DEVELOPMENT OF AN INSTRUMENT TO ASSESS THE QUALITY OF LIFE OF PET DOGS

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ABSTRACT

Companion animals play an important role in the lives of humans, and medical and technological advances used in human health care are now being applied to pets to improve their health and increase their life spans. This effort to increase pets' quantity of life is giving rise to growing concern about their quality of life (QOL).

In their assessment of an animal's suffering, veterinarians are trained to focus on the state of the animal's body, therefore insufficient consideration may be given to the animal's state of the mind and the extent to which its nature is satisfied. The Canine Quality of Life Questionnaire (C-QOL-Q) was developed to encourage a systematic and holistic assessment of pet dogs' QOL. Following objective list theory, the underlying premise was that, for optimal QOL, a pet dog requires the following: predictability of basic needs, high degree of biological functioning, opportunities for pleasure, satisfaction of telos needs, and minimal distress.

The C-QOL-Q consisted of a pre-tested, telephone-administered questionnaire soliciting information about the above factors, with emphasis on the mental and natural aspects of QOL. There were three types of questions: descriptive, linking, and QOL questions. Response options for the QOL questions were mutually exclusive. They were coded to provide 4 ordered grades of QOL: "O" was the highest, and "C" the lowest.

Between October 2002 and March 2003, 120 owners of dogs with appointments at the Atlantic Veterinary College were interviewed using this instrument. Following the QOL interview and the dog's hospital appointment, each dog was classified as sick or healthy using predefined criteria and information from the dog's hospital record. Each dog was assigned an overall QOL score based on the QOL questions that were relevant to the dog during the 7 days before the QOL interview, in which the dog's owner served as the proxy. The range of QOL scores for the sick dogs (n=77) was 67.0% to 93.8%; the range for the healthy dogs (n=43) was 68% to 89.8%. Forward and backward stepwise linear regression were used to identify predictors of the QOL score. The results showed that the instrument did not discriminate between the QOL of the sick and healthy dogs; this may be because, as with humans, QOL involves more than physical health. The significant predictors in the final regression model were environment ($p=0.037$) and duration of ownership ($p=0.049$). Using data from repeat interviews with owners of healthy dogs (n=39), the test-retest reliability of the questionnaire was evaluated with the kappa statistic. Twenty-two of the 38 QOL questions demonstrated significant reliability (i.e. $p<0.05$).

The study represents one of the first attempts to assess the QOL of companion animals in a formal manner. Further research is needed to improve the questionnaire so that it may be used to help owners and veterinarians make critical decisions about pets.

DEDICATION

This thesis is dedicated to Laddie (May 1988 – August 2001) and Eddie, two very special yet very different dogs who, in their own unique ways, taught me a great deal about quality of life.

ACKNOWLEDGEMENTS

"The miracle isn't that I finished. The miracle is that I had the courage to start." – John Bingham

This quote was made in reference to running a marathon. However, I feel this quote is equally applicable to completing a graduate degree since it is a marathon of sorts - a *mental* marathon. Although I have never run a marathon, I can relate to highs and lows, the aches and pains, and the exhilaration and (at times) the frustration of the experience. Ultimately though, this experience has been truly rewarding, in more ways than one.

I could not have completed this "marathon" without the assistance and encouragement of many individuals. First of all, I extend my gratitude to the members of my advisory committee: Dr. Caroline Hewson, Dr. Luis Bate, Dr. Norma Guy, Dr. Gary Patronek, and Dr. Vianne Timmons. Their insight and their enthusiasm for this "groundbreaking" research were greatly appreciated.

I am particularly indebted to my advisor, Dr. Caroline Hewson. While the opportunity to do this research project was the result of serendipity, it was Caroline's enthusiasm and our shared interest in promoting animal welfare within the veterinary profession that compelled me to accept the project. During the course of my work I discovered that Caroline embodies the qualities of a good advisor. She is patient, encouraging, articulate, open to suggestions, and accessible to her students. Caroline's commitment to her work and her knowledge of issues (animal welfare-related and otherwise) are inspiring.

My endurance during this project was sustained by the encouragement, humour and wisdom of family and friends. My love and thanks are extended to my parents and sisters for their unfailing support and faith during the past 2 years. Thanks also go out to my fellow graduate students and friends: Nitch Kashemsant, Isabelle Vertzberger, Boom Vijarnson, Jillian Westcott, Suna Houghton-Mooney, Danielle St. Julien, Kristin Olafson, David Yemchuk, and Ariel Epshtein. I am blessed to be related to or acquainted with these remarkable individuals.

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List of Abbreviations

QOL	Quality of life
C-QOL-Q	Canine Quality of Life Questionnaire
HRQOL	Health-related quality of life
QALY	Quality-adjusted life years
CBD	Cost-benefit dominance
CCAC	Canadian Council on Animal Care
CKC	Canadian Kennel Club
AVC	Atlantic Veterinary College
n	Number of observations
SD	Standard deviation
95% CI	95 per cent confidence interval
DFITS	Difference in fit

CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

Medical breakthroughs and advances in technology are providing companion animal veterinarians with more treatment options for their patients. Coupled with these advances is the growing concern of quality of life (QOL) because while advanced treatment may extend a patient's life, it may adversely affect their QOL. Often, veterinarians are asked to judge whether an animal is suffering. There are no formal guidelines for making this judgement which may therefore be subjective and open to bias (1). In addition, the veterinarian's assessment of an animal's suffering may be incomplete because veterinary training focuses on physical health, not on the animal's state of mind and the extent to which its nature is satisfied. Veterinarians often use the term "quality of life" when advising clients, particularly when discussing issues such as euthanasia or the possibility of intensive treatment for a pet. However, there is no formal veterinary definition of QOL and no formal method of assessing the QOL of pets, and QOL assessment is not a routine procedure in veterinary practice.

Seventy to 99% of pet owners are thought to regard their pets as members of the family (2,3,4). This is consistent with the positive role that pets have in society. Owners may reasonably expect that veterinarians are qualified to assess their pets' QOL, but there are few scientific data about what constitutes the "good life" for pets. Considering that the perceived quality of a pet's life could mean the difference between life and death for some patients, we need a standardized method of assessing the QOL of companion animals. However, before the QOL of animals can be assessed, a definition of animal QOL, a philosophical framework and an appropriate methodology must all be

established. Research on human QOL and animal welfare provides a useful foundation here.

1.1 Definitions of human quality of life

While it is debatable as to who coined the term "quality of life", American president Lyndon B. Johnson has been credited with bringing the concept of QOL to the public domain in the 1960s (5,6). Since then human QOL has been the focus of researchers in many different fields, including philosophy, human health care, education, psychology, and sociology. The context in which QOL is studied influences how it is defined (7). Most people intuitively know what human QOL is and seem only to give it serious consideration when an aspect of it is compromised (e.g. health, financial stability, family, or work) (8,9). However, QOL is an abstract concept that defies simple definition because QOL encompasses many different aspects of life (10,11). Moreover, QOL changes over time (12,13,14) and its meaning evolves as science and society evolve, contributing to the difficulty in establishing a precise definition (15). Often, equally abstract terms such as "happiness" and "life satisfaction" are used synonymously with human QOL (6,16,17). There is a plethora of definitions for human QOL that continue to be subject to debate, prompting one researcher (18) to suggest an end to the "definition-shouting" by abandoning the term altogether and using terms such as "health-related QOL" that are tailored to specific research needs.

Despite the many criticisms and arguments however, there is general agreement that human QOL is affected by objective and subjective factors (5,10,11,19); is a highly individual (14,20,21) and dynamic construct (13); changes over time (12,22); and

depends on one's circumstances (11,23,24). In addition, QOL is measurable along a continuum (9,14), is unique to every individual and rooted in their perception of their situation (10,23,25) and is influenced by life experiences (23,24), cultural and personal values (16), personality (26) and changes in physical function.

While a universally accepted, precise definition of QOL may not be attainable, agreement over its domains is more likely. Reviews of the human QOL literature by Cummins (1997) (5), King et al (1997) (14), and Brown (2000) (27) demonstrate that the domains of physical, psychological and social well-being appear consistently in many definitions of human QOL. Some definitions encompass all three domains. For example, Holmes and Dickerson (1987) (28) defined QOL as an "abstract and complex term representing individual responses to the physical, mental and social factors that contribute to "normal" living". Felce and Perry's (1997) (10) definition also specified elements from all three domains, including intimate relationships, friendships, work, education, health and self. Other definitions are more general and emphasize only one aspect of QOL. For example, Shumaker et al (1990) (29) proposed that QOL is about the subject's "overall satisfaction with life and their general sense of well-being". In comparing 27 definitions of QOL, Cummins (1997) (5) found that 85% included emotional well-being and 70% included health. This indicates the emphasis placed on emotional well-being or feelings in the assessment of human QOL.

While many models of QOL emphasize the subjective aspect of QOL (7), it seems more accurate to depict QOL as an aggregate of objective indicators, such as health indices and behaviour, and subjective indicators, such as personal feelings and satisfaction with various aspects of life. The definition by Gotay et al (1992) (30)

satisfies this, proposing that QOL concerns "1) the ability to perform everyday activities which reflect physical, psychological and social well-being and 2) patient satisfaction with levels of functioning and control of disease and treatment-related symptoms." Also, one of the most widely used QOL measures, the Quality of Life Interview (31), consists of both objective and subjective QOL indicators.

1.2 Definitions of animal quality of life

1.2.1 Animal welfare

While research on animal QOL is relatively new, the debate over the welfare of animals is not new and has continued from the time of Aristotle (32). The scientific study of animal welfare arose out of popular ethical concern over the treatment of animals (33). However, defining animal welfare in a strictly scientific and objective manner is not possible (34,35) because, as Duncan and Fraser (1997) (33) pointed out, welfare is a "concept that is fundamentally rooted in values". Instead of providing a definitive answer to what welfare is, a definition of welfare provides guidance and direction in terms of qualitative or quantitative approaches to welfare assessment (33). Various definitions have been proposed. Duncan and Fraser (1997) (33) suggested that there are three types of definitions: 1) *functioning-based* definitions of welfare focused on the animal's physical health, 2) *feelings-based* definitions centred on the animal's subjective experience, and 3) *natural living* definitions which emphasize satisfaction of the animal's nature or *telos* (i.e. genetically encoded traits that dictate an animal's development and behaviour) (36). Examples of these definitions and their respective interpretations are presented in Table 1.1. Duncan and Fraser's (1997) (33) perception of

welfare as a multidimensional construct (Table 1.1) incorporates many of the ideas in those definitions. Those authors' three domains (body, mind and nature) mirror the domains of physical, psychological, and social well-being of human QOL. The idea that welfare is multidimensional is also implied in the Five Freedoms (37) (Table 1.1).

Welfare is used synonymously with quality of life and well-being. For example, Whay et al (2003) (38) described a "welfare issue" as "any QOL issue that can influence an animal's mental or physical state". Hurnik et al (1995) (39) equated welfare with well-being and their definition of well-being referred to quality of life. However, Fraser (1989) (40) made the distinction that welfare is a general term that refers to external factors such as the animal's environment, while well-being is concerned with internal factors, namely physical and psychological health. Fraser (1998) (41) on the other hand, made a persuasive argument that too much confusion arises from making a distinction between welfare and well-being, and that the two should be used interchangeably. The same may be said of distinctions between animal QOL and animal welfare. Moreover, in some countries, the term "welfare" has negative connotations because it is synonymous with being on social assistance; animal well-being or quality of life are useful synonyms for animal welfare in such circumstances. In this thesis, animal QOL is held to be synonymous with animal welfare, as defined by Duncan and Fraser (1997) (33) (Table 1.1)

Table 1.1 Definitions of animal welfare

Definition and author(s)	Type of definition	Interpretation and comments
"State of an animal as regards its attempts to cope with its environment" Broom 1986 (42)	Functioning	Emphasizes the ability to cope and focuses on the mechanisms that animals use to adapt to the environment. Can be interpreted as the animal's ability to maintain homeostasis and is often assessed by measuring physiologic indices such as heart rate and blood cortisol as well as monitoring changes in the individual's behaviour (42). This objective approach allows measurement that is "independent of moral considerations" (43). However, by focusing on objective measures, it suggests that the subjective experience of the animal (i.e. related to the animal's state of mind and the extent to which its nature is satisfied) is of lesser importance.
Welfare is about "...maintaining appropriate standards of accommodation, feeding and general care, the prevention and treatment of disease and the assurance of freedom from unnecessary discomfort and pain". Blood and Studdert 1988 (44)	Functioning	A veterinary definition; emphasizes standards of care and external factors that affect physical health. The weakness of this definition is the suggestion that welfare is something that can be given to an individual. However, welfare is not something one can bestow because welfare is an inherent characteristic of the individual (43).
"Welfare is all to do with subjective states (i.e. feelings, emotions or affective subjective states)" Duncan 1996 (45)	Feelings	Suggests that welfare is determined by the relative presence or absence of positive (pleasure) and negative (suffering) affective states. (See Section 1.2.2 for additional comments)
"...welfare involves the subjective feelings of animals". Dawkins 1990 (46)	Feelings	See comments above.

Definition and author(s)	Type of definition	Interpretation and comments
"Animal welfare consists of the animals' positive and negative experiences." Simonsen 1996 (47)	Feelings	Suggests that feelings are the most important determinant of welfare. However, feelings arise from the animal's physical state and its ability to satisfy its nature, which is not made clear in this definition or the other feelings-based definitions of welfare quoted here.
"...the balance between positive (reward, satisfaction) and negative (stress) experiences or affective states" Spruijt et al 2001 (48)	Feelings	Suggests that welfare is about the animal's perception of external events and the consequent emotional state, which are integral to welfare. This approach would necessitate assigning weights to positive and negative experiences in order to produce a meaningful assessment of an animal's welfare. Since there are few reported data on animals' experiences, anthropomorphism and misinterpretation of behaviour are potential risks.
The environment of an animal should reflect the type of habitat in which the animal has evolved to live. Welfare is optimal when "the animal is showing no evidence of distress and is able to perform all the behaviour within its repertoire, provided this does not cause suffering to others." Kiley-Worthington 1989 (49)	Nature	Comparing the behaviour of the pet dog with that displayed by a dog in a "wild" habitat is difficult because the dog is domesticated and there are few data available on wild dogs. Breed differences also pose a challenge in defining an "optimal" environment that would be suitable for all dogs.
Welfare is determined by a hierarchy of needs: life-sustaining needs, health-sustaining needs, comfort-sustaining needs. Hurnik and Lehman 1988 (50)	Needs	Suggests that factors relating to physical health and functioning are more important than mental welfare and the extent to which the animal's nature is satisfied.

Definition and author(s)	Type of definition	Interpretation and comments
"State of harmony between the animal and its environment, characterized by optimal physical and psychological functioning and high quality of life" Hurnik et al 1995 (39)	Harmony	Functioning, feelings and natural living are encompassed in this definition. However, the use of "quality of life" is confusing since welfare and QOL are often used synonymously. It is not clear what is meant by "quality of life".
"Welfare is defined as experienced preference-satisfaction. A subject's welfare at a given time (t_1) is relative to the degree of agreement between what it at t_1 prefers and how it sees its situation." Sandøe 1996 (51)	Preferences	Suggests that welfare is a balance between preferences and perceptions. Preferences are described as the motivations, wants, aspirations, and hopes of the individual. While this definition is based on sound philosophical theory, it has limited practical use because of the difficulties in assessing the subjective experience of animals. Sandøe (1996) (51) stated that the purpose of the definition was to "clarify what welfare is" not to say "how it should be measured".
Five Freedoms – freedom: 1) from hunger and thirst; 2) to express normal behaviour; 3) from pain, injury and disease; 4) from discomfort; 5) from fear and distress. UK Farm Animal Welfare Council, 1992 (37)	Functioning, feelings and natural living	Very similar to Duncan and Fraser's (1997) definition of welfare (33). Provide a framework for assessing welfare and suggest that welfare is optimal when all freedoms are satisfied. However, these criteria for welfare may be too vague and may not necessarily be practical or realistic under various circumstances. For example, an animal about to undergo surgery must first be fasted. Thus, in this case freedom from hunger is not realistic or desirable.
Welfare comprises the state of the animal's body and mind and the extent to which the animal's nature is satisfied. Duncan and Fraser 1997 (33)	Functioning, feelings, and natural living	Welfare is a multidimensional construct. This definition encompasses many of the ideas that are implied by the other definitions listed here. (See Section 1.2.1)

1.2.2 Animal quality of life

Several definitions of animal QOL have been proposed. Derrell Clark et al (52) defined animal QOL as "an individual's internal somatic and mental state that is affected by what it knows (cognition) or perceives; its feelings (affect) and motivational state, and the responses to internal or external stimuli or environments". The Dictionary of Farm Animal Behavior (39) defined animal QOL as: "(the) state of an organism resulting from total array of conditions affecting its existence. Quality of life may range from negative to positive extremes". This definition suggests that QOL falls along a continuum. DeGrazia (41) equated QOL with "experiential well-being" and describes it as the "quality of experiences or feelings", with feelings being positive or negative.

