



Quality of life of the pet dog: Influence of owner and dog's characteristics

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Accepted 19 November 2006
Available online 15 December 2006

Abstract

The present study investigates how characteristics of both the dog, *Canis familiaris*, and their owner influence the quality of life (QoL) of the pet dog. The investigation was carried out using a multiple approach: (1) three questionnaires which investigated characteristics of the dog and their owner and care given to the dog, (2) simple physical examination of the dog, (3) the Strange Situation Test to investigate the dog's attachment to their owner and (4) the Lexington Attachment to Pets Scale (LAPS) test.

A sample of 104 dog–owner dyads participated in the study. The level of care was found to be positively influenced by marital status (single) and negatively by the age of the dog, length of the dog–owner relationship and neutering. The best physical condition was found for pure breed dogs belonging to men and to people who prefer dogs among pets while physical condition decreases for aging dogs or those with a long relationship with their owner. Attachment to the owner was stronger for dogs with a long relationship and those belonging to people who had had previous experience with pets and those with many emotional bonds. Conversely, the attachment level was lower for pure breed dogs and those whose owners shared the property with other people. LAPS was influenced only by owner features: people more attached to their dogs are those who do not live with children and who do have many emotional bonds. Finally, the majority of dogs had a high level of QoL which was influenced positively by the number of emotional bonds of the owner and negatively by the dog's age and length of the dog–owner relationship.

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Keywords: Dog; Human–animal interactions; Quality of life; Attachment

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1. Introduction

The first commensal relationship between human beings and the ancestor of the (modern) domestic dog has evolved into a form of mutualism which, today, provides scientific evidence for the fact that the human–animal interaction benefits animals as well as people (Lynch and McCarthy, 1969; Lynch et al., 1974; Sato et al., 1993; Odendaal and Lehmann, 2000). Positive effects, ranging from physiological (Odendaal, 2000) to endocrinological (Hennessy et al., 1998) aspects, have been proven for dogs in association with close relationships with humans. Other studies have demonstrated that a human companion may reduce the effects of novelty and threat in dogs even more effectively than a canine companion (Pettijohn et al., 1977; Tuber et al., 1996). Over time owner attitudes towards companion animals have also fluctuated and have generally become more positive (Serpell, 1986; Ritvo, 1988) because of changes that, on occasion, can occur quite rapidly. These changes can be brought about by personal experiences or the influence of sources including television, newspapers and books (Podbersek, 1997). Moreover, the attitude of people towards pets can be influenced by many factors: cultural (Kellert, 1994; Pifer et al., 1994; Laurent, 1995), demographic (Kellert and Berry, 1981; Gallup and Beckstead, 1988; Bowd and Bowd, 1989), as well as both physical and behavioural attributes of the animals (Burghardt and Herzog, 1989; Driscoll, 1992). From a psychological point of view, the attitudes of modern pet owners towards their pets are hypothesised to be determined primarily by the parental behavioural system (Askew, 2003), directed in this case towards a member of another species. Voith (1985) reported that most dog owners view their pets not as helpmates but rather as family members, mainly as children (Berryman et al., 1985). Therefore, on the basis of their parental behaviour, people often react towards the dog similarly to how they would react towards a child in analogous circumstances, sometimes eliciting or maintaining behavioural problems in the pet (O'Farrell, 1997).

Even though scientific opinions on this topic vary, it is generally accepted that the human–animal interaction, ranging from negative (abuse) to pathological bonding (Odendaal, 1997), may undermine the life of the dog. Furthermore, owner's decisions and choices, such as tail docking (Noonan et al., 1996), de-clawing (Landsberg, 1991) and neutering (Blackshaw and Day, 1994), can interfere with the life and welfare of pets. On the other hand, it is becoming more evident that selective breeding has promoted the predisposition of dogs to form bonds of attachment with humans (Millot, 1994; Gácsi et al., 2001; Topál et al., 2005). Therefore, in studying the characteristics of the owner–dog relationship it is important to consider the quality of the emotional bond between the dog and its owner and how this could affect the characteristics of the relationship. With reference to this emotional bond some studies have evaluated dog attachment by a behavioural test (Topál et al., 1998) which is considered as an appropriate and useful tool to study the dog–owner interaction (Prato-Previde et al., 2003).

