Factor 2	Correlation	P-value
C-BARQ-"Trainability"	DPQ-"Nonsocial fear"	-0.164	0.027
C-BARQ-"Trainability"	DPQ-"Excitability"	-0.159	0.032
C-BARQ-"Trainability"	DPQ-"Playfulness"	0.332	0.000
C-BARQ-"Trainability"	DPQ-"Active engagement"	0.344	0.000
C-BARQ-"Trainability"	DPQ-"Companionability"	0.521	0.000
C-BARQ-"Trainability"	DPQ-"Trainability"	0.763	0.000
C-BARQ-"Trainability"	DPQ-"Controllability"	0.521	0.000
C-BARQ-"Trainability"	DPQ-"Prey drive"	-0.194	0.009
C-BARQ-"Trainability"	MCPQ-R-"Training/focus"	0.652	0.000
DPQ-"Trainability"	C-BARQ-"Owner-directed aggression"	-0.149	0.046
DPQ-"Trainability"	C-BARQ-"Trainability"	0.763	0.000
DPQ-"Trainability"	C-BARQ-"Chasing"	-0.164	0.027
DPQ-"Trainability"	C-BARQ-"Nonsocial fear"	-0.226	0.002

DPQ-"Trainability"	C-BARQ-"Attachment/attention seeking"	0.148	0.047
DPQ-"Trainability"	MCPQ-R-"Training/focus"	0.672	0.000
DPQ-"Trainability"	MCPQ-R-"Neuroticism"	-0.158	0.033
MCPQ-R-"Training/focus"	C-BARQ-"Stranger-directed aggression"	-0.168	0.024
MCPQ-R-"Training/focus"	C-BARQ-"Owner-directed aggression"	-0.307	0.000
MCPQ-R-"Training/focus"	C-BARQ-"Dog-directed fear"	-0.155	0.037
MCPQ-R-"Training/focus"	C-BARQ-"Trainability"	0.652	0.000
MCPQ-R-"Training/focus"	C-BARQ-"Chasing"	-0.285	0.000
MCPQ-R-"Training/focus"	C-BARQ-"Nonsocial fear"	-0.182	0.014
MCPQ-R-"Training/focus"	C-BARQ-"Touch sensitivity"	-0.188	0.011
MCPQ-R-"Training/focus"	C-BARQ-"Attachment/attention seeking"	0.156	0.035
MCPQ-R-"Training/focus"	DPQ-"Fear of people"	-0.155	0.037
MCPQ-R-"Training/focus"	DPQ-"Nonsocial fear"	-0.185	0.012
MCPQ-R-"Training/focus"	DPQ-"Situational aggression"	-0.193	0.009
MCPQ-R-"Training/focus"	DPQ-"Playfulness"	0.218	0.003
MCPQ-R-"Training/focus"	DPQ-"Active engagement"	0.392	0.000
MCPQ-R-"Training/focus"	DPQ-"Companionability"	0.334	0.000
MCPQ-R-"Training/focus"	DPQ-"Trainability"	0.672	0.000
MCPQ-R-"Training/focus"	DPQ-"Controllability"	0.427	0.000
MCPQ-R-"Training/focus"	DPQ-"Prey drive"	-0.189	0.011
DPQ-"Controllability"	C-BARQ-"Training"	0.521	0.000

DPQ-"Controllability"	C-BARQ-"Chasing"	-0.219	0.003
DPQ-"Controllability"	C-BARQ-"Excitability"	-0.146	0.050
DPQ-"Controllability"	C-BARQ-"Energy"	-0.311	0.000
DPQ-"Controllability"	C-BARQ- "Separation-related behavior/problems"	-0.232	0.002
DPQ-"Controllability"	MCPQ-R-"Extraversion"	-0.311	0.000
DPQ-"Controllability"	MCPQ-R-"Self-assuredness/motivation"	-0.217	0.003
DPQ-"Controllability"	MCPQ-R-"Training/focus"	0.427	0.000

Table 2 Significant correlations between factors relating to aggression and amicability in dogs