Independent of the research in animal welfare, McMillan (2000) (53) proposed a feelings-based model for animal QOL, with two domains: comfort-discomfort and pleasure. McMillan (2003) (54) subsequently defined QOL as a balance between pleasant and unpleasant feelings. McMillan's is the first QOL model to be reported in the context of veterinary medicine and is similar to Duncan's (1996) (45) and Dawkins' (1990) (46) proposals that feelings or the subjective mental state of the animal is the predominant component of welfare, and to Spruijt et al's (2001) (48) conception of welfare as a balance of positive and negative affective states. Under all these models, a fractured femur, for example, is not relevant to QOL; it is the pain, discomfort or frustration (i.e. the feelings) associated with the broken limb that is relevant. Thus, if an animal with a fractured femur is anesthetized and provided that no other negative feelings are being experienced, the animal's welfare is good (45). McMillan (2000, 2003) (53,54) asserted that any factor that does not affect feelings does not affect QOL. A limitation

with this approach is that feelings arise from the animal's physical state and its ability to satisfy its nature, both of which are inextricably connected to the animal's feelings. Thus, consideration of physical and natural aspects is also important in QOL assessment, and in the prevention of reduced QOL. In light of this, Duncan and Fraser's (1997) (33) model of welfare, consisting of functioning, feelings and natural living (Table 1.1) represents a suitable framework for QOL assessment because it reflects the multidimensionality of the QOL construct.

1.3 Assessing quality of life

1.3.1 Quality of life and veterinary medicine

As "mediators between humankind and nature" (55) veterinarians have a responsibility to relieve the suffering of animals and are often asked "Is my animal suffering?", particularly in companion animal practice. Absence of suffering is integral to good QOL. Suffering implies a negative mental state which is the result of harmful physical or psychological stimuli (56) such as injury, deprivation of necessary resources (e.g. food and water), physiological imbalance caused by disease and stress, and prevention of highly motivated behaviours (39). Suffering is an issue that is equally concerning to veterinarians and pet owners. However, with the increasing array of veterinary treatment options, owners' expectations are very high. Consequently, veterinarians may be at risk of reducing the patient's QOL (e.g. by the side effects of chemotherapy). There is growing concern that, in some cases, prolonging life may actually be prolonging death and that a longer life does not necessarily translate into a life worth living (25,57,58). Therefore, in veterinary clinical research, QOL assessment is

being incorporated increasingly into the evaluation of the patient despite the fact that no formal QOL instrument exists. For example, in a study of dogs being treated with multidrug chemotherapy for multicentric lymphoma (59), owners were asked "During chemotherapy did you consider the quality of life of your dog to be either good, fair or poor?".

While veterinarians have a general sense of what QOL is, there has been little formal effort to assess the welfare of companion animals in a holistic and systematic manner. Veterinarians and pet owners would benefit from having such an instrument which would help to rationalize critical decisions such as euthanasia of a pet or pursuing intensive treatment such as chemotherapy. The first stage in the development of a QOL instrument is the choice of a suitable philosophical basis.

1.3.2 Quality of life philosophies

The philosophical basis of a QOL instrument guides the instrument's development and facilitates the interpretation of results (60,61). The failure to identify a philosophical basis jeopardizes the purpose and credibility of an instrument (7). There are three philosophical approaches to human QOL research that have the potential to be adapted for animal QOL assessment: objective list theory, desire or preference fulfillment, and hedonism (61).

Objective list theory suggests that there are things that are objectively good for an individual whether they realize it or not (51,61). This approach focuses on things that can be objectively measured or assessed, such as physical and physiological parameters, living conditions, and type and degree of social contact, but could include subjective

states such as enjoyment, excitement and satisfaction. For example, having environmental control is objectively good for dogs because it is in their nature to investigate and explore their surroundings (62). Lack of environmental control can result in stereotypic behaviour and learned helplessness (63). Objective list theory provides a suitable framework for QOL assessment because all three components of QOL (functioning, feelings and natural living) can be assessed within this framework. However, a limitation with this approach is that it is not possible to represent all three components of canine QOL equally. Furthermore, what is deemed objectively good in one domain of QOL may conflict with another aspect of QOL. For example, going for walks may promote the dog's physical welfare, but if the dog does not enjoy going for walks, the activity is detrimental to the dog's mental welfare.

Related to objective list theory is perfectionism, which implies that every individual should strive to realize their full potential (60). This philosophical approach emphasizes personal goals and fulfilling one's potential. Perfectionism is not an appropriate philosophical basis for QOL assessment in animals because it is not known whether animals have personal goals. For example, it is not possible to determine if an Australian Cattle Dog is achieving its potential as a herding dog, or if the dog aspires to do so.

In contrast to perfectionism, desire fulfillment (preference satisfaction in the context of animal welfare) focuses on an individual's desires and preferences, i.e. the "good life" consists in getting what one wants (61). Feelings are central to this philosophy which would therefore be ideally suited to a feelings-based model of QOL, as would hedonism. Hedonism implies that QOL is about "the presence of pleasant mental

states and the absence of painful or unpleasant ones" (60). This approach is evident in the Quick Assessment QOL Questionnaire (54) which, to the author's knowledge, is one of the first reported QOL instruments designed for veterinary use. A limitation of hedonism as with objective list theory is individual differences: what may be an unpleasant or painful experience for one animal, may not be for another. Of the three philosophies presented here, objective list theory is the most adaptable in terms of representing QOL as a multidimensional concept.

1.3.3 Human quality of life assessment

The assessment of human QOL in different settings has been reviewed in detail (e.g. (5,64,65)). One of the many challenges in QOL assessment lies in capturing the multidimensionality of the QOL construct. This multidimensionality is often assessed by subdividing QOL into domains, such as physical well-being, emotional well-being, social well-being, material well-being and productivity (5,66). Assessment is further complicated by the fact that objective indicators (e.g. physical condition, adequate finances, and housing (67)), and subjective aspects (e.g. the individual's perceptions, (10,68), expectations and ability to adapt (66)), are integral to QOL. The extent to which QOL is assessed in an objective and/or subjective fashion is largely influenced by the purpose of the QOL instrument.

1.3.3.1 Objective approach

Objective QOL refers to "objectively measurable characteristics of an individual's situation" (68). Therefore, objective QOL includes quantitative measures of health status

(e.g. tumour size, morbidity, mortality, response to treatment) (69,70), income, housing (71), and other objective factors. The advantages of an objective approach to QOL assessment are that objective QOL indices can be readily observed (69,72); valid and reliable information can be obtained (73,74); and this information can be compared to a standard (5,67). There are many different instruments for the assessment of objective QOL (e.g.(75,76)).

Traditionally, the medical profession has placed a lot of emphasis on objective QOL, and assessment has typically focused on effects of illness and treatment on an individual's QOL. This narrow view of QOL is embodied in the term "health-related quality of life" (HRQOL) (7,72,77). Some argue that such a specific term abuses the concept of QOL by targeting one aspect of QOL (7,19) and ignoring the fact that QOL is multidimensional and includes health. Michalos (2001) (19) suggested the term HRQOL should be abandoned because it only adds to the confusion of distinguishing QOL, HRQOL and health status from each other. Furthermore, there is potential of incorrectly using the three terms interchangeably (7). For example, the Sickness Impact Profile is described by Bergner et al (1976) (78) as a "measure of health status"; however, in the *Quality of life bibliography and indexes: 1993* (79) the Sickness Impact Profile is listed as a HRQOL measure.

Proponents of objective QOL data have made attempts to quantify QOL by mathematical equations. An example of this is Shaw's formula: QOL=NE * (H + S), where NE represents the person's physical and mental capabilities, and H and S represent contributions by home and society, respectively (Shaw 1977 cited in (80)). However, as Ferrans (1990) (80) pointed out, the applicability of this type of equation is limited to

medical decision-making because the equation centres on physical and mental function with minimal emphasis on other factors affecting QOL. Overall, Shaw's method of assessing QOL is simplistic and neglects to consider subjective aspects of QOL such as anxiety, self-esteem and realizing human potential. The same can be said for QALYs (quality-adjusted life years), a utility measure that attempts to combine *quality* of life, *quantity* of life and health into a single index (81). One QALY represents one year of perfect health, while a year with a disability or illness is worth less than one QALY (72,82). In a system with scarce resources (such as a financially beleaguered health care system), the QALY approach is useful because decisions are made with the benefits of the group in mind (81). A significant weakness of this approach is that it is biased toward the young and healthy while elderly people or individuals with disabilities or disease are at a disadvantage (82). The QALY approach would not be suitable for QOL assessment of individual patients because it was designed for assessment of a population.

The major disadvantage of a strictly objective approach to QOL assessment in human beings is that it ignores the person's opinions and perspective, that is, their subjective QOL. Reluctance to accept a subjective approach to QOL assessment is probably due to concern that subjective data do not have the same degree of accuracy and reliability as objective data (73). However, some researchers (66,83) have argued that subjective QOL is more important than objective QOL. An exclusive focus on objective measures such as physical health implies that life revolves around health. However, health is only one aspect of QOL (72,80) and medical professionals are beginning to realize that by simply measuring objective measures of health they are neglecting how the patient feels about a particular therapeutic intervention. Assessment of QOL in a

medical context now often includes assessing the patient's perception of a therapeutic intervention (84). There is mounting evidence that QOL is a significant consideration in the treatment decision-making process; this is particularly evident with patients undergoing treatment for cancer (72), who want to know how each treatment option will affect their short-term and long-term functional capacity.

1.3.3.2 Subjective approach

A person's attitude and feelings have a significant influence on their health, yet health has been shown not to be the most important determinant of happiness in people (19). In a study comparing the regression models of happiness from eleven surveys, Michalos (2001) (19) found that self-reported health was not a significant predictor of human happiness in five of the surveys. In the regression models of the remaining surveys, health did not have the highest regression coefficient. Self-esteem was the most consistent predictor of human happiness and was significant in all eleven models, accounting for 7-38% of the variation in happiness.

Subjective QOL is person-centred; it is dependent on a person's feelings, values (10), expectations (19), perspective (6,72), and perception of life satisfaction (68,83). Perception is an important aspect of QOL. According to Michalos' Multiple Discrepancies Theory (1985) (23), an individual's subjective well-being is based upon the perceived discrepancy between one's current conditions and multiple standards including past conditions and experiences; one's aspirations, needs and goals; and the expectations of others.

Many instruments are available for the assessment of subjective QOL (85,86). One example is the Satisfaction with Life Scale (87) which assesses the subject's satisfaction with life as a whole, has good internal consistency and is sensitive to change (85). By contrast, the Oxford Happiness Inventory (88) is a more generic measure of subjective well-being and consists of 29 questions about emotional attributes as well as satisfaction with life.

Subjective QOL measures highlight the uniqueness of individuals while objective measures compare individuals to a standard (74). The ideal way to capture the "whole picture" of an individual's QOL, would be to combine objective measures with an individual's subjective ratings (11,74,80).

1.3.3.3 Quality of life assessment of humans with communicative and cognitive limitations

Self-reports are the most efficient and valid means of subjective QOL assessment (85) and require the subject to communicate verbally or use controlled, deliberate gestures e.g. Sign Language. The ability to understand the questions is also necessary. Lack of receptive and expressive language can limit an individual's ability to provide meaningful answers (89), as in the case of babies, and children and adults with severe mental challenges. For example, the satisfaction ratings of people with poor receptive and expressive language are often associated with inconsistent reliability and poor validity (10,67). Consequently, QOL models for such individuals tend to focus primarily on objective QOL indicators such as clinical and behavioural data as well as information regarding living conditions; these data do not require verbal communication on the part of the subject (90).

Quality of life instruments have been developed for people with communicative and cognitive limitations. For example, the Quality of Life Questionnaire (68) was developed to assess the subjective QOL of people with severe mental illness. The instrument, a 24-item self-administered questionnaire, assesses subjective QOL in seven areas. When used in a cross-sectional study of patients with severe mental illness and their families, the questionnaire showed good reliability, validity and discriminative ability (68). The Quality of Life Interview Schedule (91,92) was designed specifically for assessing the QOL of people with severe intellectual disabilities. The 72-item instrument measures objective as well as subjective QOL indicators. Instead of the subjects providing self-reports, individuals who know the subject well and can understand and answer the questions are required to complete the interview (92). The contentment dimension showed the highest intra-rater agreement, with scores ranging from 79 to 99% (91,92). The dimension assessing participation also demonstrated high intra-rater agreement with an average value was of 79% (91). These examples illustrate that there are viable alternatives to the self-report in assessing subjective QOL.

Human QOL research has much to offer researchers of QOL assessment of animals, particularly because the challenges in assessing the QOL of people with communicative and cognitive limitations are similar in assessing animal QOL. In both cases, dependency, lack of verbal language, and differences in cognition and consciousness are important considerations.

1.3.4 Quality of life assessment of animals

Some researchers (5,19) contend that there is no "single best method" for assessing QOL of humans, and that assessing both objective and subjective aspects of an individual's QOL in a "reasonable and morally acceptable way" is the best approach (19). This idea is equally applicable to assessment of animal QOL. The fundamental challenge is to determine what constitutes the "good life" for an animal. Since QOL assessment of companion animals is in its infancy, researchers must work with concepts, methods and principles from human QOL research and animal welfare science.

1.3.4.1 Cartesian and non-Cartesian approaches

Objective list theory provides a persuasive philosophical framework within which to assess the QOL of animals in field situations, such as in veterinary settings. A further philosophical consideration is whether to take a Cartesian or non-Cartesian approach. The Cartesian or dualistic approach operates on the principle that QOL assessment is limited to directly observable, objective indices such as health, physiology and behaviour. The approach contends that subjective states such as pain and suffering cannot be directly and objectively assessed and therefore are not relevant to QOL assessment (93). This approach is mechanistic because it assumes that animals operate like "machines" and are devoid of the ability to think and feel (32).

Within a Cartesian framework, the development of a formal method for assessing the QOL of dogs would ideally take place in a laboratory setting and would involve for example, the measurement of urinary cortisol or the duration of specified behaviours under controlled circumstances. Wemelsfelder (2001) (94) referred to this conventional

objective approach as the "third person perspective" and criticized it because it ignores the subjective perspective of the animal by failing to recognize the animal as a dynamic, interactive agent. A laboratory approach would not be a practical method of assessing the QOL of pet dogs because they are kept in a variety of environments, under circumstances much different from clinical laboratory settings.

Because the academic training of veterinarians emphasizes the "functioning" of animals, it could be argued that veterinarians adopt a Cartesian approach to animals' assessment during veterinary training (95). Behaviour, health and physiology are aspects of animal QOL that can be measured objectively (47) and when veterinarians consider QOL there is a propensity to dichotomize physical and some behavioural measurements as normal or abnormal. Any deviation from the norm is considered to be detrimental to the animal's physical health, and therefore, detrimental to its QOL. However, the measurements do not take into account the animal's subjective experience (feelings, perceptions) that results from the objectively measurable abnormalities.