Most of the studies on the human–dog relationship concentrate on working and rescued dogs, while little work has been carried out on the more widespread human–animal bond that surrounds us every day. For this reason, differently from previous studies, we focus our attention on privately owned dogs where the sharing of life between dogs and humans can reach its maximum level. In agreement with Bono (2001), we use the more comprehensive term of “quality of life” (QoL), which considers all the aspects of animal welfare from the prevention of mistreatment to the improvement of living conditions. Reference to quality of life introduces a new dimension into the evaluation of the relationship between the individual and its environment; one that is no longer able to be measured in quantitative terms, but instead offers a broader and more complete picture (Bono and De Mori, 2005). In fact, ethological studies generally give scarce attention to

health parameters in evaluation of the QoL of pets. They are usually considered not very sensitive (Broom and Johnson, 1993), but are actually a good index of the QoL of household pets because many problems are linked to incorrect management or to the effects of the relationship itself, such as allergies (Carlotti et al., 1990) and side-effects of neutering (for example, obesity, dermatitis, urinary incontinence) (Miyake et al., 1998). On the other hand, medical studies (both physiological and pathological) seem to underestimate the importance of behavioural aspects and owner attitudes in the physical assessment of pet dogs. Therefore, considering the complexity of all the factors affecting the QoL of the pet dog, we have used a multiple approach which considers care given to the dog, a simple physical examination, and the level of the emotional bond between owner and dog to study how dog and owner features can influence the QoL of pet dogs.

2. Materials and methods

2.1. Subjects

A sample of 104 dog–owner dyads participated in the study. The owners were recruited as volunteers among the staff of the University of Padua and their acquaintances. The participants did not know the aim of the study in advance. Puppies younger than 6 months and dogs that did not live with their owners were excluded from the experiment. In case of multi-dog households, one of the dogs was selected at random. All the owners declared that their dogs did not suffer from any kind of physical or behavioural problems. No other selection criteria were imposed.

2.2. Procedure and data collection

The dog–owner relationship was studied using a multiple approach. Three questionnaires, a physical examination, the Strange Situation Test (Topál et al., 1998) and the Lexington Attachment to Pets Scale Test (LAPS; Johnson et al., 1992) were adopted. The questionnaires and the physical examination had been previously validated (Marinelli et al., 2001) to select aspects which are strictly related to the dog–owner relationship and to obtain instruments easy and to be quick to perform. The questions were formulated with multiple choice answers and they were always read to the owner by the same person. Their short and focused content allowed us to interview a large number of people and collect information about the social, physical and environmental condition of the dogs.

Questionnaires A and B investigated, respectively, the dog and the owner's characteristics which are presented in details in Table 1. The answers to these questionnaires were codified and used both to describe the sample and for the statistical analysis.

Questionnaire C investigated care given to the dog: veterinary assistance, treatment against parasites, reason of food choice (convenience, quality, illness of the pet, preferred food, advised by friend and by expert), use of canine-specific product for the bath, frequency of dog brushing and of walks longer than 30 min.

The answers to this questionnaire were evaluated on a scale of 1–5, where 1 denotes very bad condition and 5 denotes excellent condition. The assessment was made on the basis of scientific knowledge and, when there was no specific scientific evidence on which the owner could have relied, the level of attention, sensitivity and devotement of the owner for her/his pet was considered. The sum of scores of all answers represented the level of care given to the dog. The level of care (Total Care) was evaluated low (L), medium (M) or high (H) considering the highest and the lowest obtainable score and dividing the range into thirds (6–14, 15–21 and 22–30, respectively).

The physical examination was performed by a veterinarian and assessed the nutritional status and ear condition of the dogs. From the validation study (Marinelli et al., 2001) these two parameters resulted to be particularly suitable to our aim as the owner can tend to his/her dog's ears and nutritional status more easily and effectively than to other aspects (i.e., teeth). The nutritional status and ear condition were evaluated on a scale 1–3, where 1 denotes a bad condition and 3 denotes a good condition. The sum of the scores of the two

Table 1

Characteristics of the dog and the owner investigated in questionnaires A and B

1. Questionnaire A (dog's characteristics)

Age, gender, breed, size (toy, small, medium, large, giant), neutering, age of acquisition (before 8th week, between 8th and 12th week, after 12th week), length of dog–owner relationship, origin (born at home, from friend, found, rescue facility, pet shop, breeder), reason of acquisition (company, work, no reason), cohabitation with other animals (dog, cat, other), regular contacts with other people (except family members), any previous diseases which had required veterinary intervention

2. Questionnaire B (owner's characteristics)

Age, gender, education (primary school, secondary school, high school, college degree), marital status (single, married, widow, divorced, separate), employment (working person or not), number of family members and of children, place of living (town, suburb, countryside), size of dwelling (<50, 50–100, >100 m², family house with garden), previous pet-ownership, preferred animal (dog, cat, other), real ownership (myself, another member of the family, all the family, others), who looked after the dog (myself, all the family, others), number of friends (0–4, 5–10, >10), of emotional bonds (including relatives; 0–4, 5–10, >10) and of social activities (0, 1–3, >3)

parameters represented the level of dog's physical condition. The level of physical condition (Total Physical Condition) was evaluated low (L), medium (M) or high (H) considering the highest and the lowest obtainable score and dividing the range into thirds (2–3, 4 and 5–6, respectively).