Factor 1	**Factor 2**	**Correlation**	**P-value**
MCPQ-R-"Amicability"	C-BARQ-"Strange-directed aggression"	-0.581	0.000
MCPQ-R-"Amicability"	C-BARQ-"Owner-directed aggression"	-0.247	0.001
MCPQ-R-"Amicability"	C-BARQ-"Dog-directed aggression"	-0.468	0.000
MCPQ-R-"Amicability"	C-BARQ-"Dog-directed fear"	-0.352	0.000
MCPQ-R-"Amicability"	C-BARQ-"Chasing"	-0.233	0.002
MCPQ-R-"Amicability"	C-BARQ-"Stranger-directed fear"	-0.453	0.000
MCPQ-R-"Amicability"	C-BARQ-"Nonsocial fear"	-0.273	0.000
MCPQ-R-"Amicability"	C-BARQ-"Touch sensitivity"	-0.288	0.000
MCPQ-R-"Amicability"	C-BARQ-"Energy"	-0.189	0.011
MCPQ-R-"Amicability"	C-BARQ- "Separation-related behavior/problems"	-0.194	0.009

MCPQ-R-"Amicability"	DPQ-"Fear of people"	-0.473	0.000
MCPQ-R-"Amicability"	DPQ-"Nonsocial fear"	-0.348	0.000
MCPQ-R-"Amicability"	DPQ-"Fear of dogs"	-0.311	0.000
MCPQ-R-"Amicability"	DPQ-"Fear of handling"	-0.215	0.004
MCPQ-R-"Amicability"	DPQ-"General aggression"	-0.592	0.000
MCPQ-R-"Amicability"	DPQ-"Situational aggression"	-0.477	0.000
MCPQ-R-"Amicability"	DPQ-"Excitability"	-0.241	0.001
MCPQ-R-"Amicability"	DPQ-"Companionability	0.379	0.000
MCPQ-R-"Amicability"	DPQ-"Aggression towards dogs"	-0.562	0.000
MCPQ-R-"Amicability"	DPQ-"Dominance over other dogs"	-0.204	0.006
C-BARQ-"Dog-directed aggression"	DPQ-"Fear of people"	0.252	0.001
C-BARQ-"Dog-directed aggression"	DPQ-"General aggression"	0.478	0.000
C-BARQ-"Dog-directed aggression"	DPQ-"Situational aggression"	0.370	0.000
C-BARQ-"Dog-directed aggression"	DPQ-"Excitability"	0.183	0.014
C-BARQ-"Dog-directed aggression"	DPQ-"Companionability"	-0.192	0.010
C-BARQ-"Dog-directed aggression"	DPQ-"Aggression towards dogs"	0.787	0.000
C-BARQ-"Dog-directed aggression"	DPQ-"Prey drive"	0.182	0.014
C-BARQ-"Dog-directed aggression"	MCPQ-R-"Amicability"	-0.468	0.000

DPQ-"Aggression towards dogs"	C-BARQ-"Stranger directed aggression"	0.406	0.000
DPQ-"Aggression towards dogs"	C-BARQ-"Dog-directed aggression"	0.787	0.000
DPQ-"Aggression towards dogs"	C-BARQ-"Dog-directed fear"	0.337	0.000
DPQ-"Aggression towards dogs"	C-BARQ-"Dog rivalry	0.300	0.000
DPQ-"Aggression towards dogs"	C-BARQ-"Chasing"	0.212	0.004
DPQ-"Aggression towards dogs"	C-BARQ-"Stranger-directed fear"	0.239	0.001
DPQ-"Aggression towards dogs"	C-BARQ-"Nonsocial fear"	0.147	0.049
DPQ-"Aggression towards dogs"	C-BARQ-"Touch sensitivity"	0.210	0.005
DPQ-"Aggression towards dogs"	C-BARQ-"Excitability"	0.244	0.001
DPQ-"Aggression towards dogs"	MCPQ-R-"Amicability"	-0.562	0.000
DPQ-"Aggression towards dogs"	MCPQ-R-"Neuroticism"	0.207	0.005
DPQ-"General aggression"	C-BARQ-"Stranger-directed aggression"	0.759	0.000
DPQ-"General aggression"	C-BARQ-"Owner-directed aggression"	0.160	0.032
DPQ-"General aggression"	C-BARQ-"Dog-directed aggression"	0.478	0.000
DPQ-"General aggression"	C-BARQ-"Dog-directed fear"	0.348	0.000
DPQ-"General aggression"	C-BARQ-"Dog rivalry"	0.175	0.036