In contrast, the non-Cartesian or holistic approach would address the complex and dynamic nature of QOL by suggesting that there may be more than one cause for a certain outcome or response by an individual (52). The holistic approach would not assume that mind and body are mutually exclusive and it would represent QOL as the result of interaction between physical, psychological and environmental phenomena (52). Under this "first person perspective" (94,96), QOL would be the state experienced by the animal and could not be adequately described by treating body and mind as separate entities and measuring elements of them. Instead, the animal would be regarded as an "agent" because it has the ability to initiate interaction or movement. This approach

contrasts with the Cartesian view in which the animal is a "causal object" of interaction (93), i.e. a being to which things happen and on which measurements can be made.

There is a reluctance by the scientific community to accept subjective measurements because of the fear of anthropomorphism (96), which is the projection of human attributes and feelings to animals (93,97). Wemelsfelder (1997) (93) argued, however, that the subjective experience of animals is "open to empirical observation and scientific assessment". Therefore observations like "Rover looks depressed" may be more valid than previously recognized. According to Wemelsfelder et al (2001) (96) such statements provide a summary of the animal's interaction with its environment by taking into account subtle details such as the animal's posture, movement and the context in which a behaviour occurred. Descriptors such as "depressed" may accurately reflect the combined effects of the feelings, genetics, cognition and environment of an individual at a given moment (96). This was demonstrated in a study in which untrained observers were asked to use their own descriptive terms to score the behavioural expressions of pigs presented in live situations and on video (96). The high internal validity and high inter- and intra-rater reliability of the results suggested that behavioural observation may be a dependable and valid method for QOL assessment (94,98).

The above subjective approach continues to be debated (99), but it is too early to know if the approach is a feasible method of QOL assessment. Duncan and Fraser (1997) (33) argued that welfare assessment cannot be completely objective because it combines scientific observation with value judgements, which are themselves subjective. Due to the considerable variability in the lives of pet dogs, a holistic approach would provide a more complete account of a dog's QOL. The approach would recognize that objective

and subjective measures provide information about the physical and mental well-being of an individual. In the absence of valid subjective measures, however, objective measures of physical and mental state are desirable.

1.3.4.2 Assessment of physical state

Behaviour can inform about the physical aspect of an animal's QOL. In veterinary practice, behavioural observation is an important part of making a clinical diagnosis (100). Physical health data are another important component. The advantages of incorporating physical health data into QOL assessment is that these data are readily accessible and their normal ranges are well-established in domestic animals. However, the interpretation of physical health data with respect to QOL is challenging because the relationship between illness and suffering is complex (101). The challenge lies in choosing and interpreting those measures that best reflect the animal's welfare (102).

Physiologic indices are useful because they reflect aspects of an animal's internal function and ability to cope with stress (101,103). Stress represents an imbalance in homeostasis (56,102,104), and because stress can reduce welfare it is one of the most studied measures of animal welfare (102). The stress response of animals is mediated by the activity of the hypothalo-pituitary-adrenal axis and involves many complex neuro-endocrine reactions (103,104). Changes in physiologic indices such as plasma glucocorticoids (105), opioid peptides (106), and leukocyte count (107,108) as well as changes in heart and respiratory rates (104,105) have been used as to define acute and chronic stress in various domestic species (56,109,110). In addition to physiologic indices of stress, other physiologic indices (e.g. serum biochemistry) may be used to

assess welfare, through the diagnosis of disease. There is the perception that as stress increases, welfare decreases (105). However, while physiologic and physical health measures may suggest that an animal is experiencing acute or chronic stress, they do not indicate whether the stress is positive or negative (102).

There has been considerable debate about the use of physiologic measures as exclusive indicators of stress and suffering because the interpretation of physiologic data can be misleading (105,111,112). Given the complexity of the stress response, one parameter measured once may not reflect the fluctuating nature of the homeostatic process and consequently, there is the risk of arriving at incorrect conclusions about an animal's or group of animals' welfare. Interpretation of acute stress responses is further complicated by the fact that they are considered "normal" adaptive responses (105). To reduce the risk of misinterpretation Beerda et al (1997) (108) recommended measuring more than one stress parameter.

Another challenge with physiologic indices of welfare is the choice of cutoff points (111). For example, Barnett and Hemsworth (1990) (105) suggested that an increase in free corticosteroid levels greater than 40% is an indication of reduced welfare, implying that an animal showing a 39% increase would have acceptable welfare. This example illustrates the point that physiologic measures should not be interpreted in isolation; it is necessary to consider factors such as species, sex, age, the experience of the animal, individual variability (103), and context (113).

Pre-pathological and pathological states, which represent the final stages in an animal's biological response to stress (102), are also used as indicators of welfare (114). Growth rate, reproductive rate and clinical signs of disease can be used as markers of

these states (43,105,114). For example, Grandin et al (1999) (115) used physical health traits including body condition score, limb injuries and the presence of wounds and lesions to characterize the welfare of horses arriving at slaughter plants.

Given the complexity of physiological and biological interactions in "stressful" circumstances (whether positive or negative) physiologic measures cannot provide a clear answer about the emotional state of an animal (116). Normal physiologic and immunologic parameters or the absence of physical abnormalities do not necessarily equate with psychological well-being (117) and the extent to which the animal's nature is satisfied (114). Behavioural observations and consideration of the animal's environment are also necessary.

1.3.4.3 Assessment of mental state and satisfaction of nature

An animal's behaviour can provide insight about its mental state and its nature. For example, behavioural signs such as tail and ear carriage, posture, level of activity and frequency of urination (118), can collectively provide an indirect measure of whether an animal is fearful, anxious or relaxed. An animal's behaviour in response to external stimuli depends on how it perceives the stimuli (118) which in turn is influenced by the animal's species, temperament, age, and past experiences (117,118).

Applied ethology (the study of the behaviour of animals managed by humans (119,120)) has the potential to contribute valuable information to animal QOL research through methods such as preference and motivation testing, direct observation and ethograms. An ethogram is a catalogue of behaviours and provides a benchmark against which all behaviours within a certain species can be compared (121). An example is the

Cat-Stress-Score which describes the stress reaction of domestic cats in terms of behaviour and posture (122). Kessler and Turner (1997) (122) used this noninvasive measure to assess the stress response of cats housed in boarding catteries and animal shelters. Using trained observers, the inter-rater reliability for this measure was 0.90 (122), which suggests that behavioural observation can be a useful means of assessing QOL.

The communication of animals provides another useful behavioural tool with potential in QOL assessment. Animals communicate in a variety of ways and offer visual, vocal, olfactory, and tactile cues about how they are feeling. These cues have not been widely studied in welfare research, but vocalizations have been used. Vocalizations are the "consequence of the perceptual, cognitive and emotional processes" (123) and represent a personal commentary of the individual's psychological state (123). Vocal responses have been used in research to assess pain in piglets (124); in dogs, responses such as growling or whining, may be suggestive of pain or discomfort (100). Dogs also communicate by signalling: a study by Miklosi et al (2000) (125) demonstrated that dogs can exhibit attention-getting and "showing" behaviour that owners are able to interpret successfully. "Showing" consists of "both a directional component related to an external target and an attention-getting component that directs the attention of the perceiver to the sender" (125). This sort of referential and intentional behaviour has also been described in non-verbal humans (89).

1.3.4.3.1 Preference testing

Appleby and Sandøe (2002) (61) suggested that an animal's preferences are an indication of their feelings. Preference testing enables researchers to objectively ask

animals what their preferences are by presenting them with options under controlled conditions and observing the choices they make (126). Variation in individual characteristics such as age, sex, experience, and differences in environmental conditions are important considerations in the design and interpretation of preference studies (126). When studies are done correctly, they can provide useful information about the nature of a species under given circumstances and about an animal's experience at a point in time (126). However, preferences determined to be beneficial to the animal's mental well-being over the short term may not necessarily prove beneficial in the long term (126). In addition, preference tests do not provide information about the strength of an animal's motivation for a particular preference. Motivation strength can be assessed by applying consumer demand theory to operant tasks (127).

The results of preference tests are aimed at benefiting a large, uniform population or herd of animals in a particular environment. The tests have successfully identified the environmental preferences of production animals, including battery hens (127) and pigs (128). The fairly uniform environmental conditions of shelters and laboratories would facilitate the determination of the environmental preferences (through preference testing) of companion animals housed in those facilities. However, this information is of limited use for the QOL assessment of pet dogs because their environments and breeds are so varied.

Given the individual nature of QOL and the fact that asking animals the "right" question is complicated by many factors, the practicality of preference and motivation testing in assessing QOL of companion animals is limited. However, individual

behavioural observation has practical application; observations would include signs of abnormal behaviour, and would not require strictly controlled experimental conditions.

1.3.4.3.2 Abnormal behaviour

It is generally accepted that abnormal behaviour is an indicator of compromised welfare, and is usually due to negative states such as pain, frustration and anxiety (129, 130,131). Abnormal behaviour is the result of complex processes at neurochemical, neuroanatomical and molecular levels (132). The interpretation of abnormal behaviour requires an understanding of the species-specific behaviour, the context in which the abnormal behaviour is performed (131), and the pattern and frequency of the behaviour (43).

Stereotypic behaviour is a form of abnormal behaviour that is widely used as an index of reduced welfare in many species (130). Stereotypies are repetitive and unvarying behaviour patterns that serve no obvious purpose in the context in which they are performed (131). In reference to companion animals, stereotypic behaviour is also referred to as compulsive behaviour (133). Examples of stereotypic behaviour in pet dogs are fly biting, tail chasing, fence running, and circling (132). The form and persistence of a stereotypy is affected by the animal's age, experience, species and environment (130). Broom (1991) (43) has suggested that stereotypic behaviour is the individual's means of coping with lack of environmental control. Thus, some animals that do not show stereotypies may be more of a welfare concern (122,131).

The causes of abnormal behaviour can be classified as pathophysiologic or experiential (134). Stereotypies fall within the latter group, as reactive abnormal behaviour which develops when an animal's attempts to exhibit species-specific

behaviour (i.e. express its nature) are repeatedly prevented or when releasing stimuli for such behaviour (e.g. the presence of conspecifics; opportunities to hunt) are consistently absent (134). An unstimulating environment and inadequate management are potential inciting factors for stereotypy development (130,134).

Stereotypies are an indication that an animal is experiencing negative feelings such as boredom, anxiety and frustration, and provide "direct evidence of serious suffering" (135). Although it is generally accepted by farm animal welfare scientists that stereotypic behaviour suggests poor QOL, the degree of QOL compromise is not known, which presents a challenge in QOL assessment (131). Broom and Johnson (1993) (136) proposed a scale which uses the frequency of an animal's stereotypic behaviour to assess the detrimental effect of the stereotypy on the animal's welfare. The scale suggests for example, that if the stereotypy is performed during 40% of the animal's active time the animal's welfare is poor. The approach is simplistic because it does not take into account the form, persistence and variability of the stereotypy which can be affected by the animal's age, experience and species, and the eliciting stimuli (130). In addition, the approach fails to address the potential beneficial effects of stereotypic behaviour under certain circumstances (e.g. release of endorphins (131)).

Stereotypies and abnormal behaviour have been examined in dogs under conditions of impoverished environment and spatial and social restrictions (137,138,139). While the majority of studies have used dogs housed in shelters (138, 139,140) or laboratory facilities (137,141) the results have relevance to pet dogs. For example, Hubrecht et al (1992) (138) observed that with dogs that were housed singly, stereotypic behaviour occupied 4-5% of their (observed) time, compared to less than 2% for dogs

that were housed in groups. Similarly, Mertens and Unshelm (1996) (139) found that 10% of singly-housed shelter dogs developed stereotypies while group-housed dogs did not exhibit any stereotypic behaviour. These studies suggest that social interaction with conspecifics is necessary for optimal canine QOL. While this conclusion is a useful general recommendation, it cannot be assumed that all dogs necessarily want to interact with other dogs. With respect to pet dogs, the owner and the veterinarian would have to use behavioural cues to decide about this aspect of a dog's subjective experience.

Another use of behavioural cues is in the assessment of pain. Pain has been used synonymously with QOL in some veterinary literature (142) and pain assessment is the subject of considerable research (143,144,145,146). McMillan (2002) (147) has proposed that assessment of emotional pain is also important.

1.3.4.4 Quality of life assessment of production animals

Much of what is understood about animal welfare stems from research with production animals. Considerable research has been done to specify minimum welfare standards for production animals following the Brambell Report, which was presented in the UK in 1965 (126). The Report was the inspiration for Five Freedoms (37) (Table 1.1) which have been the cornerstone of several approaches to welfare assessment (148).

Assessment of physical health plays a significant role in assessment of farm animal welfare, particularly because some production diseases such as lameness in dairy cattle (149) and musculoskeletal disorders in broiler chickens (150) are the consequence of intensive farming practice. Originally, the direction of farm animal welfare research was the assessment of physical health of animals, the availability of resources and the

adequacy of the environment (38) using the herd, the flock or a group of animals as the study unit. However, there is a growing realization that the welfare of production animals goes beyond good husbandry practices and provision of a satisfactory environment (38), and that welfare means more than adequate physical health. Studies in farm animal welfare are becoming increasingly animal-centred, which is consistent with the notion that QOL is unique to the individual. Whay et al (2003) (38) solicited the expertise of animal welfare scientists, veterinarians, and farmers to identify animal-based measures of welfare for dairy cattle, pigs and laying hens. The collective efforts of the participants and the authors resulted in protocols for animal welfare assessment that involved the examination of records, behavioural observation and evaluation of health status.

Taylor et al (1995) (151) advocated an approach to QOL assessment of farm animals, which takes into consideration that the relative importance of "welfare-related factors" can vary in terms of importance to the individual. Taylor et al (1995) (151) proposed using cost-benefit dominance (CBD) to evaluate animal QOL. CBD compares factors qualitatively such that factors are ranked according to preference, but are not assigned a numeric value. For example, housing systems would be ranked according to the benefits they could provide for animal welfare. Assessment of QOL in this way is facilitated by categorizing welfare factors into functional classes (e.g. biological needs, general indicators, protective variables). CBD is appealing because in addition to its qualitative nature, it provides ways of customizing welfare assessment so that one can focus on assessing many or just a few select welfare parameters. The main disadvantage is that CBD becomes less efficient as more factors are incorporated into the analysis.

Nonetheless, CBD offers some potentially useful ideas for developing a method of QOL assessment for companion animals given that there is currently no scientific evidence to assign weights to the needs and preferences of these animals.

1.3.4.5 Quality of life assessment of laboratory animals

The Canadian Council on Animal Care (CCAC) has developed guidelines to ensure the welfare of animals used for research purposes (152). The CCAC's approach to welfare assessment is primarily quantitative and is not animal-centred as it focuses on the measurement of objective parameters such as lighting, ventilation, noise, and bedding (152). However, the guidelines acknowledge the importance of psychological well-being of animals by including a chapter on pain and distress.

Mellor and Reid (1994) (148) proposed a grading scheme to evaluate the potential impact of scientific experiments on the welfare of research animals. The scheme had five domains, representing the Five Freedoms (Table 1.1); the domain based on freedom from fear and distress carried the most weight. This approach provides an appealing framework for QOL assessment in pets because it incorporates the body, mind and nature components of QOL; however, at this time, there is no scientific basis to indicate that feelings of fear and distress are more important than the opportunity to perform natural behaviour, although both are related to each other.

1.3.4.6 Quality of life assessment of companion animals

In contrast to production and laboratory animals, the lives of pets are highly variable, which is a challenge in the development of a standardized QOL instrument. The

stresses of daily life for pet dogs varies between individuals. For some dogs, choosing between chew toys may be the extent of distress while for others it may be separation from an owner, or pain due to injury or disease. A dog with an owner may not be better off than a dog without an owner because the quality of the pet's life is a function of the routine and lifestyle of its owner.

There has been little scientific investigation of what constitutes the "good life" for pet dogs. The effects of noise (108,153,154), space restriction (138,155,156), social isolation (137,139), environmental enrichment (140,141,157), and exercise (107), on the behaviour and physiology of shelter and laboratory dogs have been studied. However, the results have limited applicability to pet dogs due to differences in environment, routine and breed.