The Strange Situation Test was recently validated to assess the level of the dog's attachment to the owner (Topál et al., 1998). Briefly, the test consisted of a sequence of seven episodes during which the dog could be alone, with the owner, and/or with a stranger in a unfamiliar room. Activities displayed by the dog during all the episodes were first scored using instantaneous sampling and afterwards the relative percentages of the time spent by the dog on each activity when alone (-A), in the presence of the owner (-O) or the stranger (-S) were calculated. The activities recorded are described in Table 2. The dog's attachment level was assessed by considering the score obtained in the superordinate variable Attachment resulting from a factor analysis applied on behavioural variables exhibited in the presence of the owner (see statistical analysis). The attachment level (Dog Attachment) was considered low (L) for values below (-)1, medium (M) for values ranging between (-)1 and (+)1, and high (H) for values above (+)1.

The LAPS Test is an instrument for assessment of the emotional attachment of owners to their pets using a score scale and has been validated for owners of both dogs and cats (Johnson et al., 1992). The sum of the scores of all items was used to evaluate the level of owner attachment to the dog. The level of owner attachment (Total LAPS) was evaluated low (L), medium (M) or high (H) considering the highest and the lowest obtainable score and dividing the range into thirds (0–22, 23–46 and 47–69, respectively).

The level L, M and H obtained from each dog in Total Care, Total Physical Condition and Dog Attachment were scored (L = 1, M = 2, H = 3) to gain addends with the same load to calculate the quality of life of the dog. The QoL was considered low (L), medium (M) or high (H) considering the highest and the lowest obtainable score and dividing the range into thirds (3–4, 5–7 and 8–9, respectively).

Table 2

Activities displayed by the dog during the Strange Situation Test

1. Exploration (E): activity direct towards unmovable aspects of the environment, including sniffing, visual inspection and oral examination
2. Playing (PL): any toy- or social partner-related behaviour, including running and jumping
3. Passive behaviour (P): sitting, standing or lying down without any orientation towards the environment
4. Standing by the door (SD): standing near the door (<1 m) with the face oriented to the exit
5. Greetings (G): proximity of, contact seeking by, contact maintenance jumping or tail wagging of the dog towards the entering partners
6. Physical contact seeking (PC): leaning the muzzle or the body against the partner's legs or seeking attention with the paws

2.3. Statistical analysis

The percentage of time spent by the dogs in each activity during the Strange Situation Test was first analysed by non-parametric statistical tests (two-tailed Spearman rank correlation, Wilcoxon test) to evaluate major differences in behavioural activities displayed by the dogs when alone, in the presence of the owner and in the presence of the stranger. Furthermore, the correlation pattern of the dog's behaviour in the presence of the owner was then studied using a factor analysis to obtain superordinate variables (factors) which accounted for individual differences in observed behaviours. One factor related to the dog–owner relationship can be referred to as the factor of attachment and its score was used to assess dog attachment level.

Finally, analysis of variance (Kruskal–Wallis) and two-tailed statistical analysis (Spearman rank correlation, Mann–Whitney test) were applied to see how dog and owner characteristics (independent variables) influenced the score of each variable and of the total score of the care given to the dog, its physical condition, its QoL and attachment of both dog and owner (dependent variables). The data were analysed using SPSS statistical package (SPSS[®] 12.0 Syntax Reference Guide, 2001, SPSS Inc., Chicago, IL, USA) and $P < 0.05$ was considered significant.

3. Results

3.1. Sample's features

Our sample of owners mainly consisted of women (70.1%). The age of the people who participated in the study ranged from 12 to 65 years (mean age \pm S.D. = 39 ± 18). The participants had graduated from university and worked in 28.8 and 64.4% of cases, respectively. They were mostly married (43.4%) or single (48.1%). In fact, only 3.3% were divorced and 4.4% were widowed. Most of them (85.2%) lived in the suburbs (85.2%), in a house (55.8%), with the family (93.3%). Only 16.3% had children and 87.5% had had previously experience as pet owners. They regarded themselves as the real owner of the dog in 63.3% of cases and 58.9% of them looked after the dog personally. Most of the owners claimed to meet more than 10 friends a month (54.4%), to have important emotional bonds with more than 10 people (44.4%) and to take part in social activities (77.8%). The dog was the preferred animal for 82.7% of the sample.