DPQ-"General aggression"	C-BARQ-"Chasing"	0.231	0.002
DPQ-"General aggression"	C-BARQ-"Stranger-directed fear"	0.604	0.000
DPQ-"General aggression"	C-BARQ-"Nonsocial fear"	0.257	0.000
DPQ-"General aggression"	C-BARQ-"Touch sensitivity"	0.191	0.010
DPQ-"General aggression"	C-BARQ-"Excitability"	0.202	0.006
DPQ-"General aggression"	MCPQ-R-"Amicability"	-0.592	0.000
DPQ-"General aggression"	MCPQ-R-"Neuroticism"	0.374	0.000
DPQ-"Situational aggression"	C-BARQ-"Stranger-directed aggression"	0.490	0.000
DPQ-"Situational aggression"	C-BARQ-"Owner-directed aggression"	0.515	0.000
DPQ-"Situational aggression"	C-BARQ-"Dog-directed aggression"	0.370	0.000
DPQ-"Situational aggression"	C-BARQ-"Dog-directed fear"	0.231	0.002
DPQ-"Situational aggression"	C-BARQ-"Stranger-directed fear"	0.304	0.000
DPQ-"Situational aggression	C-BARQ-"Dog rivalry"	0.281	0.001
DPQ-"Situational aggression"	C-BARQ-"Touch sensitivity"	0.153	0.039
DPQ-"Situational aggression"	C-BARQ- "Separation-related behavior/problems"	0.218	0.003
DPQ-"Situational aggression"	MCPQ-R-"Training/focus"	-0.193	0.009
DPQ-"Situational aggression"	MCPQ-R-"Amicability"	-0.447	0.000

C-BARQ-"Stranger-directed aggression"	DPQ-"Fear of people"	0.548	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Nonsocial fear"	0.269	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Fear of dogs"	0.293	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Fear of handling"	0.166	0.026
C-BARQ-"Stranger-directed aggression"	DPQ-"General aggression"	0.759	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Situational aggression"	0.490	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Companionability"	-0.292	0.000
C-BARQ-"Stranger-directed aggression"	DPQ-"Aggression towards dogs"	0.406	0.000
C-BARQ-"Stranger-directed aggression"	MCPQ-R-"Training/focus"	-0.168	0.024
C-BARQ-"Stranger-directed aggression"	MCPQ-R-"Amicability"	-0.581	0.000
C-BARQ-"Stranger-directed aggression"	MCPQ-R-"Neuroticism"	0.293	0.000

C-BARQ-"Owner-directed aggression"	DPQ-"General aggression"	0.160	0.032
C-BARQ-"Owner-directed aggression"	DPQ-"Situational aggression"	0.515	0.000
C-BARQ-"Owner-directed aggression"	DPQ-"Companionability"	-0.279	0.000
C-BARQ-"Owner-directed aggression"	DPQ-"Trainability"	-0.149	0.046
C-BARQ-"Owner-directed aggression"	DPQ-"Dominance over other dogs"	0.315	0.000
C-BARQ-"Owner-directed aggression"	MCPQ-R-"Self-assuredness/motivation"	0.204	0.006
C-BARQ-"Owner-directed aggression"	MCPQ-R-"Training/focus"	-0.307	0.000
C-BARQ-"Owner-directed aggression"	MCPQ-R-"Amicability"	-0.247	0.001
DPQ-"Dominance over other dogs"	C-BARQ-"Owner-directed aggression"	0.315	0.000
DPQ-"Dominance over other dogs"	C-BARQ-"Dog-directed aggression"	0.285	0.000
DPQ-"Dominance over other dogs"	C-BARQ-"Dog-directed fear"	-0.157	0.035
DPQ-"Dominance over other dogs"	C-BARQ-"Chasing"	0.152	0.041

DPQ-"Dominance over other dogs"	C-BARQ-"Dog rivalry	0.583	0.000
DPQ-"Dominance over other dogs"	MCPQ-R-"Self-assuredness/motivation"	0.204	0.006
DPQ-"Dominance over other dogs"	MCPQ-R-"Amicability"	-0.204	0.006
C-BARQ-"Dog rivalry"	DPQ-"General aggression"	0.175	0.036
C-BARQ-"Dog rivalry	DPQ-"Situational aggression"	0.281	0.001
C-BARQ-"Dog rivalry	DPQ-"Aggression towards dogs"	0.300	0.000
C-BARQ-"Dog rivalry	DPQ-"Dominance over other dogs"	0.583	0.000
C-BARQ-"Dog rivalry	MCPQ-R-"Amicability"	-0.208	0.012