Research on canine temperament and on breed-specific behaviours (158,159, 160, 161) has applicability to the natural aspect of canine QOL. Temperament is an aspect of the individual's nature (36) and is the manifestation of behaviour, determined by the interaction of internal factors (e.g. genetics) and external factors (e.g. environment, past experiences) (162,163). Temperament tests involve the objective assessment of the behavioural responses of an individual to a variety of controlled stimuli (161). The results of these tests provide insight in to the dog's nature.

There have been reports of QOL assessment in companion animals with diseases such as cancer (59,142), degenerative joint disease (145,146), and infectious diseases (164). To the author's knowledge, there are only two formal instruments for QOL assessment of companion animals (54,164). Hartmann and Kuffer (1998) (164) adapted Karnofsky's index (76) to assess the QOL of cats with feline immunodeficency virus that

were enrolled in a clinical trial. A Karnofsky Score for each cat was determined by data contributed by the cat's owner and the clinician examining the cat. The owner answered questions pertaining to the cat's mental and physical welfare (e.g. appetite, level of activity, sleeping behaviour); the questions were "not of equal emphasis". The clinician assigned a score to the cat's general condition; the score was on a scale of 0 (the patient was dead) to 5 (the patient demonstrated no abnormalities on physical examination and no complaints were reported) (164). This study demonstrated an effect of treatment on QOL and illustrated that Karnofsky's index may be a useful model for QOL assessment of cats. The strengths of this measure are that it integrates data from the individuals most familiar with the subject (i.e. the owner and the veterinarian) and the method of arriving at a score is straightforward and concise. A limitation is that the measure emphasized objective aspects of QOL, but no formal definition of QOL was provided. Other limitations are that the weights assigned to the owners' questions were not explained and the instrument was not validated for QOL assessment of cats.

McMillan's Quick Assessment QOL Questionnaire (2003) (54) is designed to assess the QOL of pets regardless of disease condition. The instrument is based on the premise that QOL is a balance of positive and negative feelings, and is the first of its kind to be reported in veterinary medicine. The instrument has some limitations: it has not been validated, its philosophical basis is not apparent, and some assumptions suggest uncritical anthropomorphism. One such assumption is that conditions such as blindness and deafness prevent or inhibit pleasurable feelings, and therefore directly and adversely affect QOL. The instrument also assumes that walking is a pleasurable activity for all dogs. Walks may be beneficial to physical health, but it cannot be assumed that all dogs

enjoy walks. The enjoyment of an activity would be influenced by the dog's nature which is fixed, and by the dog's physical condition which is liable to change with time. Anthropomorphic tendencies are also evident in some questions; for example, "How willing would you be to take on the life your pet is now living?" (54). Furthermore, the Quick Assessment QOL Questionnaire does not seem quick or practical because it would require substantial information from the owner and considerable time for the veterinarian to assimilate the information. The instrument also seems to imply that unpleasant feelings outweigh pleasant feelings and that the "distress potentials" for different unpleasant feelings are not equal. A method of assigning weights to positive and negative feelings is suggested, based on the survival value of the feelings. However, the method is vague; therefore, calculating a final QOL score or value seems challenging. Despite these weaknesses, the Quick Assessment QOL Questionnaire is encouraging because it means that the groundwork for QOL assessment within veterinary medicine has begun to be laid. The Questionnaire also serves to highlight some of the important methodological issues concerning QOL assessment of pets.

1.4 Methodological issues of quality of life assessment of pet dogs

Since there has been little scientific research on QOL assessment of pet dogs in the context of veterinary medicine, the following methodological issues need to be addressed: proxy assessment, identification of what constitutes optimal QOL for dogs, and the type of instrument required.

1.4.1 Proxy assessment

Veterinarians can accurately assess a dog's physical health; however, they cannot easily ascertain the dog's mental well-being and the extent to which the dog's nature is satisfied because the dog cannot report on these. A similar difficulty occurs in the assessment of the QOL of human beings with communicative and cognitive limitations (Section 1.3.3.3). Researchers of human QOL overcome this challenge by using proxy informants, which is the best alternative to self-reports for providing information about a person's subjective experience (72). A proxy is someone who responds on behalf of an individual and offers an opinion about that individual's perspective (165,166). A proxy respondent is usually a close relative, guardian, caregiver, or health professional (166,167). With respect to QOL assessment of dogs, the pet's owner and veterinarian would be suitable proxy informants since the owner is most familiar with the dog's personality, behaviour, and daily routine while the veterinarian is most knowledgeable about the dog's physical health. Each assessor could contribute important information about the animal's QOL.

Research by Wemelsfelder et al (2001) (98) suggests that an observer's unfamiliarity and lack of experience with an animal may not detract from their ability to interpret animal behaviour (Section 1.3.4.1). In an effort to describe the development of different types of canine aggression (e.g. fear, dominance, protective, possessive), Borchelt (1984) (168) interviewed the owners of dogs with behavioural problems. Owners were asked to report on behaviours such as growling, barking and biting. While minimal detail was given regarding methodology of this study, it is necessary to exercise caution when interpreting conclusions that are based on proxy assessments because in the

end the proxy's perspective is *not* the patient's perspective (11,20). A proxy rater makes inferences based on the knowledge they have (169) and ratings by proxy informants will be influenced by their own feelings, perceptions (163,166,170), experience of caring for the individual (166) and attitudes towards the subject (92,171). Human QOL research suggests that the caregiving function of significant others can affect their ability as proxy raters (167). There are also conflicting results regarding the accuracy of proxy ratings of significant others who live in the same household as the subject versus non-resident proxies (167). Moreover, there may be differences between proxy and subject in their assessment of certain domains of QOL. For example, health care professionals are accurate proxy raters of physical and physiological function (166,167,169). However, in a narrative review of numerous QOL studies involving proxy respondents, Sprangers et al (1992) (167) found an overall tendency for health care providers and "significant others" to underestimate patients' QOL. Implementing a number of scales, Slevin et al (1988) (172) found poor correlation between doctor and patient scores for assessment of QOL, anxiety and depression. Nekolaichuk et al (1999) (173) assessed the proxy ratings of cancer patients by professional medical staff and found that physicians showed a tendency to underestimate, while nurses more closely approximated patient's ratings. In addition, factors such as the proxy's experience and knowledge of health can influence proxy assessments. In a study by Pearlman and Jonsen (1985) (174), 205 internal medicine and family medicine physicians were presented with a hypothetical case and were asked to make decisions regarding life-sustaining treatment for the patient. The responses showed considerable variability. Residents-in-training tended to consider QOL more often than experienced physicians and private practitioners (174).

There are conflicting data concerning the reliability of "significant others" as proxies. Relatives may provide good proxy ratings of functional aspects of QOL, but tend to be less accurate as raters of subjective measures, such as emotional states (175,176). Vogels et al (1998) (177) found that the ratings of parents and children showed agreement regarding the children's pain, symptoms, and cognitive functioning, while little agreement was shown regarding the children's autonomy, social and global emotional functioning. However, the authors reported that children's self-reports showed less "reliability" than the parents' proxy ratings, which may suggest inconsistency due to cognitive immaturity (177). The type of reliability was not clearly specified.

Proxy assessment of animal QOL is further complicated by the fact that humans are making a judgement for an individual of another species. Therefore, anthropomorphism is a risk. Based on research on human QOL, owners are likely to be good at reporting on concrete, observable parameters (72,166,167). This approach was adopted in a study by Podberscek and Serpell (1997) (170) in which the relationship between aggressive behaviour in cocker spaniels and owner personality was examined. In an effort to prevent owners from making general and subjective evaluative statements about their dogs' behaviour, and to minimize bias, owners were asked to report the frequencies of the dogs' behaviour under specific circumstances.

In evaluating owner attitudes towards home care of paraplegic dogs, Bauer et al (1992) (178) used questions and statements about owner expectations and perceptions of their pet's QOL on a 5-point Likert scale. Some of the statements to which respondents had to agree or disagree were largely subjective. Examples of such statements are: "Rover is leading an unacceptably poor quality of life" and "Rover's quality of life is as

good as before surgery". The authors found a significant correlation between the owners' prior expectations and the owners' perceptions of their dogs' QOL. No definition of QOL was provided and there was no indication of whether the questionnaire was validated or not, which calls into question the validity of conclusions drawn from the results (e.g. that the QOL for most of the dogs was "as good as before paralysis").

Like self-reports, proxy assessments are susceptible to the "faking good/bad" bias. "Faking good" occurs when the respondent gives answers to please or impress the interviewer (179). For example, because veterinarians advocate regular exercise for dogs, a dog owner may feel inclined to tell their veterinarian that their dog is exercised daily when in fact the dog is rarely exercised. "Faking bad" bias occurs when a person provides answers that give the impression that their situation is worse than it really is (179).

The reliability of proxy reports is also important (180). Having proxy respondents rate the accuracy of the information they are reporting, particularly if they are reporting on highly subjective domains of QOL, would be useful (92). The effects of proxy characteristics, such as age, gender, and proxy empathy, on proxy ratings need further investigation (166,171). In the case of animals, a survey of animal rights supporters, farmers, and members of the urban public suggested that empathy towards animals is influenced by a person's belief that animals have minds (97). This suggests that, as with proxy assessment of humans, a proxy's characteristics would affect QOL assessment of animals.

1.4.2 Identification of what constitutes optimal canine QOL

With respect to QOL assessment of dogs, the fundamental question within a general framework of body, mind and nature is, what constitutes the "good" life for a dog? The Five Freedoms (Table 1.1) are another account of what constitutes optimal animal welfare or QOL. The list of freedoms is not weighted, suggesting each freedom is equally important. The list provides a broad "objective list" of what pet dogs need for a good life.

An objective list approach would identify the constituents of optimal canine QOL; these constituents may be viewed as needs. A need is "any requirement that is necessary for an organism to develop normally and to maintain its physical and psychological health" (39). Hurnik and Lehman (1988) (50) suggested a hierarchy of animals' needs (Table 1.1). Maslow (1943) (181) proposed a hierarchy of basic human needs, the most important of which were the physiologic needs. These human and animal models suggest that the most important needs are basic physical needs critical for survival. The basic physical needs of a dog include regular access to food (appropriate to their age, breed and health status) and clean water, and access to shelter. Dogs' behavioural needs have not been identified scientifically.

When considering dogs' needs, individual needs should be weighted and this is a challenge to QOL assessment in animals because what is important for one dog may not be important for another. This idea of ranking needs according to importance is appealing because it suggests that by satisfying an ordered checklist of needs one can achieve optimal QOL. In practice however, the idea does not stand because QOL is a dynamic construct, therefore an individual's circumstances would alter the associated

importance of particular needs (181). Factors such breed and age differences add to the challenge of weighting the needs of dogs (47). For example, certain behaviours are breed-specific; these behaviours, known as modal action patterns, are innate and genetically programmed (121) and reflect the "nature" of the dog (e.g. the eye-stalk behaviour of herding dogs, such as the Border Collie (182)). Therefore, optimal QOL might require opportunities for some dogs to perform certain behaviours, depending on breed. Age is another factor to consider because dogs' needs may change as the animal develops and ages. For instance, geriatric dogs are more likely than their juvenile counterparts to need medication to relieve arthritic pain.

Until an efficient and valid method of assessing the needs and preferences of individual pet dogs is developed, the onus is on veterinarians and pet owners to utilize their knowledge and experience to assess canine QOL in a logical and consistent manner. At present, an "objective list" approach is appealing because it provides a structured means of assessing canine QOL.

1.4.3 Types of quality of life instruments

There are three types of QOL instruments that might be used in the assessment of animal QOL: discriminative, evaluative and predictive (183,184,185). Discriminative instruments determine if there is a difference between individuals based on their QOL at one point in time (77,183,184). A discriminative instrument asks, "What is the dog's QOL like *now*?" The disadvantage of a discriminative QOL measure is that QOL is not directly measurable, and there is no "gold standard" to which a QOL measurement can be compared. A "gold standard" is a universally accepted measure that has demonstrated

superiority in effectiveness or validity when compared to other tests or instruments that are intended to measure the same thing (186). Without a gold standard, the criterion validity of a discriminative QOL assessment of animals cannot be determined (187,188). A predictive QOL instrument determines what an individual's QOL will be like if a certain course of action is taken. A predictive instrument would be useful for prognostic purposes (185), that is, under circumstances where an owner is concerned about the potential impact of a radical intervention or event (e.g. limb amputation, moving house) on an individual/pet's QOL. Predictive measures have a gold standard for comparison (184).

Evaluative QOL measures assess change in QOL over time. They are frequently used in clinical trials and cancer treatment of people (77,184,185) and have been used with dogs under similar conditions (142). A global question such as, "How would you rate Rover's QOL on a scale of 1 to 10?" asked at regular intervals during treatment is an example of a basic evaluative QOL instrument.

1.5 Conclusion and research objectives

At present, there is no validated method for assessing the QOL of pet dogs. The veterinarian's assessment of QOL is likely to be incomplete because it emphasizes physical health and largely ignores the state of an animal's mind and the extent to which its nature is satisfied. As veterinary medical advances raise questions about animals' QOL, the need for a practical, validated and reliable QOL instrument for animals is apparent. Objective list theory provides a suitable framework for incorporating the three components of animal QOL into a QOL instrument.

The objectives of this study are:

1) to develop a preliminary discriminative QOL instrument for use in pet dogs;
2) to assess the test-retest reliability of the instrument and thereby identify aspects of the instrument that require improvement;
3) to examine the instrument's ability to discriminate between the QOL of sick and healthy dogs.

CHAPTER 2: DEVELOPMENT OF A PRELIMINARY DISCRIMINATIVE QUALITY OF LIFE INSTRUMENT FOR PET DOGS

2.1 Introduction

Companion animals play an important role in the lives of human beings, and human medical advances are now being applied to pets to improve their health and increase their life spans. This effort to increase quantity of life, is accompanied by a growing concern about quality of life (QOL). Not much is known about what constitutes QOL in companion animals. It is widely recognized that human QOL is a multidimensional construct (12,14,66) that consists of subjective and objective components (5,10,11). With respect to animals, welfare and QOL are often used synonymously (38,39) and may be considered identical; that is, like welfare, QOL comprises the state of the animal's body and mind and the extent to which its nature is satisfied (33). Rollin (1993) (36) refers to the animal's nature as its *telos* and defines it as genetic traits manifested through breed and temperament. It follows from the definition of QOL, that veterinarians' assessment of an animal's QOL may be incomplete because veterinarians are trained to focus on the health and physical needs of the animal, and may not give sufficient consideration to the animal's state of mind and its nature.

QOL assessment in the context of veterinary medicine is in its infancy. There are a variety of human QOL instruments, but none is designed specifically for QOL assessment of animals. The Sickness Impact Profile (189) is regarded as a "gold standard" among human QOL measures because it is well-constructed and has been validated (25). In veterinary medicine, no "gold standard" for QOL assessment of companion animals exists. Moreover, since animals cannot provide self-reports about

their QOL, the use of proxy respondents is necessary. To the author's knowledge, the Karnofsky's Score for cats (164) and the Quick Assessment QOL Questionnaire (54) are the only reported measures for evaluating QOL in companion animals. However, the validity and reliability of these respective instruments have not been reported. Furthermore, the Quick Assessment QOL Questionnaire focuses exclusively on the animal's feelings.

There is a need to develop an instrument that assesses QOL in a systematic and objective way; the instrument should be reliable and valid, and have the potential to be a practical tool for veterinarians. The objectives of this exploratory study were: i) to develop a preliminary discriminative instrument to assess the mental and natural aspects of QOL of pet dogs ii) to evaluate the instrument's content validity and test-retest reliability, and iii) to assess the instrument's ability to discriminate between sick and healthy dogs. This chapter describes the work done to meet the first two objectives.

2.2 Materials and methods

2.2.1 Development of the Canine Quality of Life Questionnaire (C-QOL-Q)

2.2.1.1 Philosophical foundation

The philosophical foundation of the Canine QOL Questionnaire (C-QOL-Q) was objective list theory, which argues that a subject requires certain things for optimal QOL (61). Based on the Five Freedoms (37) and farm animal welfare literature, the following requirements were thought necessary for pet dogs: satisfaction and predictability of basic needs (food, water, shelter) (Appendix A), a high degree of biological functioning,

satisfaction of *telos* needs (e.g. opportunities for social interaction and environmental control) (Appendix A), opportunities for pleasure, and minimal distress.