The sample of pets mainly consisted (66.3%) of pure breed dogs (German Shepherd = 17, Rottweiler = 6, Labrador Retriever = 4, Chihuahua = 4, Miniature Pinscher = 4, Golden Retriever = 4, Border Collie = 4, English Setter = 4, Shih tzu = 3, Dobermann = 2, Standard Poodle = 2, Pitbull = 2, Kuvasz = 1, Basset Hound = 1, Dachshund = 1, Whippet = 1, West Highland White Terrier = 1, Dalmatian = 1, Siberian Husky = 1, Cane Corso = 1, Maltese = 1, Bernese Mountain Dog = 1, Irish Setter = 1, Maremma Sheepdog = 1, Belgian Shepherd = 1). The size was distributed in the following manner: toy (4.8%), small (30.8%), medium (43.3%) and large (21.1%). The dogs were 51.9% females (29.6% spayed) and 48.1% males (10% castrated) with ages ranging between 9 months and 18 years (mean age \pm S.D. = 5 ± 4). The mean length of the relationship with the owner \pm S.D. was 4 ± 3 years. Many of the dogs (41.3%) were acquired in the most suitable period (8–12th week) as companion animals (76.9%). They were obtained from a breeder (37.5%), from friends (28.8%) and from pet shops (10.6%). Only 7.7% were adopted from a rescue facility, 12.5% were found by chance and 2.9% were born in the house of the owner. In 58.7% of cases they lived with other pets (32.7% with other dogs and 26% with animals of other species). Most of the dogs (92.3%) had regular contact with people who were not members of the family and had had previous diseases (66.3%).

3.2. Dog and owner attachment

Two dogs of the sample were excluded from the statistical analysis of the Strange Situation Test because their performances had compromised the reliability of the test. In fact, during one separation episode, one of the dogs was able to open the door and the other did not react to the stimuli because of visual and auditory deficits due to its age (18 years).

Considering the relative percentage of time spent on each activity (Fig. 1), the activities most commonly displayed by the dogs were: exploring in the presence of the owner (mean \pm S.D. = $29.0 \pm 17.8\%$) and standing by the door in the presence of the stranger (mean \pm S.D. = $41.2 \pm 19.9\%$) and when alone (mean \pm S.D. = $86.2 \pm 24.7\%$). Passive behaviour in the presence of the owner, greetings to the stranger and play when alone were the least displayed activities (mean \pm S.D. = 9.3 ± 12.3 , 1.6 ± 2.9 and $1.7 \pm 9.4\%$, respectively).

Spearman rank correlation analysis on behavioural variables displayed in the presence of the owner or of the stranger showed a significant positive correlation only between physical contact seeking and greetings with both human partners (PCO–GO, $r_s = 0.30$, $N = 102$, $P = 0.002$; PCS–GS, $r_s = 0.27$, $N = 102$, $P = 0.007$) but while physical contact seeking in the presence of the owner and the stranger were positively correlated ($r_s = 0.38$, $N = 102$, $P < 0.000$) greetings were not. The comparison of times spent by the dogs on each activity when alone or in the presence of the owner or the stranger were all significantly different, except playing in the presence of the owner versus the stranger and passive behaviour in the presence of the stranger versus alone (Fig. 1).

In order to study the correlation pattern of the dog's behaviour that strictly related to the pet–owner relationship a factor analysis was performed only on activities displayed in the presence of the owner. Moreover, the variable playing was excluded from factor analysis because it did not show significant differences between the presence of the owner versus the stranger. The principal component analysis of the data produced two rotated factors (varimax rotation, eigenvalue > 1.3), which accounted for 55.2% of the total variability (28.4 and 26.8%, respectively). The first factor was characterised by two behavioural variables with high loading and was referred to as *Attachment*. In the presence of the owner, individuals that scored high in this factor did not behave passively (PO = -0.71) and displayed a high level of greetings towards their owner (GO = 0.67). The second factor was referred to as *Insecurity* because individuals that scored high

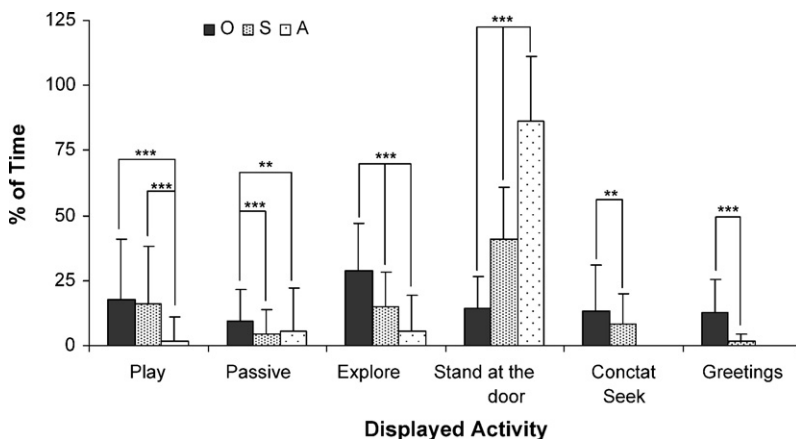


Fig. 1. Relative percentage of time spent by the dogs on each activity when alone (A) or in the presence of the owner (O) or the stranger (S) (Wilcoxon test; $N = 102$; *** $P < 0.001$; ** $P < 0.01$).