Table 3 Significant correlations between factors relating to fear in dogs

Factor 1	Factor 2	Correlation	P-value
MCPQ-R-"Neuroticism"	C-BARQ-"Stranger-directed aggression"	0.293	0.000
MCPQ-R-"Neuroticism"	C-BARQ-"Dog-directed fear"	0.479	0.000
MCPQ-R-"Neuroticism"	C-BARQ-"Stranger-directed fear"	0.534	0.000
MCPQ-R-"Neuroticism"	C-BARQ-"Nonsocial fear"	0.497	0.000
MCPQ-R-"Neuroticism"	C-BARQ-"Touch sensitivity"	0.177	0.017
MCPQ-R-"Neuroticism"	DPQ-"Fear of people"	0.611	0.000
MCPQ-R-"Neuroticism"	DPQ-"Nonsocial fear"	0.788	0.000

MCPQ-R-"Neuroticism"	DPQ-"Fear of dogs"	0.639	0.000
MCPQ-R-"Neuroticism"	DPQ-"Fear of handling"	0.440	0.000
MCPQ-R-"Neuroticism"	DPQ-"General aggression"	0.374	0.000
MCPQ-R-"Neuroticism"	DPQ-"Playfulness"	-0.262	0.000
MCPQ-R-"Neuroticism"	DPQ-"Active engagement"	-0.236	0.001
MCPQ-R-"Neuroticism"	DPQ-"Companionability"	-0.158	0.033
MCPQ-R-"Neuroticism"	DPQ-"Trainability"	-0.158	0.033
MCPQ-R-"Neuroticism"	DPQ-"Aggression towards dogs"	0.207	0.005
MCPQ-R-"Neuroticism"	C-BARQ-"Separation-related behavior/problems"	0.250	0.001
C-BARQ-"Dog-directed fear"	DPQ-"Fear of people"	0.439	0.000
C-BARQ-"Dog-directed fear"	DPQ-"Nonsocial fear"	0.415	0.000
C-BARQ-"Dog-directed fear"	DPQ-"Fear of dogs"	0.649	0.000
C-BARQ-"Dog-directed fear"	DPQ-"Fear of handling"	0.180	0.015
C-BARQ-"Dog-directed fear"	DPQ-"General aggression"	0.348	0.000
C-BARQ-"Dog-directed fear"	DPQ-"Situational aggression"	0.231	0.002
C-BARQ-"Dog-directed fear"	DPQ-"Excitability"	0.170	0.022
C-BARQ-"Dog-directed fear"	DPQ-"Aggression towards dogs"	0.337	0.000
C-BARQ-"Dog-directed fear"	DPQ-"Dominance over other dogs"	-0.157	0.035

C-BARQ-"Dog-directed fear"	MCPQ-R-"Self-assuredness/Motivation"	-0.155	0.038
C-BARQ-"Dog-directed fear"	MCPQ-R-"Training/Focus"	-0.155	0.037
C-BARQ-"Dog-directed fear"	MCPQ-R-"Amicability"	-0.352	0.000
C-BARQ-"Dog-directed fear"	MCPQ-R-"Neuroticism"	0.479	0.000
DPQ-"Fear of dogs"	C-BARQ-"Stranger-directed aggression"	0.293	0.000
DPQ-"Fear of dogs"	C-BARQ-"Dog-directed aggression"	0.185	0.012
DPQ-"Fear of dogs"	C-BARQ-"Dog-directed fear"	0.649	0.000
DPQ-"Fear of dogs"	C-BARQ-"Stranger-directed fear"	0.488	0.000 .
DPQ-"Fear of dogs"	C-BARQ-"Nonsocial fear"	0.550	0.000
DPQ-"Fear of dogs"	C-BARQ-"Touch sensitivity"	0.239	0.001
DPQ-"Fear of dogs"	C-BARQ-" Attachment/attention-seeking"	0.180	0.015
DPQ-"Fear of dogs"	C-BARQ-"Separation-related behavior/problems"	0.312	0.000
DPQ-"Fear of dogs"	MCPQ-R-"Extraversion"	0.174	0.019
DPQ-"Fear of dogs"	MCPQ-R-"Self-assuredness/Motivation"	-0.327	0.000
DPQ-"Fear of dogs"	MCPQ-R-"Amicability"	-0.311	0.000
DPQ-"Fear of dogs"	MCPQ-R-"Neuroticism"	0.639	0.000
C-BARQ-"Touch	DPQ-"Fear of people"	0.170	0.022