2.2.1.2 Item selection

The C-QOL-Q (Appendices B,C) is a telephone questionnaire and was developed using established guidelines (190,191,192). Emphasis was placed on the mind and nature aspects of canine QOL because the study population consisted of pet dogs treated at a veterinary referral centre, and it was assumed that the dogs' basic needs were being met. Also, since the respondents were dog owners it was assumed that they would be most knowledgeable about the personality, behaviour and routine of their dog, and less knowledgeable about the dog's physical health. There were only three questions about physical health (biological function) because it was not possible to make an exhaustive list that would be applicable to all dogs and would obtain valid answers (190). (Refer to Appendix D for those physical health questions that were eliminated from the final version of the questionnaire). In addition, the dog's veterinarian could provide more accurate information about physical health. The remaining questions related to *telos* needs, opportunities for pleasure, and minimal fear and distress.

Questions were derived from: the author's experience as a veterinarian and dog owner; the literature about canine behaviour, veterinary medicine, and animal welfare; and the comments from a focus group of 5 dog owners with varied experience as pet owners. A summary of the focus group questions and results is presented in Appendix E.

Questions were designed to be clear, concise and unintrusive (25); they were worded as objectively as possible in order to solicit factual information about various

aspects of the dog's QOL. Questions about sensitive topics such as punishment were positioned between less threatening topics towards the end of the questionnaire in order to reduce the perceived importance of the subject (190). Those questions were made less threatening by loading them to suggest that the behaviour is common (190). For example, before asking about how often the dog was scolded or physically corrected, respondents were told: "It's not uncommon for people to correct their dog in some way (when it misbehaves)".

The C-QOL-Q was designed to be a discriminative instrument, therefore it was necessary to define the period to which the questions referred. The seven days prior to the telephone interview were chosen as the reference period because a time frame exceeding 1-2 weeks has been associated with "increased bias due to memory loss" (25). When appropriate, questions began with "Thinking about the last seven days..." or "How often during the last seven days...?". Activities that occurred outside of the 7-day window in question were not considered.

The C-QOL-Q was intended to be a generic measure, applicable to all pet dogs in the general population. The questions were general and related to feeding, activity, environment, physical health, behaviour and feelings, but did not cover issues related to specific breeds or diseases. The questionnaire had three types of questions:
1) questions that solicited basic, descriptive information about the dog e.g. the dog's age, breed and neuter status, and how long the respondent had owned the dog; 2) questions pertaining to the objective list of requirements for optimal canine QOL (QOL questions); and 3) linking questions or probes that led up to the QOL questions. For example, before asking the respondent if their dog enjoyed obedience training, respondents were

asked whether the dog had participated in obedience training during the seven days before the telephone interview. An affirmative answer was followed by a question about the dog's enjoyment of training. These questions were worded in a unipolar manner (i.e. asking about enjoyment) rather than in a bipolar manner (i.e. like or dislike) because it has been shown that in the development of human mental health measures unipolar items are superior to bipolar items (190).

2.2.1.3 Response options

The majority of questions were closed-ended and had descriptive, mutually exclusive response options. The response options for the QOL questions were assigned the letter grades O, A, B, C. "O" denoted the ideal for a particular situation, while "C" was the lowest grade and represented the worst conditions. For example, having the freedom to go anywhere in the house when the owner was home implied that the dog had complete environmental control and grade "O" was assigned. Being limited to one small room/area implied minimal or limited environmental control and this response was assigned grade "C". The letter grading scheme was modeled after Mellor and Reid (1994) (148) who proposed it as a means of assessing the impact of experimental procedures on the welfare of laboratory animals. The purpose of using letter grades was to avoid the mathematical assumptions of numbers (148). The grades were not read out to the respondents.

There were two types of QOL questions: objective, factual questions (e.g. asking about the type of collar the dog wore on a walk) and questions about feelings such as distress, enjoyment of a particular activity (e.g. walks, obedience training, interaction

with dogs, interaction with children) or "getting along" with household members. To reduce anthropomorphism, the questions about feelings and the associated response options were worded as objectively as possible. The enjoyment questions were worded such that owners first identified whether their dog enjoyed a particular activity. This was followed by a question about the duration or frequency of the activity; the response options were graded such that the greater the frequency or duration of exposure to a pleasant event the better the grade, but the greater the frequency or duration of exposure to unpleasant events, the lower the grade (Figure 2.1).

Figure 2.1 Example of linking questions and the QOL question to assess a dog's enjoyment of obedience training

Linking questions:

Q-64i In the last seven days has Rover participated in obedience training? This includes training at home or going to obedience classes.

1 YES
2 NO ⇨ Skip to Q-66i

Q-64ii Thinking about the last seven days, would you say that Rover enjoyed obedience training?

1 YES
2 NO ⇨ Skip to Q-65ii
3 NOT SURE ⇨ Skip to Q-66i
4 IT DEPENDS ⇨ Skip to Q-66i

QOL question:

Q-65i How often during the last seven days has Rover engaged in obedience training?

O 6-7 DAYS ⇨ Skip to Q-66i
A 4-5 DAYS ⇨ Skip Q-66i
B 2-3 DAYS ⇨ Skip to Q-66i
C ONE DAY IN THE LAST SEVEN ⇨ Skip to Q-66i

Q-65ii How often during the last seven days has Rover engaged in obedience training?

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

The grading of the response options for the objective questions also reflected the beneficial or detrimental contribution of the factor to QOL. For example, Q-25 (Appendix B) asked about the type of collar the dog wore during walks; the response options were graded according to the degree of discomfort or lack of environmental control the dog would experience wearing the collar. The prong collar received the lowest grade because of its potential to inflict harm and to severely restrain the dog.

Since dogs are social animals (62), being left alone is a potential cause of distress. In order to assign a grade in this area (Appendix B, Q-26), it was necessary to consider the longest period of time the dog had been left alone as well as where the dog was confined during that time. The less time spent alone and the larger the space available, the better the grade. Therefore, a grade of "O" was assigned if the dog had not been left alone at all. A grade of "C" was assigned if a dog had been restricted to a small area for more than 8 hours in a 24-hour period.

2.2.1.4 Content validity and pretesting

The content validity of the questionnaire was assessed by nine experts in the fields of canine medicine, canine behaviour, animal welfare, and veterinary ethics. A summary of the experts' comments is presented in Appendix F. Following revision, the questionnaire was pretested (193) on 14 dog owners by telephone. In its final form, the C-QOL-Q consisted of 68 questions, of which 38 were QOL questions; the associated interview took 30-40 minutes to complete.

2.2.2 Study population and recruitment

Recruitment began following approval of the project by the University of Prince Edward Island Research Ethics Board. Between October 2002 and March 2003, the owners of dogs with scheduled appointments at the Atlantic Veterinary College (AVC) were recruited from the computerized hospital appointment book. All owners of dogs with scheduled appointments in medicine, surgery, ophthalmology or dermatology were telephoned, informed of the study, and invited to participate provided that predefined entry criteria were met (Appendix G and Appendix H). Interested owners were sent an information package containing a cover letter, an information sheet, and a list of sample questions from the C-QOL-Q (Appendix I) to review prior to the interview. A cash incentive of $20 per completed interview was offered to encourage participation in the study.

Recruitment calls were made eight days before the dog's scheduled appointment at AVC, which resulted in more referral cases (i.e. "sick" dogs) than routine cases (e.g. neuters, spays and vaccinations). Referral cases tended to be booked further in advance than appointments for routine, elective procedures. Therefore, in an effort to increase recruitment of routine cases, the hospital appointment book was consulted again five days before the schedule day of interest. Any new cases were noted in the appointment log (Appendix J) and owners were called. All prospective participants were called up to three times. Recruitment calls were typically made in the morning and in the evening, but were not made on public holidays.

2.2.3 Quality of life interviews

Following receipt of the information package, owners were telephoned to ascertain their interest in participating in the study. After verbal consent was obtained, the questionnaire was administered by one interviewer (JW). In order to prevent the AVC veterinarian's advice or perceptions from influencing the owner's answers to the C-QOL-Q questions, interviews were conducted prior to the dog's scheduled appointment at AVC.

Following the interview and the dog's appointment at AVC, each dog was classified as "sick" or "healthy" using the information in the last entry of the dog's AVC medical record in conjunction with a decision tree (Appendix K) that centred on the presence of clinical signs (44) (Appendix A). A dog was "healthy" if it had no current medical or surgical condition(s); or if it had a medical or surgical condition, but its physical function was stable (i.e. the dog was not showing clinical signs) due to therapeutic intervention (Appendix A). A dog was classified as "sick" if its physical function was not stable (i.e. the dog was showing clinical signs) (Appendix A). In order to assess the test-retest reliability of the QOL questions, the owners of dogs classified as "healthy" were re-interviewed three to four weeks following the first QOL interview.

2.2.4 Data management

Each participant was assigned an identification number which was recorded on all pages of the questionnaire. The data were coded and entered into Epidata Version 2.1b (Data entry software, Odense, Denmark). Data verification was completed by comparing the results from two separate data entry sessions, which were both done by the author.

Purebred dogs were classified according to a coded list of breeds based on the Canadian Kennel Club's dog registration (194). Any other dog breed which was not listed in the CKC registry, such as Border Collie or (Toy) American Eskimo was designated as "other". Non-purebred dogs were recorded as "mixed" breed.

Statistical analyses were performed using Intercooled STATA 7 (Statistics and Data Analysis software, College Station, Texas, U.S.A.) and Minitab 12 (Statistical software, State College, Pennsylvania). The test-retest reliability of the QOL questions in the C-QOL-Q was assessed using the unweighted kappa statistic (184,195,196) and a significance level of $p<0.05$. Since two sets of answers are required to calculate kappa, any cases in the "healthy" group that did not complete two interviews could not be used in determining test-retest reliability. The durations of the first and second interviews were compared using a t-test.

2.3 Results

Two hundred and thirty dog owners from the Atlantic provinces (Prince Edward Island, Nova Scotia, New Brunswick and Newfoundland) were telephoned. Two potential participants could not be contacted because no phone number was available. Reasons for non-response and exclusion are presented in Table 2.1. One hundred and thirty dog owners were successfully recruited; 10 were subsequently excluded for reasons given in Table 2.2. Of the remaining 120 dogs, 43 were classified as healthy and 77 as sick. Four respondents in the healthy group did not complete two interviews therefore, the following results represent data from 39 dogs. A comparison of results from the healthy and sick dogs is presented in Chapter 3.

Table 2.1 Reasons for non-response and exclusion from the Canine QOL Study

Reasons	Number of dog owners
Answering machine-no return call from respondent	22
Did not meet entry criteria	18
Not interested	14
Owner busy (cannot take phone call) or away	13
No answer – phone allowed to ring at least 8 times	7
Phone number not in service or wrong number	7
Dog's appointment cancelled or rescheduled	9
Left message with person; no return call from owner	3
Unable to get through because of fax line	2
Information package arrived too late[a]	4
Did not read information package	1
TOTAL	100

[a] QOL interviews had to be completed before the dog's appointment at AVC. Therefore, packages that did not arrive by a specified date precluded respondent from participating in the study.

Table 2.2 Reasons why interviews were excluded from data analysis

Reasons	Number of dog owners
"Pretest" interviews [a]	4
Cancelled appointment at AVC	3
No-show for appointment at AVC	1
Dog's health status not clear due to few details in dog's medical record	1
Poor quality interview[b]	1
TOTAL	10

[a] These interviews occurred at the start of data collection; revisions were subsequently made to the C-QOL-Q.

[b] Repeated interruptions and distractions during the interview.

2.3.1 Descriptive statistics (healthy dogs)

Data from sick dogs are presented in Chapter 3. Owners of the "healthy" dogs were from Prince Edward Island, New Brunswick and Nova Scotia. Fifty percent of the dogs had been owned by their present owner for at least 4 years. Duration of ownership ranged from 5 months to 12 years (mean ± SD, 4.5 ± 3.5 years). The dogs ranged in age from 7 months to 12 years (mean ± SD, 4.6 ± 3.4 years). Forty-one percent of the dogs were spayed females, and 23% were neutered males; sexually intact males and sexually intact females accounted for 18% each. The majority of dogs were purebred (n=28, 72%), represented by eighteen different breeds.

The first interview took 41 minutes to complete (mean ± SD, 41 ± 11 minutes; range 25-70 minutes) and the second interview 35 minutes (mean ± SD, 35 ± 11 minutes; range 17-65). There was a significant difference in the duration of the two interviews ($t = 2.3$; $p = 0.02$). During the first interview all of the respondents reported being "very familiar" with their dog's care and routine; during the second interview 38/39 respondents also reported this. The one exception had been away from home for 3 of the 7 days immediately before the QOL interview and felt "somewhat familiar" with the dog's care and routine. The number of people living in the respondents' households ranged from 1 to 6. The majority of households (n=26, 67%) had two residents including the respondent. Twenty-one percent of the households had at least one child resident.

Fifty-six percent (n=22) of dogs were presented to AVC for routine or elective procedures (e.g. routine vaccinations, spaying or neutering, or routine dentistry). Twenty-six percent (n=10) presented for ophthalmologic assessment, while 5% (n=2) presented for orthopedic assessment. The remaining 13% (n=5) were dogs with treated

or untreated medical conditions, but whose physical function was deemed stable. The conditions were: heart murmur (n=1), immune-mediated hemolytic anemia (n=1), anal gland infection (n=1), potential renal compromise (n=1), and osteosarcoma (n=1).

2.3.2 Test-retest reliability

Fourteen QOL questions were applicable to all dogs during both QOL interviews (See Appendix L). One question, about competitive sports, was not relevant to any dog since none had participated in competitive sports in the seven days before the QOL interview. Questions about infrequent activities such as bathing or having nails trimmed were not applicable to many of the dogs.

Twenty-two questions had significant kappa values, ranging from 0.11 to 0.91. (Table 2.3). Of these questions, four had kappa values greater than 0.80 which is considered to be "almost perfect" agreement (196). Five QOL items had kappa values less than 0.40 which suggests fair to slight agreement (196).

The kappa coefficients for 11 of the QOL questions were not significant (Table 2.4); these questions included items about the dog's subjective experiences such as pain or reaction to distressing circumstances. For the remaining five QOL questions, kappa values could not be computed for reasons listed in Table 2.5. For the purposes of comparison, the kappa values for some of the descriptive questions are listed in Table 2.6.

Table 2.3 QOL questions in the Canine QOL Questionnaire that had significant kappa (κ) coefficients ($p < 0.05$). Kappa statistics listed in order of decreasing value.[a]

Question number	Question	Number of dogs (respondents)	Number of respondents in agreement between first and second interviews	Proportion of observed agreement	κ	p
25	Collar type (if leashed)	26	25	25/26 = 0.96	0.91	<0.001
24	How often leashed during walks	29	26	26/29 = 0.90	0.84	<0.001
9	Control over access to food	39	36	36/39 = 0.92	0.83	<0.001
19	Extent of freedom when dog was outdoors without supervision	39	34	34/39 = 0.87	0.83	<0.001
37	Time spent with dog during a typical weekend day	38	36	36/38 = 0.95	0.73	<0.001
16	Extent of freedom when dog was indoors	39	33	33/39 = 0.85	0.73	<0.001
22	Frequency of walks	27	22	14/27 = 0.81	0.72	<0.001
20	Extent of freedom when dog was outdoors under supervision	39	30	30/39 = 0.77	0.68	<0.001
52	Play with toys	28	26	26/28 = 0.93	0.65	<0.001
26	Average duration of being left alone and dog's situation when left alone	39	29	29/39 = 0.74	0.64	<0.001
53	Access to toys	39	31	31/39 = 0.79	0.60	<0.001
36	Time spent with dog during a typical weekday	39	34	34/39 = 0.87	0.52	<0.001
17	Control over going indoors to outdoors and vice versa	39	29	29/39 = 0.74	0.51	<0.001
63	Frequency of punishment	39	28	28/39 = 0.72	0.50	<0.001
49	Interaction with dogs	20	15	15/20 = 0.75	0.47	0.001

Table 2.3 cont'd...