Table 3

Values of relevant statistics and probability level of the significant effects of dog characteristics on dog Attachment and Insecurity, LAPS, dog physical condition and dog QoL

Dog features	Attachment	Insecurity	LAPS	Ears condition	Nutritional status	Total Physical Condition	QoL
Breed ^(MW) ($N_1 = 69$, $N_2 = 35$)	$Z = -2.88$, $P = 0.004$	ns	ns	ns	$Z = -2.11$, $P = 0.035$	ns	ns
Age ^(KW)	ns	ns	ns	$X_2^2 = 10.38$, $P = 0.006$	ns	$X_2^2 = 12.84$, $P = 0.002$	$X_2^2 = 9.25$, $P = 0.010$
Relationship length ^(SRC)	$rS = 0.20$, $N = 102$, $P = 0.04$	ns	ns	ns	$rS = -0.22$, $N = 104$, $P = 0.02$	$rS = -0.29$, $N = 104$, $P = 0.004$	$rS = -0.24$, $N = 104$, $P = 0.016$
Acquisition reason ^(KW) (no reason)	ns	$X_2^2 = 11.39$, $P = 0.003$	ns	ns	ns	ns	ns
Neutering ^(MW) ($N_1 = 22$, $N_2 = 82$)	ns	ns	ns	ns	$Z = -2.34$, $P = 0.019$	ns	ns

MW: Mann–Whitney test; KW: Kruskal–Wallis test; SRC: Spearman rank correlation; ns: not significant.

in this factor did not explore ($EO = -0.83$) and strove for physical contact with the owner ($PCO = 0.76$).

The dog attachment level was found to be low for 14.7% of the sample, medium for 71.6% of the sample and high for 13.7% of the sample. Statistical analysis showed that dog and owner characteristics influenced dog Attachment and Insecurity in different manners (Tables 3 and 4).

Owner attachment level was high for the majority of our sample (82.7%). In fact, only for 17.3% of cases it was found to be medium and was never low. Moreover, Total LAPS resulted influenced only by owner features (Table 4).

Table 4

Values of relevant statistics and probability level of the significant effects of owner characteristics on dog Attachment and Insecurity, LAPS, dog physical condition and dog QoL

Owner features	Attachment	Insecurity	LAPS	Ears condition	Nutritional status	Total Physical Condition	QoL
Gender ^(MW) (male) ($N_1 = 32$, $N_2 = 72$)	ns	ns	ns	ns	ns	$Z = -2.06$, $P = 0.039$	ns
Number of emotional bonds ^(SRC,KW)	$rS = 0.25$, $N = 102$, $P = 0.02$	ns	$X_2^2 = 6.88$, $P = 0.032$	ns	ns	ns	$X_2^2 = 9.40$, $P = 0.009$
Experience with pets ^(MW) ($N_1 = 91$, $N_2 = 13$)	$Z = -2.14$, $P = 0.03$	ns	ns	ns	ns	ns	ns
Dog preferred pet ^(MW) ($N_1 = 86$, $N_2 = 18$)	ns	ns	ns	ns	ns	$Z = -2.63$, $P = 0.008$	ns
Care sharing ^(MW) ($N_1 = 60$, $N_2 = 44$)	ns	$Z = -2.11$, $P = 0.034$	ns	ns	ns	ns	ns
Property sharing ^(SRC,KW)	$rS = -0.23$, $N = 102$, $P = 0.03$	$X_2^2 = 7.90$, $P = 0.019$	ns	ns	ns	ns	ns
Presence of children ^(MW) ($N_1 = 17$, $N_2 = 87$)	ns	ns	$Z = -2.13$, $P = 0.033$	ns	ns	ns	ns

MW: Mann–Whitney test; KW: Kruskal–Wallis test; SRC: Spearman rank correlation; ns: not significant.