sensitivity”			
C-BARQ-“Touch sensitivity”	DPQ-“Nonsocial fear”	0.207	0.005
C-BARQ-“Touch sensitivity”	DPQ-“Fear of dogs”	0.239	0.001
C-BARQ-“Touch sensitivity”	DPG-” Fear of handling”	0.557	0.000
C-BARQ-“Touch sensitivity”	DPG-”General aggression”	0.191	0.010
C-BARQ-“Touch sensitivity”	DPG-”Situational aggression”	0.153	0.039
C-BARQ-“Touch sensitivity”	DPG-”Playfulness”	-0.153	0.040
C-BARQ-“Touch sensitivity”	DPG-”Companionability”	-0.273	0.000
C-BARQ-“Touch sensitivity”	DPG-”Aggression towards dogs”	0.210	0.005
C-BARQ-“Touch sensitivity”	MCPG-R-“Training/focus”	-0.188	0.011
C-BARQ-“Touch sensitivity”	MCPG-R-“Amicability”	-0.288	0.000
C-BARQ-“Touch sensitivity”	MCPG-R-“Neuroticism”	0.177	0.017
DPG-” Fear of handling”	C-BARQ-“Stranger directed aggression”	0.166	0.026
DPG-” Fear of handling”	C-BARQ-“Dog-directed fear”	0.180	0.015
DPG-” Fear of handling”	C-BARQ-“Stranger-directed fear”	0.241	0.001

DPG-" Fear of handling"	C-BARQ-"Nonsocial fear"	0.447	0.000
DPG-" Fear of handling"	C-BARQ-"Touch sensitivity"	0.557	0.000
DPG-" Fear of handling"	MCPQ-R-"Self-assuredness/motivation"	-0.189	0.011
DPG-" Fear of handling"	MCPQ-R-"Amicability"	-0.215	0.004
DPG-" Fear of handling"	MCPQ-R-"Neuroticism"	0.440	0.000
DPQ-"Fear of people"	C-BARQ-"Stranger-directed aggression"	0.548	0.000
DPQ-"Fear of people"	C-BARQ-"Dog-directed aggression"	0.252	0.001
DPQ-"Fear of people"	C-BARQ-"Dog-directed fear"	0.439	0.000
DPQ-"Fear of people"	C-BARQ-"Chasing"	0.188	0.011
DPQ-"Fear of people"	C-BARQ-"Stranger-directed fear"	0.715	0.000
DPQ-"Fear of people"	C-BARQ-"Nonsocial fear"	0.409	0.000
DPQ-"Fear of people"	C-BARQ-"Touch sensitivity"	0.170	0.022
DPQ-"Fear of people"	C-BARQ-"Separation-related behavior/problems"	0.187	0.012
DPQ-"Fear of people"	MCPQ-R-"Self-assuredness/motivation"	-0.210	0.004
DPQ-"Fear of people"	MCPQ-R-"Training/focus"	-0.155	0.037
DPQ-"Fear of people"	MCPQ-R-"Amicability"	-0.473	0.000
DPQ-"Fear of people"	MCPQ-R-"Neuroticism"	0.611	0.000

C-BARQ-"Stranger-directed fear"	DPQ-"Fear of people"	0.715	0.000
C-BARQ-"Stranger-directed fear"	DPQ-"Nonsocial fear"	0.454	0.000
C-BARQ-"Stranger-directed fear"	DPQ-"Fear of dogs"	0.488	0.000
C-BARQ-"Stranger-directed fear"	DPQ-"Fear of handling"	0.241	0.001
C-BARQ-"Stranger-directed fear"	DPQ-"General aggression"	0.604	0.000
C-BARQ-"Stranger-directed fear"	DPQ-"Situational aggression"	0.304	0.000
C-BARQ-"Stranger-directed fear"	DPQ-"Companionability"	-0.220	0.003
C-BARQ-"Stranger-directed fear"	DPQ-"Aggression towards dogs"	0.239	0.001
C-BARQ-"Stranger-directed fear"	MCPQ-R-"Self-assuredness/motivation"	-0.220	0.003
C-BARQ-"Stranger-directed fear"	MCPQ-R-"Amicability"	-0.453	0.000
C-BARQ-"Stranger-directed fear"	MCPQ-R-"Neuroticism"	0.534	0.000
DPQ-"Nonsocial fear"	C-BARQ-"Stranger-directed aggression"	0.269	0.000
DPQ-"Nonsocial fear"	C-BARQ-"Dog-directed fear"	0.415	0.000
DPQ-"Nonsocial fear"	C-BARQ-"Trainability"	-0.164	0.027
DPQ-"Nonsocial fear"	C-BARQ-"Stranger-directed fear"	0.454	0.000