Question Number	Question	Number of dogs (respondents)	Number of respondents in agreement between first and second interviews	Proportion of observed agreement	κ	p
11	Enjoyment of regular food	39	31	31/39 = 0.79	0.46	0.002
60	Brushing	14	8	8/14 = 0.57	0.40	0.006
12	Enjoyment of food treats	39	23	23/39 = 0.59	0.39	<0.001
68	Frequency of contact with distressing things/events	32	18	18/32 = 0.56	0.38	<0.001
56	Duration of play sessions with people	36	19	19/36 = 0.53	0.35	<0.001
23	Duration of an average walk	27	14	14/27 = 0.52	0.27	0.016
46	Interaction with children ≥10 years old	7	4	4/7 = 0.57	0.11	0.044

[a] Results based on 39 healthy dogs whose owners completed two QOL interviews

Table 2.4 QOL questions in the Canine QOL Questionnaire where kappa (κ) coefficients were not significant ($p > 0.05$). Kappa statistics listed in order of decreasing value.[b]

Question Number	Question	Number of dogs (respondents)	Number of respondents in agreement between first and second interviews	Proportion of observed agreement	κ	p
41, 42	Interaction with toddlers	5	4	4/5 = 0.80	0.21	0.17
54, 55	Play with people	36	23	23/36 = 0.64	0.20	0.06
64, 65	Obedience training	5	1	1/5 = 0.20	0.17	0.26
30	Frequency of pain experience	39	32	32/39 = 0.82	0.12	0.22
43, 44	Interaction with children between 4-9 years of age	10	7	7/10 = 0.70	0.04	0.38
27	Distressed when left alone	37	32	32/37 = 0.86	0.02	0.19
35	Getting along with regular visitors (people who spend at least 20 hours/week at the home)	5	4	4/5 = 0.80	0.00	*
10	Eating without disturbance	39	25	25/39 = 0.64	-0.04	0.86
18	Access to shelter when outdoors	39	28	28/39 = 0.72	-0.08	0.95
38, 39	Company of strangers	10	4	4/10 = 0.40	-0.11	0.67
47	Frequency of contact with distressing people	7	5	5/7 = 0.71	-0.17	0.80

[b] Results based on 39 healthy dogs whose owners completed two QOL interviews

* Actual and expected (chance) agreement were equal; an exact p value was not computed (by Stata), but was assumed to be very high

Table 2.5 QOL questions in the Canine QOL Questionnaire for which κ could not be calculated

Question number	Question	Number of dogs (respondents)	Number of respondents in agreement between interviews	Reason for no kappa coefficient
61, 62	Nail trimming	2	2	Too few rating categories
33	Getting along with household members	38	38	Too few rating categories
66, 67	Competitive sports	0	0	None of the dogs had participated in this activity 7 days before the interview
57, 58	Bathing	1	1	Too few rating categories
50, 51	Interaction with other species of animals (besides dogs)	8	8	Too few rating categories

Table 2.6 Kappa coefficients for descriptive items in the Canine QOL Questionnaire

Question number	Question	κ	p
2	Sex of dog	1.00	<0.001
3i	Breed of dog	1.00	<0.001
31	Number of people living in dog's household	1.00	<0.001
32i	Number of children in the household	1.00	<0.001
14	Description of dog's residence	0.84	<0.001
13	Environment (urban, suburban, rural)	0.80	<0.001
29	Duration of health problem(s)	0.69	<0.001
7	Duration of ownership	0.62	<0.001
1	Age of dog	0.60	<0.001
28	Dog experiencing health problems (yes/no)	0.38	<0.005
5	Weight of dog	0.35	<0.001

2.4 Discussion

This study was exploratory (197) and its goal was to examine the performance of a novel QOL questionnaire, not to make a statement about the QOL of dogs in the general population. The objectives of the study were met and the results raise a number of issues relating to methodology, validity and reliability.

2.4.1 Methodology

The sample of healthy dogs was small (n=43) and represents a convenience sample. Although the sample was not randomly obtained, the results were useful in determining which items of the questionnaire were reliable and which required modification or elimination from the instrument.

Objective list theory was an appealing philosophical framework for the instrument because it permitted the stipulation of general conditions for optimal QOL. The approach can be criticised for not allowing for individual preferences (61), but it was impossible in the C-QOL-Q to cover all preferences of pet dogs. Another limitation was the potential contradiction between the instrument's stipulated conditions. For example, for dogs that didn't like going for walks because of fear or pain, the condition "minimal distress" was better served by their not going for walks. In that case, their biological functioning might have been reduced due to lack of exercise. However, the purpose of this instrument was to evaluate the dogs' mental state and the extent to which their natures were satisfied with less emphasis on physical health.

The lower reliability of some questions is unlikely to have been affected by the interview method. Face-to-face interviews with participants were not possible because

the QOL interviews had to be completed before the dog's scheduled appointment at AVC and participants were distributed across a large geographic area. Telephone interviews were a practical and feasible alternative. Telephone interviews are a reliable method of obtaining information (198). The advantage of telephone interviews compared to mail surveys is that the interviewer has more control over data collection because they can ask to speak with a specific individual, and can encourage a respondent to answer all questions (192). Therefore, telephone interviews can yield complete and detailed information (199).

2.4.2 Validity

There are different types of validity and these may be affected by bias and the use of proxy assessors. This study addressed content and face validity only. Criterion validity could not be established because there is presently no "gold standard" to which the questionnaire can be compared (184,188). An examination of the construct validity was beyond the scope of the study. All types of validity may have been reduced by i) not addressing all possible factors related to canine QOL, ii) addressing complex aspects of QOL, such as pain, with only one item, iii) response bias, and iv) use of proxy assessment.

In the interests of time and efficiency, it was not possible to address all aspects of canine QOL. There were few questions about biological functioning, and complex, sensitive issues such as pain and punishment were each addressed with only one question each. This may have reduced the questionnaire's validity (191). Most interviews did not

exceed the maximum recommended length of 60 minutes (193). Moreover, longer questionnaires are often found to be more valid and reliable than shorter ones (191,200).

The prospect of doing a 30-40 minute telephone interview may have been initially discouraging to the respondent, but once an interview begins, its length may not seem to matter (198). A number of respondents commented that they were surprised at how quickly the interview went which suggests that they enjoyed talking about their pets. To ensure that a veterinarian administering the C-QOL-Q had thorough knowledge of the subject's biological functioning, a health checklist (Appendix M) would be a useful complement.

A 3-4 week interval was used between first and second interviews because it was assumed that no significant changes in the lives and routines of healthy dogs would occur in that time frame and that owners would have forgotten their answers from the first interview (25). The expectation was that the answers given in the second interview would be the same as those given in the first. This assumption was misguided, however, because the effect of uncontrollable factors such as weather were not taken into consideration.

Control and choice were significant factors in the grading of some items, and duration and frequency of a particular activity also influenced grading. For example, the subject of play sessions with people (Appendix B, Q54-56) was assessed by duration and frequency. The problem with this approach is that it assumed that more play is good or detrimental to the dog's QOL (depending on whether the dog enjoys the activity or not) and it assumed that the person playing with the dog determined the duration of a play session. However, as many respondents pointed out, the duration of a play session was

determined by the dog's interest. Dogs that enjoyed play sessions but chose to play only for 5 minutes (e.g. the dog stopped fetching the ball) would be given the lowest possible grade (i.e. C). This does not reflect the fact that it was the dog's choice (not the person's) to end the play session.

Common activities and events were addressed in the questionnaire, but breed-specific behaviours such as swimming and hunting were not included, limiting any evaluation of the individual or natural aspects of QOL. A solution might be to include an item similar to Q-68 (Appendix B) which asks the respondent to list the things or events that the dog enjoys.

2.4.2.1 Bias

Validity as well as reliability can be compromised by response biases. A number of respondents commented that the questions encouraged them to think about their dog's QOL and how they as owners could directly affect their dog's QOL. For example, during a second interview one respondent reported that following the first QOL interview (when the dog had not been taken for any walks) he felt compelled to take his dog for walks (despite the owner having a sore foot) because he realized that it was an activity that the dog enjoyed. The fact that the respondent remembered his answers from the first interview suggests the possibility of recall bias, but it is encouraging nevertheless that the interviews prompted respondents to find ways of improving their dog's QOL.

The veterinarian's advice may also have affected the respondents' answers during the second interview. For example, some owners who classified their dogs as having a medical problem in the first interview, answered the opposite in the second interview. In

these instances, the owners' perception of their health may have changed following the veterinarian's assessment of the dog's physical health.

Systematic response bias (167) may also have compromised validity. For example, for Q-19 and Q-20 (Appendix B), it is possible that the author's interpretation of "freedom to roam anywhere" may have been different from that of the respondents. For some, freedom to roam under supervision implies that the dog has no boundaries whatsoever, while for others, it means that the dog is not bounded by a physical barrier, but is under voice command. These different interpretations were not apparent at pretesting.

"Faking good" bias was a concern with regard to questions about sensitive subjects such as frequency of punishment and frequency of exposure to distressing people or events. "Faking good" occurs when respondents intentionally answer questions in a manner that will cast them in a favourable light (197,188). When the respondent is unaware that they are answering in a way that conforms to dominant or common belief and social patterns, this is referred to as social desirability bias (188,198). There is no simple way of reducing these biases. Telephone interviews reduce the probability of socially desirable responses (198) and care was taken to word questions in ways that encourage the respondent to answer honestly (190,197). For example, the questions about enjoyment of walks and frequency of walks were prefaced by, "For different reasons it's not always possible to take dogs for walks every day".

2.4.2.2 Proxy assessment

Despite the pitfalls of proxy use in human QOL assessment (167), proxy assessment is currently the only feasible option for QOL assessment in animals. Owners were proxies for their dogs and were liable to make inferences and value judgements about what it is like to be their dog (169). In addition, owners may have misinterpreted their dog's behaviour. In both cases, uncritical anthropomorphism was a risk, but questions were worded as objectively as possible to minimize such bias. Although respondents were asked to make judgments about their dog's enjoyment of a particular activity or event, many questions focused on the frequencies of these events. This focus attempted to integrate objective (quantitative) and subjective (qualitative) observations, and was indicated because proxies are reported to be good at reporting on concrete observable parameters (166,167). By asking about subjective topics such as the dog's pain experience or its enjoyment of a particular activity, it was assumed that the respondent was capable of correctly interpreting their dog's behaviour. However, correct interpretation depends on a number of factors, including the respondent's knowledge of canine behaviour, familiarity and understanding of their dog's nature and temperament, and experience as a dog owner. Expectations and perceptions about behaviour could be influenced by differences in experience as a dog owner, which could result in systematic response bias (163,201). For example, Jagoe and Serpell (1996) (201) suggested that first-time dog owners may be inclined to over-exaggerate behaviour because they have limited experience with dogs and therefore may be less familiar with normal canine behaviour and less aware of breed differences in behaviour. Responses to subjective questions can also be influenced by respondent's feelings, such as empathy (166,171).

One way of improving the validity of the instrument in this respect may be to ask more than one question about subjective topics because one question may not address and reflect the complexity of subjective issues (197).

For inexperienced dog owners or owners unsure of how to interpret their dog's behaviour, additional response options of "not sure" or "it depends" were available. For example, when asked the question about their dog's enjoyment of the company of toddlers a number of respondents chose the "not sure" option and qualified their choice by saying that they were not sure if the dog enjoyed the company of toddlers or merely tolerated their presence. Similarly, when asked about the enjoyment of interaction with others dogs some owners replied "it depends", and some owners explained that their dog's reaction to other dogs depended on whether the subject was on leash or not. The wording of these questions permitted interpretive statements from owners, which may have invited anthropomorphism. The use of pictorial representations of different types of canine behaviour were not used in the questionnaire, following discussion at the focus group (Appendix E).

Another concern is the possibility that respondents with more than one pet in the household were answering questions about the subject's enjoyment of particular events by comparing the subject to either another dog in the household or to a subject of a different species (e.g. a pet cat) (163). This problem has been encountered in personality research of animals where factors such as breed and the pets' personality differences can affect the validity of answers. For example, an owner of a Bassett hound may be inclined to compare the hound's enjoyment of play with people to that of their other pet dog, a Jack Russell terrier. An owner with limited experience may misinterpret the Bassett

hound's relaxed nature as disinterest in play. While it is difficult to prevent this type of misinterpretation without burdening the respondents with too many instructions, Podberscek and Gosling (2000) (163) have recommended "collecting large sample sizes" to reduce the effects of "minor rating biases".

Any method of observation implies some degree of subjectivity. However, research suggests that untrained human observers can make accurate and reliable judgements about how an animal may be feeling (96). That research and the fact that the respondents in this study were familiar with their dogs' behaviour and personality, suggest that owners' interpretations about a dog's enjoyment of a particular activity for example, may be valid. The issue might be clarified by research into the cues that dog owners use to determine what feeling a dog may be experiencing. Such studies have been conducted in small children (202) and cognitively impaired individuals (203,204). In addition, interviewing two owners of the same dog and examining the inter-rater reliability would indicate their "success" as proxies (205), provided the instrument is valid.

2.4.3 Test-retest reliability

Given that QOL is a dynamic construct that is influenced by many factors and that changes with time, it is not entirely surprising that the reliability of the QOL questions varied. The results suggest that questions that were based more on objective assessment and less on opinion demonstrated good reliability. The QOL questions with "almost perfect" agreement ($\kappa > 0.80$) concerned environmental control (Table 2.3). In addition, the kappa values for the objective descriptive items in the C-QOL-Q (Table 2.6) were

high. These findings are consistent with human QOL studies that have suggested that proxies such as relatives (176), caregivers, medical professionals (167) are better at reporting on functional and concrete aspects of an individual's QOL.

In contrast, the reliability was poor for questions concerning less concrete and less visible aspects of canine QOL. This may be because a greater degree of judgement was involved. Many of the QOL questions with kappa values less than 0.50 related to enjoyment and distress. These findings are consistent with many human QOL studies (167,172,176) which have shown that the reliability of proxies' responses to questions about psychological aspects of a subject's QOL is poor. Despite the effort to devise an objective method of canine QOL assessment, some degree of subjectivity is unavoidable since QOL comprises subjective as well as objective components (33).

Many of the items for which the kappa value was not significant concerned interaction with people (Table 2.4), which may not have been regular or consistent. For example, the grandchildren of one respondent had visited during the week before the first interview, but did not visit in the seven days before the second interview.

The questions about pain and punishment demonstrated poor or insignificant reliability (Tables 2.3 and 2.4). Subjective or sensitive topics are complex therefore they are more difficult to assess than objective topics (197). This difficulty is further compounded by factors such as context, emphasis, question wording and form, as well as the respondent's mood and feelings (197). Single items about attitudes tend to demonstrate poor reliability (197).

The results indicate that a number of items require improvement before this questionnaire can be used in practice (187). Low test-retest reliability is commonly

explained as "random fluctuation of performance (error) from one test session to another" (187). Any discrepancies may have been due to external factors (e.g. item wording (197), weather, change in dog's health status) or internal factors (187). Internal factors are those within the respondent's control such as changes in routine, and not having time to review the interview questions prior to the interview, as may have been likely for the second interview. Additional reasons for inconsistencies in responses between first and second interviews are: the influence of the veterinarian's comments; low frequency of activities such as nail trimming or bathing; and events that would alter the dog's normal routine and behaviour (e.g. owner illness, public holidays).

Another potential influence is the interval between the interviews. There was a three-to-four week interval between the first and second QOL interviews (12) because it is recommended that retests should not occur less than 2 weeks after the first interview (191). If the interval is too short, the respondent may answer from memory (191,206), but if it is too long, the attribute(s) being assessed may have changed (191,206). The significant difference between the mean duration of the first and second interviews may suggest that respondents remembered their answers from the first interview and so completed the interview more quickly. On the other hand, the shorter duration of the second interview may indicate that the respondents knew what to expect the second time and therefore were more comfortable and more prepared to answer the questions.