Table 5

Values of relevant statistics and probability level of the significant effects of dog characteristics on care given to the dog

Dog features	Veterinary assistance	Parasite treatment	Reason of food choice	Frequency of long walks	Frequency of brushing	Specific bath products	Total Care
Breed ^(MW) ($N_1 = 69, N_2 = 35$)	$Z = -2.64,$ $P = 0.008$	ns	$Z = -2.30,$ $P = 0.021$	ns	ns	ns	ns
Age ^(KW)	$\chi^2_2 = 8.96,$ $P = 0.011$	ns	ns	$\chi^2_2 = 13.66,$ $P = 0.001$	ns	ns	$\chi^2_2 = 7.66,$ $P = 0.022$
Relationship length ^(SRC,KW)	ns	ns	$rS = -0.25,$ $N = 104,$ $P = 0.012$	$\chi^2_3 = 14.63,$ $P = 0.002$	ns	ns	$\chi^2_3 = 13.31,$ $P = 0.004$
Acquisition reason ^(KW) (company)	$\chi^2_2 = 6.56,$ $P = 0.037$	ns	ns	ns	ns	ns	ns
Neutering ^(MW) ($N_1 = 22, N_2 = 82$)	ns	ns	$Z = -3.30,$ $P = 0.001$	ns	ns	ns	$Z = -1.98,$ $P = 0.047$
Cohabitation with dogs ^(MW) ($N_1 = 34, N_2 = 70$)	ns	ns	ns	ns	$Z = -2.62,$ $P = 0.009$	ns	ns

MW: Mann–Whitney test; KW: Kruskal–Wallis test; SRC: Spearman rank correlation; ns: not significant.

3.3. Dog care and physical condition

In the questionnaire about care given to the dog, 1.9% of the sample scored a low Total Care, 52.9% a medium Total Care and 45.2% a high Total Care.

Table 6

Values of relevant statistics and probability level of the significant effects of owner characteristics on care given to the dog

Owner features	Veterinary assistance	Parasite treatment	Reason of food choice	Frequency of long walks	Frequency of brushing	Specific bath products	Total Care
Employment ^(MW) (worker) ($N_1 = 67, N_2 = 37$)	ns	ns	$Z = 2.26,$ $P = 0.023$	ns	ns	ns	ns
Single ^(MW) ($N_1 = 50, N_2 = 54$)	ns	$Z = -2.02,$ $P = 0.043$	ns	ns	ns	$Z = -2.44,$ $P = 0.014$	$Z = -2.18,$ $P = 0.029$
Experience with pets ^(MW) ($N_1 = 91, N_2 = 13$)	$Z = -1.99,$ $P = 0.046$	ns	ns	ns	ns	ns	ns
Dog preferred pet ^(MW) ($N_1 = 86, N_2 = 18$)	ns	ns	ns	$Z = -2.39,$ $P = 0.017$	ns	ns	ns
Care sharing ^(MW) ($N_1 = 60, N_2 = 44$)	ns	ns	$Z = -2.30,$ $P = 0.021$	ns	$Z = -2.48,$ $P = 0.013$	ns	ns
Education ^(KW) (high school)	ns	$\chi^2_3 = 8.78,$ $P = 0.032$	ns	ns	ns	ns	ns
Dwelling size ^(KW)	ns	ns	ns	$\chi^2_3 = 24.62,$ $P < 0.000$	ns	ns	ns

MW: Mann–Whitney test; KW: Kruskal–Wallis test; SRC: Spearman rank correlation; ns: not significant.

The results of statistical tests showed that dog and owner features differently influenced the score of each variable and of the total score of questionnaires C (Tables 5 and 6) and physical examination (Tables 3 and 4). The Total Care was influenced positively by marital status and negatively by dog age, length of relationship and neutering. Moreover, it is interesting to notice that frequency of walks longer than 30 min increased for dogs that lived in small flats while 30.0% of the dogs that lived in family houses with garden was never walked.

In the physical examination, 2.9% of the sample scored a low Total Physical Condition, 5.8% a medium Total Physical Condition and 91.3% a high Total Physical Condition. Owner and dog characteristics which significantly affected physical condition of the dog are presented in Tables 3 and 4.

3.4. *Quality of life of the pet dogs*

On assessing the QoL, no dogs presented a low level. In fact, most of the dogs (54.6%) reached a high and 45.4% a medium level of QoL.

QoL was found to be positively influenced by the number of owner emotional bonds and negatively by dog age and length of relationship (Tables 3 and 4).