DPQ-"Nonsocial fear"	C-BARQ-"Nonsocial fear"	0.548	0.000
DPQ-"Nonsocial fear"	C-BARQ-"Touch sensitivity"	0.207	0.005
DPQ-"Nonsocial fear"	C-BARQ-"Separation-related behavior/problems"	0.285	0.000
DPQ-"Nonsocial fear"	MCPQ-R-"Self-assuredness/motivation"	-0.427	0.000
DPQ-"Nonsocial fear"	MCPQ-R-"Training/focus"	-0.185	0.012
DPQ-"Nonsocial fear"	MCPQ-R-"Amicability"	-0.348	0.000
DPQ-"Nonsocial fear"	MCPQ-R-"Neuroticism"	0.788	0.000
C-BARQ-"Nonsocial fear"	DPQ-"Fear of people"	0.409	0.000
C-BARQ-"Nonsocial fear"	DPQ-"Nonsocial fear"	0.548	0.000
C-BARQ-"Nonsocial fear"	DPQ-"Fear of dogs"	0.550	0.000
C-BARQ-"Nonsocial fear"	DPQ-"Fear of handling"	0.447	0.000
C-BARQ-"Nonsocial fear"	DPQ-"General aggression"	0.257	0.000
C-BARQ-"Nonsocial fear"	DPQ-"Excitability"	0.157	0.034
C-BARQ-"Nonsocial fear"	DPQ-"Playfulness"	-0.146	0.050
C-BARQ-"Nonsocial fear"	DPQ-"Active engagement"	-0.177	0.017
C-BARQ-"Nonsocial fear"	DPQ-"Companionability"	-0.161	0.030
C-BARQ-"Nonsocial fear"	DPQ-"Aggression towards dogs"	0.147	0.049
C-BARQ-"Nonsocial fear"	DPQ-"Trainability"	-0.226	0.002
C-BARQ-"Nonsocial fear"	MCPQ-R-"Self-assuredness/moti	-0.246	0.001

	vation”		
C-BARQ-“Nonsocial fear”	MCPQ-R-“Training/focus”	-0.182	0.014
C-BARQ-“Nonsocial fear”	MCPQ-R-“Amicability”	-0.273	0.000
C-BARQ-“Nonsocial fear”	MCPQ-R-“Neuroticism”	0.497	0.000

Table 4 Significant correlations between factors relating to energy, excitement, engagement and playfulness in dogs

Factor 1	**Factor 2**	**Correlation**	**P-value**
MCPQ-R-“Extraversion”	C-BARQ-“Excitability”	0.391	0.000
MCPQ-R-“Extraversion”	C-BARQ-“Attachment/attention seeking”	0.292	0.000
MCPQ-R-“Extraversion”	C-BARQ-“Energy”	0.707	0.000
MCPQ-R-“Extraversion”	C-BARQ- “Separation-related behavior/problems”	0.238	0.001
MCPQ-R-“Extraversion”	DPQ -“Fear of dogs”	0.174	0.019
MCPQ-R-“Extraversion”	DPQ -“Excitability”	0.731	0.000
MCPQ-R-“Extraversion”	DPQ -“Playfulness”	0.398	0.000
MCPQ-R-“Extraversion”	DPQ -“Active engagement”	0.514	0.000
MCPQ-R-“Extraversion”	DPQ -“Companionability”	0.247	0.000
MCPQ-R-“Extraversion”	DPQ -“Controllability”	-0.311	0.000
C-BARQ-“Energy”	DPQ-“Excitability”	0.603	0.000
C-BARQ-“Energy”	DPQ-“Playfulness”	0.386	0.000
C-BARQ-“Energy”	DPQ-“Active engagement”	0.443	0.000
C-BARQ-“Energy”	DPQ-“Companionability”	0.200	0.007