Reliability does not necessarily mean accuracy (207). Conversely, poor reliability can occur under conditions of adequate/good validity (207). Therefore, items that showed poor reliability (i.e. low kappa) need not necessarily be eliminated from the questionnaire. Such elimination is a particular risk of using kappa to assess reliability

because it is a "single omnibus" index (207). Another disadvantage of kappa is that it can be misleading because it does not reflect the extent of disagreement. Also, kappa is affected by prevalence (208) and a high proportion of observed agreement may provide a low kappa value (208,209). However, in this study the items with low kappa (κ <0.40) had proportions of observed agreement between 50% and 60% (Table 2.3). Conversely, a high value of kappa can occur when there is asymmetry in the marginal totals (208). With regard to these results, symmetry in the marginal totals predominated (Appendix N).

Cicchetti and Feinstein (1990) (209) recommended that kappa coefficients be accompanied by the proportion of positive and negative agreement (similar to sensitivity and specificity). This is possible when there are two levels of agreement, but is more difficult in the present case when there are multiple levels of agreement (e.g. multiple grades O, A, B, C). One solution is to use weighted kappa which allows for the major and minor discrepancies of agreement (184,196). However, given the exploratory nature of the study and that factors like study design and changes in routine and health may have affected the consistency of answers, weighted kappa was not advantageous.

2.4.4 Improving the Canine Quality of Life Questionnaire

Despite pretesting, it was observed that certain questions were difficult to understand because respondents required additional explanation for these questions (Appendix O). An item that caused particular difficulty was the question concerning the dog's ability to move freely between indoors and outdoors (Q-17, Appendix B). In many cases, additional questions were asked of the respondent to assist their understanding

(e.g. questions about the owner's schedule, the dog's ability to communicate its preference to inside or outside, and whether a doggie door was available for the dog). Therefore, what started as a closed-ended question became a series of open-ended questions, the responses to which were subject to interpretation by the interviewer. The primary question could be improved by being divided into several closed-ended questions. Additional recommendations for improving the C-QOL-Q are described in Appendix O. Additional data about proxy attributes, such as age and work status might be useful in making conclusions and offering advice about a dog's QOL.

2.5 Conclusion

The development of a novel QOL instrument is an evolutionary process (191,210). The C-QOL-Q represents an important first step in QOL assessment of companion animals since no instrument like it exists or has been tested in the context of veterinary medicine. The results provide a framework for further development and highlight aspects of the instrument that require improvement. The results suggest that QOL may fluctuate even when individuals are healthy; this supports the notion that QOL concerns more than just physical health. Further studies are needed to refine the instrument and to assess its reliability and validity before it can be used to make a statement about the QOL of dogs in the general population.

CHAPTER 3: ASSESSMENT OF THE DISCRIMINATIVE ABILITY OF THE CANINE QUALITY OF LIFE QUESTIONNAIRE

3.1 Introduction

Physical health plays a large role in the veterinary assessment of animals' quality of life (QOL). However, this approach fails to address the multidimensionality and the subjective components of animal QOL (33). At present, no valid or reliable method of evaluating the QOL of animals exists. The Quick Assessment QOL Questionnaire (54) represents one of the first instruments purposefully developed for assessing the QOL of companion animals in the context of veterinary medicine; presently however, there are no data reporting that this instrument has been used in practice. The feelings of the animal are central to the QOL model on which this instrument is based. In contrast, the Canine Quality of Life Questionnaire (C-QOL-Q) described in Chapter 2, was developed on the basis that QOL comprises the state of an animal's body and mind, and the extent to which its nature is satisfied (33). The Questionnaire emphasizes the mind and nature aspects of QOL and represents a preliminary method for assessing the QOL of pet dogs in a systematic and holistic manner. By using pet owners as proxies and relying on the pet owner's familiarity with the animal's personality, behaviour and routine, the C-QOL-Q is intended to complement the veterinarian's assessment of physical health. Using objective list theory (61) as its philosophical framework, the C-QOL-Q identifies the following domains for optimal QOL in pet dogs: satisfaction of basic needs (e.g., regular provision of food and water), optimal biological functioning, satisfaction of *telos* needs (i.e. needs predetermined by species-specific genetic coding (36)), opportunities for pleasure, and minimal distress.

Pet owners often ask veterinarians, "Is my animal suffering?". The C-QOL-Q was designed as a discriminative instrument, intended to assess the subject's QOL at a point in time (77,183,184,185). The objective of this study as described in this chapter was to evaluate the C-QOL-Q's ability to discriminate between sick and healthy dogs, in terms of QOL, under the assumption that dogs with impaired physical health will have reduced QOL compared to healthy dogs. Therefore, the hypothesis of this study was that the QOL of the sick dogs was different from the QOL of the healthy dogs.

3.2 Materials and methods

In order to demonstrate that the QOL of sick dogs was different from the QOL of healthy dogs, a difference of 20% between the mean QOL Scores of the respective groups was assumed. The sample size was calculated from the following equation:

$$N = 2 * \left[\frac{(z_\alpha + z_\beta)\,\sigma}{\delta}\right]^2$$

where δ is the magnitude of effect (20%); σ is the standard deviation (40%); and z_α (1.96) and z_β (0.84) represent the type I and II error rates, respectively (211). It was determined that 63 sick dogs and 63 healthy dogs would be necessary.

Between October 2002 and March 2003, the owners of dogs with scheduled appointments at the Atlantic Veterinary College (AVC) Small Animal Hospital were interviewed using the C-QOL-Q. The recruitment of dog owners, questionnaire design, health status classification and data collection have been described in Chapter 2.

3.2.1 Quality of Life Scores

Following data collection, each dog was assigned a QOL Score. The Score was derived from those QOL questions that were relevant to the dog during the seven days before the QOL Interview; the maximum number of applicable questions was 38 (See Section 2.2.1.2). The response options to the QOL questions were assigned letter grades O, A, B and C, "O" representing the best QOL grade and "C" representing the worst QOL grade (See Section 2.2.1.3). These grades were respectively designated 4 (O), 3 (A), 2 (B), 1 (C) on an interval scale. The QOL Score was calculated as the percentage of the maximum possible score, using the following equation:

$$\text{QOL Score} = \frac{\sum \text{grades (numbers) for the relevant items}}{(\#\text{ of relevant items}) * 4} * 100\%$$

The denominator represented the maximum score a dog could receive if given a grade of O (4) for all applicable questions. The numerator was the summation of the numbers (grades) assigned for the applicable questions. Questions were weighted equally since there were no data to guide any weighting. The maximum possible QOL Score was 100%, while the minimum possible score was 25%. A score of 0 was impossible, which is consistent with the notion that by virtue of being alive, a dog has QOL. A high score implied that the proposed criteria for optimal QOL under the objective list were met. The QOL Score was also presented as a bar graph for each dog.

3.2.2 Data analysis

Data entry and verification are described in Chapter 2 (Section 2.2.4). Purebred dogs were classified according to Canadian Kennel Club guidelines (194) as: 1) working breeds (i.e. those breeds listed in the CKC as working, herding, sporting breeds, or hounds) 2) terriers, toy and non-sporting breeds 3) "other" breeds (i.e. any dog breed that was not listed in the CKC registry). Mixed breeds were a fourth category.

Each dog was classified as sick or healthy following their appointment at AVC. Classification was based on the most recent information in the dog's medical record used in conjunction with a decision tree (Appendix K).

Statistical analyses were performed using Intercooled STATA 7 and STATA 8 (Statistics and Data Analysis software, College Station, Texas, USA) and Minitab, v.13 (Statistical software, State College, Pennsylvania, USA). QOL Score was analyzed using stepwise linear regression. Explanatory variables that were evaluated were: age, duration of ownership, environment, breed, neuter status, sex, health status, and date of the QOL interview. Prior to performing multivariable analysis, univariable analysis was done between each predictor and QOL Score to examine the significance of the relationship (Results). Linearity between QOL Score and each of the continuous independent variables (i.e. age and duration of ownership) was assessed by using scatterplots. The continuous variables were transformed into quadratic terms in order to meet the assumption of linearity. Variables with multiple categories (e.g. neuter status, environment) were entered as categorical independent variables (dummy variables).

Due to the limited number of predictors, all possible combinations of variables were compared in an effort to develop the most suitable model. Explanatory variables

were excluded from the model if their associated p value was greater than 0.15. Potential confounders (e.g. age) were forced into the reduced model and were excluded if the change in the regression coefficients of the other predictors was small. Due to the high collinearity between duration of ownership and age, age was removed from the reduced model. Regression diagnostics were done on the full and reduced regression models. Homoscedasticity and normality of residuals were assessed by graphical techniques. The presence of outliers, leverage values and influential observations (212) was determined by i) examining the magnitude of the residuals and calculating DFITS (the difference in fit between when the observations in question were included in the model and when the observations were excluded) (212), and ii) examining graphical representations of regression lines with and without the outlying data. The coefficient of determination, R^2, was used to describe the amount of variation in the QOL Score accounted for by the explanatory variables in the reduced regression model (212,213).

3.3 Results

3.3.1 Descriptive statistics

One-hundred-and-twenty dogs were recruited from Atlantic Canada (i.e. Prince Edward Island, Nova Scotia, New Brunswick and Newfoundland). The dogs ranged in age from 7 months to 17 years (mean ± SD, 5.5 ± 3.7 years). Fifty percent of the dogs had been owned by their present owner for at least 4 years (range 5 months to 17 years; mean ± SD, 5.0 ± 3.6 years). There were equal numbers of male (n=60) and female (n=60) dogs in the study. Eighty percent of the dogs were neutered. The majority of dogs (68%) were purebred. The most common purebreed was the Labrador Retriever

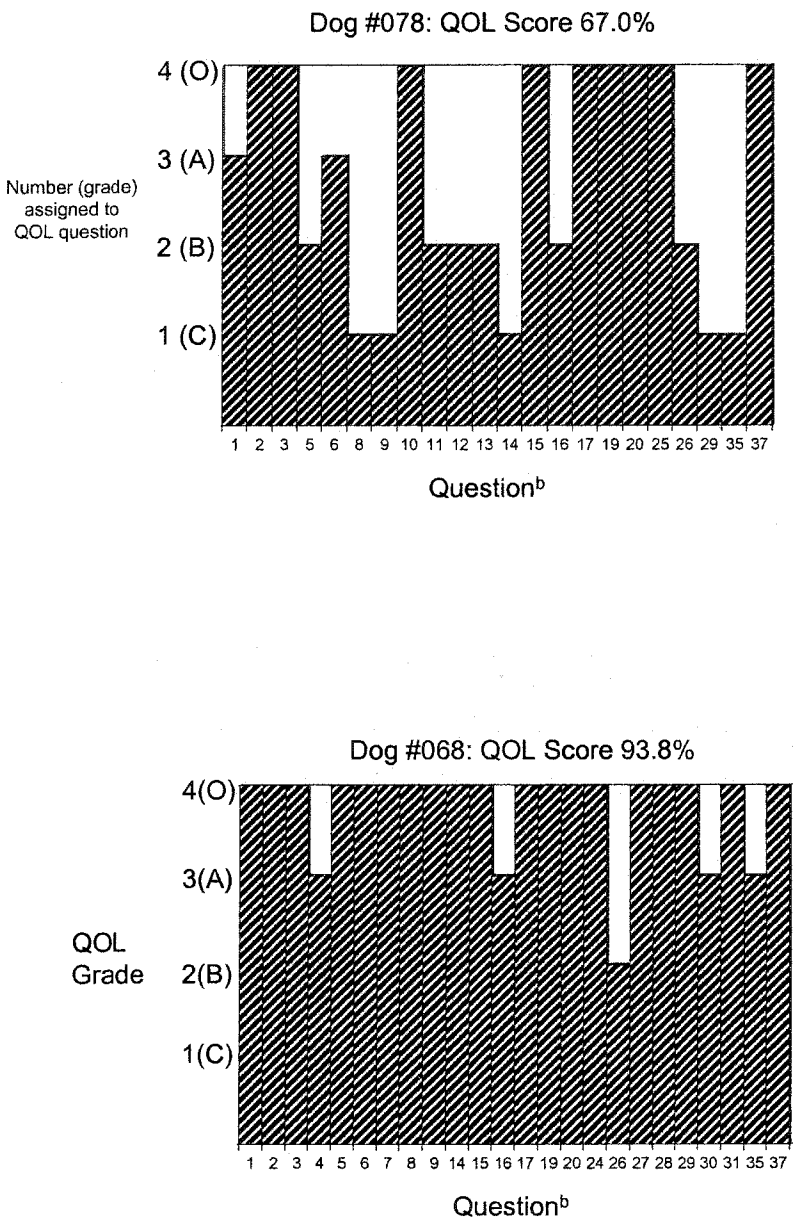
(11%). Fifty-one percent of dogs lived in a rural environment. Twenty percent of the dogs presented for routine or elective procedures. Dogs with orthopedic problems and dogs with ophthalmologic conditions accounted for 38% and 18%, respectively. The remaining 24% were dogs with medical conditions such as cardiac, dermatologic, and dental problems.

Seventy-seven of the dogs were classified as sick and 43 were classified as healthy. The range of QOL Scores for the sick dogs was 67.0% to 93.8%. The range of QOL Scores for the healthy dogs was 68.0% to 89.8%. The number of questions relevant to each dog ranged from 18 to 34. None of the dogs in the study had participated in competitive sports during the seven days before the QOL interview (Appendix B, Q-66-67). Additional descriptive statistics for the sick and healthy dogs are presented in Table 3.1. Figures 3.1 and 3.2 show the bar graphs for dogs with the highest and lowest QOL Scores in the sick and healthy groups.

Table 3.1 Descriptive statistics for healthy and sick dogs in the Canine QOL Study

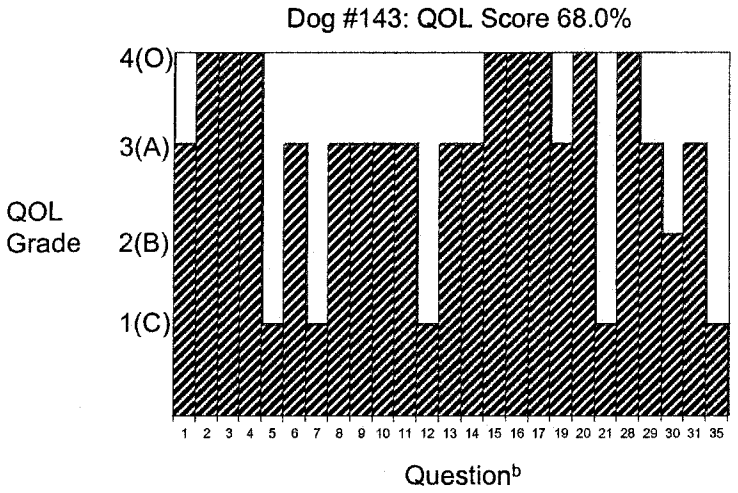
Variable	Category (if applicable)	Sick (n=77)	Healthy (n=43)
Age (μ ± SD)		6.0 ± 3.8 yrs	4.4 ± 3.3 yrs
Duration of ownership (μ ± SD)		5.4 ± 3.7 yrs	4.3 ± 3.4 yrs
Neuter status	Male neutered	35 (45.5%)	10 (23.3%)
	Male intact	7 (9.1%)	8 (18.6%)
	Female spayed	34 (44.2%)	17 (39.5%)
	Female intact	1 (1.3%)	8 (18.6%)
Breed	Mixed	26 (37.8%)	13 (30.2%)
	Working	36 (46.8%)	15 (34.9%)
	Toy, non-sporting and terrier	9 (11.7%)	13 (30.3%)
	Other	6 (7.8%)	2 (4.7%)
Environment	Urban	13 (16.9%)	13 (30.2%)
	Suburban	23 (29.9%)	10 (23.3%)
	Rural	41 (53.3%)	20 (46.5%)
Presenting complaint	Routine visit/elective procedure	0	24 (55.8%)
	Orthopedic	44 (57.1%)	2 (4.7%)
	Ophthalmic	10 (13.0%)	11 (25.6%)
	Medical	23 (29.9%)	6 (14.0%)
Number of relevant questions (range)		18-33	20-34
QOL Score (μ ± SD)		79.7 ± 5.6 %	79.9 ± 5.4 %

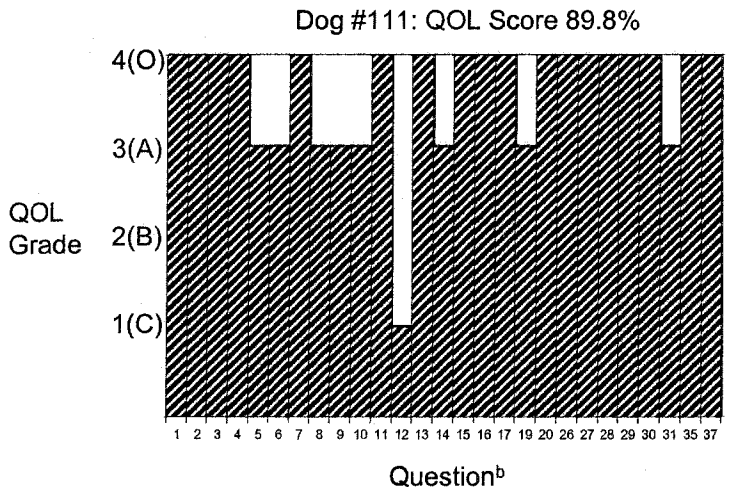
Figure 3.1 Bar graphs of the lowest and highest QOL Scores for the sick dogs[a]



[a] The perimeter of each graph outlines the area of the maximum QOL Score that the dog could have achieved. The filled area represents the dog's actual QOL Score.
[b] Questions that were relevant to the dog during the 7 days before the QOL Interview. See Appendix P which lists the QOL questions that the numbers on the x axis represent.