4. Discussion

4.1. *Behavioural assessment of dog attachment*

In this study, aimed at analysing the quality of life of pet dogs as comprehensively as possible, we used the Ainsworth's Strange Situation Test as a practical tool to assess the level of a dog's attachment to its owner. This practical approach of the test had never been explored in previous studies (Topál et al., 1998, 2005; Gácsi et al., 2001; Prato-Previde et al., 2003; Palestini et al., 2005), which also differed in the procedure used for data collection (Gácsi et al., 2001; Prato-Previde et al., 2003; Palestini et al., 2005; Topál et al., 2005) and analysis (Prato-Previde et al., 2003). Nevertheless, our sample of dogs is the most numerous and even if we could not entirely compare our findings to those of these authors, our results should be of interest for future applications of the Ainsworth's Strange Situation Test for the dog. In agreement with the abovementioned studies, our results show the dogs' distress due to the test procedure (unfamiliar environment, presence of a stranger and episodes of separation from the owner). In fact, the activity most frequently displayed by the dogs, when alone, was standing by the door. Also, the affective tie between dogs and their owners is confirmed by specific activities (exploration, greetings and physical contact seeking) more frequently displayed in the presence of and towards the owner than the stranger. Concerning this tie between dog and owner, it is generally accepted that domestication and selective breeding have not only influenced cognitive skills in dogs (Hare et al., 2002) but also their predisposition to form affective bonds with humans (Millot, 1994; Gácsi et al., 2001; Topál et al., 2005), underlining the genetic background of this behavioural phenomenon. However, the same studies claim the importance of dog social experience (Gácsi et al., 2001; Topál et al., 2005) and sensitive periods for socialisation (Scott, 1992) on the development of affective bonds in these pets. These findings raise the question as to how the latter factors may interfere with the Ainsworth's Strange Situation Test, which was originally formulated for the more uniform relationship between infant and mother. In fact the dog-owner bonds could be quite different in aspects such as age of adoption, length of relationship and dog previous social experiences. The present study provides additional information on the role of

these factors and could be of some help in discussion on the nature of the bond between dog and owner. Our results show that a dog's attachment level depends on the length of relationship, previous pet ownership, number of owner emotional bonds and sharing of property, while age of adoption does not affect this. Therefore, even though dog attachment includes a genetic component, it seems to be predominantly shaped by living context and owner management of the relationship, more than individual experiences during the critical socialisation period of the dog. This result is in agreement with the study of Topál et al. (2005) which recently proved that the socialisation history of puppies has only a minor effect on their attachment behaviour towards the owner. On the other hand, when owner life circumstances and dog rearing arrangements change the attachment development can easily change direction, as seen between infant and mother (De Wolff and van Ijzendoorn, 1997), eventually affecting pet dogs quality of life. These data emphasise the fact that the owner's management of the relationship is more important than experiences during the dog's sensitive socialisation periods, except for cases of heavy deprivation. In fact, it has to be noted that the dogs of our sample did not come from extreme situation and the fact that they were adopted as adult did not imply that they had lacked socialisation. On the one hand, this information should promote owner education in management of the dog–owner relationship (from puppyhood up) and on the other hand, it should serve to reduce the distrust associated with adoption of dogs from kennels where the dog's history during the sensitive socialisation periods is unknown.

The experimental social context (alone, with the owner, or with a stranger) cannot be considered to be the exclusive factor in Ainsworth's Strange Situation Test outcomes; an additional important influence is actually caused by dog individuality. Namely, a dog which plays, explores or shows passive behaviour tends to perform the same activity in the presence of the owner and the stranger, although to a different degree. Only greeting behaviour does not show this pattern, clearly differentiating between the type of bond towards the owner and the unfamiliar person. This is not surprising because the greeting behavioural pattern has developed specifically towards the owner (Overall, 1997) while all the other behavioural activities belong to the dog ethogram and could be more affected by factors unrelated to the relationship. In this respect, the parameters qualifying greeting behaviour seem to constitute discriminative variables and specific tools for assessing the level of dog attachment towards the owner.

4.2. *Owner's characteristics*

As expected, the owner is the fundamental member of the relationship. The characteristics of the owner that mostly influence the condition of the dog are social life, experience in pet-ownership and willingness to keep a dog as companion animal. Among social aspects the marital status, namely single, results in being more attentive in the care being given to the dog. This result could be explained by the greater amount of free time available to single people, but also by the fact that in this condition there may be less dispersion of attention. In fact, the level of care decreases if the dog is shared with other people and when the owner owns more than one dog. The sharing of property also undermines the level of bonding of the dog. In this case, the dog is less attached to its owner and more insecure. This result emphasises the great importance of exclusivity in the relationship, which represents one criterion in the bond between people and dogs, as for other species (Mason and Mendoza, 1998; Prato-Previde et al., 2003). It is interesting to note that in our previous study on the cat–owner relationship (Adamelli et al., 2005) the importance of exclusivity in the relationship did not appear. Cats owned by small families were more sociable towards the owner than those belonging to single people. Furthermore, the dog–owner bond is also favoured by increasing

number of owner emotional bonds, supporting the study of Bown et al. (1972) who claimed that the owner's attachment to the dog is not due to a lack of love but to the particular predisposition of the owner to establish social relationships. Once again, this is in contrast with studies concerning other species. Recently, we have found that cat owners are more attached to their pet if they have less than 10 emotional bonds (Adamelli et al., 2005) and the same correlation for cat owners was found by other authors (Brown and Katcher, 1997, 2001). Moreover, the absence of children in the family increases owner attachment to the dog, while this condition did not affect cat-owner attachment (Adamelli et al., 2005). These differences highlight the heterogeneity of owner features affecting bonds and quality of life of pets of different species and confirm the risks arising from generalised conclusion on pet-owner relationships (Kidd et al., 1983).