C-BARQ-"Energy"	DPQ-"Controllability"	-0.311	0.000
C-BARQ-"Energy"	MCPQ-R-"Extraversion"	0.707	0.000
C-BARQ-"Energy"	MCPQ-R-"Self-assuredness/motivation"	0.150	0.045
C-BARQ-"Energy"	MCPQ-R-"Amicability"	-0.189	0.011
DPQ-"Playfulness"	C-BARQ-"Trainability"	0.332	0.000
DPQ-"Playfulness"	C-BARQ-"Chasing"	-0.150	0.044
DPQ-"Playfulness"	C-BARQ-"Nonsocial fear"	-0.146	0.050
DPQ-"Playfulness"	C-BARQ-"Touch sensitivity"	-0.153	0.040
DPQ-"Playfulness"	C-BARQ-"Energy"	0.386	0.000
DPQ-"Playfulness"	MCPQ-R-"Extraversion"	0.398	0.000
DPQ-"Playfulness"	MCPQ-R-"Self-assuredness/motivation"	0.177	0.017
DPQ-"Playfulness"	MCPQ-R-"Training/focus"	0.218	0.003
DPQ-"Playfulness"	MCPQ-R-"Neuroticism"	-0.262	0.000
DPQ-"Active engagement"	C-BARQ-"Trainability"	0.344	0.000
DPQ-"Active engagement"	C-BARQ-"Nonsocial fear"	-0.177	0.017
DPQ-"Active engagement"	C-BARQ-"Excitability"	0.157	0.035
DPQ-"Active engagement"	C-BARQ-"Attachment/attention seeking"	0.244	0.001
DPQ-"Active engagement"	C-BARQ-"Energy"	0.443	0.000
DPQ-"Active engagement"	MCPQ-R-"Extraversion"	0.514	0.000
DPQ-"Active engagement"	MCPQ-R-"Self-assuredness/motivation"	0.241	0.001
DPQ-"Active engagement"	MCPQ-R-"Training/focus"	0.392	0.000

DPQ-"Active engagement"	MCPQ-R-"Neuroticism"	-0.236	0.001
DPQ-"Excitability"	C-BARQ-"Dog-directed aggression"	0.183	0.014
DPQ-"Excitability"	C-BARQ-"Dog-directed fear"	0.170	0.022
DPQ-"Excitability"	C-BARQ-"Trainability"	-0.159	0.032
DPQ-"Excitability"	C-BARQ-"Nonsocial fear"	0.157	0.034
DPQ-"Excitability"	C-BARQ-"Excitability"	0.351	0.000
DPQ-"Excitability"	C-BARQ-"Attachment/attention seeking"	0.215	0.004
DPQ-"Excitability"	C-BARQ-"Energy"	0.603	0.000
DPQ-"Excitability"	C-BARQ- "Separation-related behavior/problems"	0.282	0.000
DPQ-"Excitability"	MCPQ-R-"Self-assuredness/Motivation"	0.178	0.017
DPQ-"Excitability"	MCPQ-R-"Amicability"	-0.241	0.001
C-BARQ-"Excitability"	DPQ-"General aggression"	0.202	0.006
C-BARQ-"Excitability"	DPQ-"Excitability"	0.351	0.000
C-BARQ-"Excitability"	DPQ-"Active engagement"	0.157	0.035
C-BARQ-"Excitability"	DPQ-"Controllability"	-0.146	0.05
C-BARQ-"Excitability"	DPQ-"Aggression towards dogs"	0.244	0.001
C-BARQ-"Excitability"	MCPQ-R-"Extraversion"	0.391	0.000

Table 5 Significant correlations between factors relating to chasing in dogs

Factor 1	Factor 2	Correlation	P-value
C-BARQ-"Chasing"	DPQ-"Fear of people"	0.188	0.011

C-BARQ-"Chasing"	DPQ-"General aggression"	0.231	0.002
C-BARQ-"Chasing"	DPQ-"Playfulness"	-0.150	0.044
C-BARQ-"Chasing"	DPQ-"Trainability"	-0.164	0.027
C-BARQ-"Chasing"	DPQ-"Controllability"	-0.219	0.003
C-BARQ-"Chasing"	DPQ-"Aggression towards dogs"	0.212	0.004
C-BARQ-"Chasing"	DPQ-"Prey drive"	0.748	0,000
C-BARQ-"Chasing"	DPQ-"Dominance over other dogs"	0.152	0,041
C-BARQ-"Chasing"	MCPQ-R-"Self-assuredness/motivation"	0.146	0.049
C-BARQ-"Chasing"	MCPQ-R-"Training/focus"	-0.285	0.000
C-BARQ-"Chasing"	MCPQ-R-"Amicability"	-0.233	0.002
DPQ-"Prey drive"	C-BARQ-"Dog-directed aggression"	0.182	0.014
DPQ-"Prey drive"	C-BARQ-"Trainability"	-0,194	0.009
DPQ-"Prey drive"	C-BARQ-"Chasing"	0.748	0.000
DPQ-"Prey drive"	MCPQ-R-"Self-assuredness/motivation"	0.286	0.000
DPQ-"Prey drive"	MCPQ-R-"Training/focus"	-0.189	0.011