Among psychological aspects the choice and the preference to keep a dog as pet guarantee better care and physical condition to the dog. This underlines that owner motivation is of great importance in determining the QoL of the pet dog also for our sample made up of volunteers, who would be considered very sensitive to the well-being of their pets.

More consistent with studies of other species (Jagoe and Serpell, 1996; Fidler, 2003; Adamelli et al., 2005), the role of previous pet-ownership experience is influential in promoting better management but less frequent veterinary assistance. The reason for these findings could be that expert owners became self-confident about their pet's physical problems, while people without experience rely more on qualified people.

Owner demographic features and his or her economic status do not heavily influence the relationship, but some of them deserve to be noted because they discredit some popular beliefs. Large-sized dwellings, which are usually considered as better accommodation for dogs, are shown to negatively influence the care given to the dog. In particular, dogs that live in family houses with gardens are rarely walked for long, thus preventing dog social interactions with unknown dogs or people. In our sample, the best physical condition is guaranteed by men. Again, this is surprising because in earlier studies, women were shown to assure a higher level of care (Kidd et al., 1992; Adamelli et al., 2005) and to give more attention and love to the pet (Eldridge and Gluck, 1996; Adamelli et al., 2005). In any case, the latter result concerning the man-dog relationship needs to be confirmed because men represent the minority of our sample and women are usually more involved in studies on this topic. Finally, another interesting finding is the negative influence of having a college education, which was already pointed out by other authors (Lago et al., 1987; Johnson et al., 1992). In fact, the level of medical care increases with the level of education until High School, while it decreases for dogs belonging to graduated people.

4.3. Dog's characteristics

Dog's characteristics which most strongly influence the relationship with the owner are its breed, neutering, age and length of relationship. Dogs of pure breed represent the largest part of our sample and show better condition. These results should be attentively examined considering the fact that all the participants in our study are volunteers and for this reason they should be considered pet lovers who give attention to their dogs regardless of the breed. Similar mechanisms also seem to occur in the relationship between parents and children. In fact, it was demonstrated that attention and affect to the infants are influenced by their physical attractiveness (Langlois et al., 1995). This finding strengthens the analogy between pets and children which has been pointed out by several authors (Beck and Katcher, 1983; Berryman et al., 1985; Serpell, 1986; Albert and Bulcroft, 1988). The best level of care could be explained by the better information and motivation of people who buy a pure breed dog or simply, as Lund et al. (1996)

affirm, because the needs of specific breed influences the establishment and maintenance of the relationship. Moreover, this happens even though pure breed dogs are less attached to their owners. In any case, breed represents a fundamental aspect affecting the relationship between dog and owner and the QoL of the pet dog.

Another important parameter is neutering which resulted to be negatively associated to dog physical condition, as we found for the cat (Adamelli et al., 2005). Nevertheless, with the present study we cannot assert that bad condition are due to the gonadectomy itself because we did not assess the dogs before the surgery.

Finally, dog age and length of the relationship negatively influence QoL, physical condition and care (even though in different ways). Even if dog age and length of relationship showed redundant effects on some aspects it did not always result that both of the variables affected the same variables we studied. In fact, the age and the length of the relationship did not coincide when dog had been adopted as adult which happened for 37 of the dogs of our sample. In particular, old dogs receive less medical assistance. This reflects the scarce sensitivity or low awareness of the owner to dog geriatric care. Moreover, as the length of the relationship increases, owner attention to the dog's needs decreases while dog attachment to the owner gets stronger. The latter result assumes a great value for assessing the dog–human bond considering that, although some authors have recently affirmed that rescued dogs are able to establish an attachment after very short periods (Gácsi et al., 2001), data on the temporal stability and evolution of the owner–dog relationship are lacking.

5. Conclusion

In summary, this study provides new information about the dog–owner relationship and a contribution to the assessment of quality of life of family dogs. In particular, our findings show that the quality of the dog–owner relationship strictly depends on both owner and dog's characteristics, differently from what we found for cats (Adamelli et al., 2005), where influencing features depended mostly on owner choice (neutering, age of adoption and cohabitation with other cats). This difference demonstrates that it is not correct to draw general conclusions and absolute findings about pet–owner relationships and underlines the importance of using and developing species-specific tools to study the human–animal bond. This should be a future challenge for research on this topic aiming at improving the quality of the relationship between dogs and owners and to improve the success rate of placing rescued dogs with new owners.

Acknowledgments

Our thanks are due to all the volunteers who took part in the study. Furthermore, the authors are very grateful to Dr. Deborah Tonei for her thoughtful reading of the manuscript.

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