Table 6 Significant correlations between factors relating to self-assuredness and motivation in dogs

Factor 1	**Factor 2**	**Correlation**	**P-value**
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Owner-directed aggression"	0.204	0.006
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Dog-directed fear"	-0.155	0.038
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Chasing"	0.146	0.049
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Stranger-directed	-0.220	0.003

	fear"		
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Nonsocial fear"	-0.246	0.001
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Energy"	0.150	0.045
MCPQ-R-"Self-assuredness/motivation"	C-BARQ-"Separation-related behavior/problems"	-0.150	0.044
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Fear of people"	-0.210	0.004
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Nonsocial fear"	-0.427	0.000
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Fear of dogs"	-0.327	0.000
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Fear of handling"	-0.189	0.011
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Excitability"	0.178	0.017
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Playfulness"	0.177	0.017
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Active engagement"	0.241	0.001
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Controllability"	-0.217	0.003
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Prey drive"	0.286	0.000
MCPQ-R-"Self-assuredness/motivation"	DPQ-"Dominance over other dogs"	0.204	0.006

Table 7 Significant correlations between factors relating to attachment and companionability in dogs

Factor 1	**Factor 2**	**Correlation**	**P-value**
C-BARQ-" Attachment/attention-seeking"	DPQ-"Fear of dogs"	0.180	0.015
C-BARQ-" Attachment/attention-seeking"	DPQ-"Excitability"	0.215	0.004
C-BARQ-" Attachment/attention-	DPQ-"Active engagement"	0.244	0.001

seeking”			
C-BARQ-“ Attachment/attention-seeking”	DPQ-“Companionability”	0.426	0.000
C-BARQ-“ Attachment/attention-seeking”	DPQ-“Trainability”	0.148	0.047
C-BARQ-“ Attachment/attention-seeking”	MCPQ-R-“Extraversion”	0.292	0.000
C-BARQ-“ Attachment/attention-seeking”	MCPQ-R-“Training/Focus”	0.156	0.035
DPQ-“Companionability”	C-BARQ-“Stranger-directed aggression”	-0.292	0.000
DPQ-“Companionability”	C-BARQ-“Owner-directed aggression”	-0.279	0.000
DPQ-“Companionability”	C-BARQ-“Dog-directed aggression”	-0.192	0.010
DPQ-“Companionability”	C-BARQ-“Trainability”	0.187	0.012
DPQ-“Companionability”	C-BARQ-“Stranger-directed fear”	-0.220	0.003
DPQ-“Companionability”	C-BARQ-“Nonsocial fear”	-0.161	0.030
DPQ-“Companionability”	C-BARQ-“Touch sensitivity	-0.273	0.000
DPQ-“Companionability”	C-BARQ-“Attachment/Attention-seeking”	0.426	0.000
DPQ-“Companionability”	C-BARQ-“Energy”	0.200	0.007
DPQ-“Companionability”	MCPQ-R-“Extraversion”	0.247	0.001
DPQ-“Companionability”	MCPQ-R-“Training/focus”	0.334	0.000
DPQ-“Companionability”	MCPQ-R-“Amicability”	0.379	0.000
DPQ-“Companionability”	MCPQ-R-“Neuroticism”	-0.158	0.033

Table 8 Significant correlations between factors relating to separation problems in dogs

Factor 1	Factor 2	Correlation	P-value
C-BARQ- "Separation-related behavior/problems"	DPQ-"Fear of people"	0.187	0.012
C-BARQ- "Separation-related behavior/problems"	DPQ-"Situational aggression"	0.218	0.003
C-BARQ- "Separation-related behavior/problems"	DPQ-"Excitability"	0.282	0.000
C-BARQ- "Separation-related behavior/problems"	DPQ-"Fear of dogs"	0.312	0.000
C-BARQ- "Separation-related behavior/problems"	DPQ-"Nonsocial fear"	0.285	0.000
C-BARQ- "Separation-related behavior/problems"	DPQ-"Controllability"	-0.232	0.002
C-BARQ- "Separation-related behavior/problems"	MCPQ-R-"Extraversion"	0.238	0.001
C-BARQ- "Separation-related behavior/problems"	MCPQ-R-"Self-assuredness/motivation"	-0.150	0.044
C-BARQ- "Separation-related behavior/problems"	MCPQ-R-"Amicability"	-0.194	0.009
C-BARQ- "Separation-related behavior/problems"	MCPQ-R-"Neuroticism"	0.250	0.001