Figure 3.2 Bar graphs of the lowest and highest QOL Scores for the healthy dogs[a]





[a] The perimeter of each graph outlines the area of the maximum QOL Score that the dog could have achieved. The filled area represents the dog's actual QOL Score.
[b] Questions that were relevant to the dog during the 7 days before the QOL Interview. See Appendix P which lists the QOL questions that the numbers on the x axis represent.

3.3.2 Regression analysis

Health status was initially used as a dichotomous variable, but was not a significant predictor of QOL Score. Health status was therefore divided into 4 categories post hoc (Table 3.2). The results of univariable analyses are presented in Table 3.3. Linear regression identified environment and duration of ownership (as a quadratic term) as the only significant explanatory variables for QOL Score. Table 3.4 shows regression coefficients for the explanatory variables in the final regression model. The coefficient of determination (R^2) for the final model was 10.5%. The oldest dog in the dataset (i.e. 17 years) was identified as an outlier (212). Calculations also determined that this observation was an influential observation and had a high leverage value (212). However, removal of this observation made no significant differences to the results of the final model (Appendix Q) therefore, the observation was retained in the final dataset.

Table 3.2 Classification of health status into 4 groups

	Health status designation	Definition	Number of dogs
1	Healthy	A dog with no current medical or surgical condition(s) and exhibiting no clinical signs at the time of physical exam.	18
2	Effectively healthy	A dog that has a medical or surgical condition (listed in *The 5-Minute Veterinary Consult: Canine and Feline – Second edition* (214)), but whose physical function is stable (i.e. not showing clinical signs) on its own or due to therapeutic intervention. For example, a dog with diabetes mellitus that is well-regulated with daily insulin treatment.	25
3	Sick	A dog with any medical or surgical condition listed in *The 5-Minute Veterinary Consult: Canine and Feline – Second edition* (214) that causes minor to moderate change in the dog's ability to function normally (i.e. the dog shows mild to moderate clinical signs). For example, recovering ear infection; mild arthritis	37
4	Very sick	A dog with any medical or surgical condition listed in *The 5-Minute Veterinary Consult: Canine and Feline – Second edition* (214) that causes severe/extreme change in the dog's ability to function normally (i.e. the dog shows severe clinical signs). For example, severe arthritis; bilateral mature cataracts	40

Table 3.3 Predictor variables for QOL Score that were examined in the univariable analysis and the significance level of each

Variable	p
Environment	**0.03**
Urban	0.00
Suburban	0.50
Rural	0.02
Duration of ownership	**0.24**
Age	**0.62**
Sex	**0.48**
Neuter status	**0.36**
Breed	**0.82**
Mixed	0.00
Working	0.78
Toy, non-sporting and Terrier	0.94
Other	0.37
Health status	
2 levels	**0.89**
4 levels	**0.17**
Healthy	0.00
Effectively healthy	0.04
Sick	0.36
Very sick	0.12
Day of year[a]	**0.23**

[a] Date of the QOL interview.

Note: Numbers in bold represent the p values for the categorical variables as a whole.

Table 3.4 Final linear regression model for QOL Score (n=120)

Explanatory variable	Coefficient	Standard error	95% Confidence interval	p
Environment	-		-	0.037[a]
-suburban vs urban	0.85	1.4	-1.9-3.6	
-rural vs urban	2.9	1.2	0.5-5.4	
Duration of ownership[b]	-		-	0.049
-linear term	1.0	0.4	0.2-1.8	0.014
-quadratic term	-0.07	0.03	-0.1- 0.0	0.022

[a] p value represents the overall significance of the variable in the model
[b] Term transformed quadratically.

R^2 for the final model = 10.5%
Adjusted R^2 = 7.4%

3.4 Discussion

Since the Canine QOL Questionnaire is one of the first instruments of its kind to be used within the context of veterinary medicine, the Canine QOL Study was an exploratory study. The primary objective of this study was not to make a statement about the QOL of dogs in Atlantic Canada, but to assess the instrument's discriminative ability. The fact that the C-QOL-Q could not discriminate between the QOL of the sick and healthy dogs may be the result of methodological effects (as outlined in Section 3.4.2) or may indeed reflect that there was no difference between the QOL of the two groups. However, further studies to validate this instrument are necessary before a definitive statement can be made in this regard.

3.4.1 Quality of Life Scores

While the QOL Score does not say anything absolute about a dog's QOL, the intent of this approach is to give direction for improving reduced aspects of a dog's QOL. The bar graphs provide additional information by highlighting areas of reduced QOL.

The fact that questions were assigned equal weights assumes that all of the items had equal importance. However, it is likely that certain factors were more important than others for different dogs therefore their scores may not have represented the true level of their QOL. For example, for some dogs going for walks may have been their most enjoyable activity but the grades were assigned based on frequency and duration of walks, and the extent of the dogs' enjoyment was not included. This aspect of the instrument requires further research. Determining weights might be achieved through assessment of motivational strength (e.g. by preference and motivation testing) or through advanced statistical methods such as factor analysis (11) and principal

components analysis (213,212). Other methods might include having the dog's owner assign weights to the items (143,215), ranking the items within each domain in order of perceived or relative importance to an individual dog, or using principles of cost-benefit dominance (151).

3.4.2 Regression model

Health status was not a significant predictor of QOL Score which suggests that the C-QOL-Q could not discriminate between sick and healthy dogs. The regression model suggested that the mental and natural aspects of QOL were not affected by health status; however, they were affected by environment and duration of ownership. A rural environment was more beneficial to QOL than a suburban environment which in turn, was more favourable than an urban environment. This may be because rural and suburban environments provide dogs with greater environmental control because the dog is likely to have more space in which to roam, and fewer physical restrictions. Having environmental control is important to an animal's welfare because it encourages environmental exploration; opportunities to explore and interact with an enriched environment increases the animal's behavioural repertoire and its ability to cope with environmental challenges (216,217); and the animal has greater opportunities to satisfy its nature by performing species-specific behaviour. Dogs that live in the city may have less environmental control, with fewer opportunities to roam freely because of factors such as traffic, leash by-laws, and limited access to large exercise spaces such as parks. Dogs in a rural setting may also have greater opportunities for pleasure compared to urban or suburban dogs. For example, rural dogs may have more opportunities for

exhibiting species-typical, predatory behaviour, such as chasing birds or rodents, or herding farm animals. Further studies are necessary to support or refute these hypotheses.

The results indicated that as duration of ownership increased, QOL Score increased perhaps because the longer someone has owned a pet, the more likely they are to be familiar with their pet's temperament and behaviour, and so to be better equipped to meet the proposed criteria for optimal QOL for their pet. However, it is also possible that duration of ownership may either represent or mask other important factors that affect canine QOL, such as the abilities of the respondent as a dog owner. The study population consisted of dogs that were receiving care at a referral veterinary institution, and it is likely that these dogs received regular veterinary care. In a study of risk factors of relinquishment of dogs, Patronek et al (1996) (218) found that the risk of relinquishment decreased as veterinary visits per year increased. The protective effect of veterinary care was attributed to a number of factors including owners' increased knowledge or familiarity with canine behaviour (218). In light of this, duration of ownership may not prove to be a significant predictor of canine QOL in a study involving dogs sampled from the general population, where the range of veterinary care for dogs would likely be much wider. Further research is required to investigate this possibility.

The low R^2 for the regression model indicates that not all of the variation in QOL Score could be explained by the data. Variables relating to physical health might account for some of this additional variation. However, in human QOL studies, non-health aspects of QOL take precedence over health (e.g. emotional well-being and relationships with family and friends) (5,11,19). Other factors that might explain additional variation

in the QOL Score include: respondent characteristics (e.g. employment status), the respondent's QOL and the weather around the time of the interview. Day of year, which would reflect seasonal weather, was not significant in the final regression model for QOL Score. However, since all of the interviews took place in late fall and winter the weather in Atlantic Canada was cold during that time. A longitudinal study of QOL over the course of a year might clarify the effect, if any, of weather on QOL.

The following methodological factors may also have contributed to the C-QOL-Q's failure to discriminate between sick and healthy dogs: 1) sample size; 2) ratio of sick:healthy dogs; 3) the health status classification; 4) lack of emphasis on physical functioning in the instrument; 5) sickness not being a useful criterion for suffering.

It is unlikely that the lack of a difference between the QOL scores of the sick and healthy group was a Type II error (211). Over-interpretation of regression models is a risk when sample sizes are small (213), but the final sample size was only 6 less than the calculated sample size, and was sufficient to allow for 5-10 data points for each predictor in the regression model (213).

The fact that health status was not a significant predictor of QOL Score may be due to the unanticipated discrepancy between the sizes of the sick and healthy groups. There were nearly twice as many sick dogs as healthy dogs (Results) because the AVC Small Animal Hospital is primarily a referral centre. The higher number of sick dogs may account for the slightly wider range in QOL Scores in this group.

The health classification system may also have contributed to the poor discriminative ability of the C-QOL-Q. The system was used because in practice,

veterinarians tend to dichotomize health status in this way. However, given the variety of health conditions that the dogs in this study presented with, two categories of health status were insufficient. In some cases, even with an explicit definition of clinical signs there was uncertainty about the appropriate categorization of the dog. For example, dogs with mild otitis externa were classified as sick if they exhibited clinical signs or abnormalities (e.g. pruritus) because, according to the definition these "interfered with or impaired the dog's ability to function in a normal capacity" (Appendix A). However, these dogs were grouped in the same category as dogs with severe clinical signs (e.g. grade IV lameness; chronic vomiting and diarrhea). Furthermore, under the dichotomous classification it was possible that an obese dog would be considered "healthy" provided that the obesity did not impair the dog's ability to function in a "normal capacity". The classification of health status into 4 levels was done after the dichotomous variable was found to be insignificant and may have been unintentionally biased. If the four-level classification of health status had been established *a priori* health status may have been significant.

The lack of questions regarding physical health in the C-QOL-Q may have accounted for the relatively low R^2 for the regression model. Data about the dog's appetite, mobility, hearing, and vision for example, might have provided a more complete picture of the dog's QOL. Less emphasis was placed on health because the instrument is intended to complement the veterinarian's assessment. Owners were considered to be unable to provide sufficient information for health to be assessed by the C-QOL-Q. Also, if there had been more physical health questions, it would be questionable as to whether QOL or physical health was being measured.

In order to represent body, in addition to mind and nature, in the QOL Score, the veterinarian's assessment of the animal's physical health would need to be incorporated into QOL Score in some manner. A similar problem has been described in human QOL assessment as it is difficult to develop a QOL instrument that is applicable to all individuals despite differences in physical conditions (25,199). Disease- or treatment-specific "modules" (short, multiple item measures) which complement the generic QOL measure might be applied to the C-QOL-Q (199).

The results of this study suggested that the QOL of the healthy dogs was not different from that of the sick dogs. This finding and the fact that the highest QOL Score belonged to a sick dog were consistent with the notion that QOL involves more than physical health and that veterinarians need a more systematic way of evaluating QOL before pronouncing that the animal is or is not suffering. There is an assumption, particularly within veterinary medicine, that animal QOL revolves around physical health and that suffering relates primarily to compromised health (101). While illness and injury cause suffering, their absence (i.e. "good health") does not necessarily mean that suffering is absent (46). In addition to pain, suffering includes feelings of fear, loneliness, anxiety, and hunger (46,219). Therefore, a physically healthy dog may potentially suffer just as much as a dog with an illness or injury if prevented from performing species-typical behaviours (46,56) or given minimal or no control over its environment (56). For example, a physically healthy dog that is crated for at least eight hours a day and has limited opportunities for interaction with humans and conspecifics may experience feelings of boredom, loneliness and anxiety. In contrast, a sick dog with osteoarthritis may have unlimited freedom to roam the house, and numerous

opportunities to interact with household members and pets while receiving analgesic medication to reduce the discomfort associated with its condition.

3.5 Conclusion

This study represents one of the first attempts to assess QOL of companion animals in a formal and holistic manner. The Canine QOL Questionnaire provides the framework for the development of a practical tool to assist owners and veterinarians in making critical decisions about dogs (e.g. euthanasia, pursuing intensive medical treatment). With further research, the QOL Score could provide visual results that could be interpreted readily by veterinarians and pet owners and prompt them to find ways of optimizing the dog's QOL. It is anticipated that the results of this study will encourage the refinement of this practical QOL instrument that combines the veterinarian's and pet owner's knowledge about an animal to provide a comprehensive and thorough answer to the complex question, "Is my pet suffering?". In the future, owners may be able to make more informed decisions about their pet by using the information obtained from a validated C-QOL-Q in conjunction with the veterinarian's assessment of the pet's health.

CHAPTER 4: SUMMARY AND FUTURE RESEARCH

The objectives of the Canine QOL Study were met. A discriminative instrument (Canine QOL Questionnaire) to assess the QOL of pet dogs was developed (Chapter 2). The instrument's reliability was assessed, and some questions proved more reliable than others (Chapter 2). The discriminative ability of the instrument was also assessed, and the instrument did not discriminate between sick and healthy dogs (Chapter 3). However, as discussed in Chapter 3 this finding is not definitive since the validity of the C-QOL-Q has not yet been established. Thus, the findings of this study provide a basis for further development of the C-QOL-Q. Recommendations for future research and amendments to the instrument are now outlined.

Before the C-QOL-Q can be used in practice or to make a definitive statement about pet dogs in the general population, it must demonstrate validity and reliability (25). Though the criterion validity of this instrument cannot be determined due to the lack of a gold standard for comparison (188), construct validity could be established by further studies. Validation of a hypothetical construct such as QOL is a continuous process (188,191). One way of validating a new instrument is by predicting the correlation between the results of the C-QOL-Q and another QOL index for different groups of dogs (i.e. dogs that differ in type, severity and duration of illness) (187). This could be achieved by having the dog owner as well as the veterinarian answer a global question such as, "How would you rate Rover's overall QOL?" and comparing the responses to the score determined by the Canine QOL Questionnaire. Another method would be to evaluate changes in QOL Scores over time, in circumstances when the construct and

related physiologic or behavioural measures are expected to change (187). For example, one would expect an improvement in QOL Scores for dogs with cruciate injuries following surgical repair. Therefore, the QOL Scores of dogs with cruciate injuries could be compared before and after surgery, along with behavioural measures such as frequency and duration of physical activities (e.g. running, playing fetch).

Establishing the validity of specific questions within the instrument might be achieved by asking the same question in a variety of ways. This was not feasible in this study since the aim was to address all relevant and ethical aspects of canine QOL without making the questionnaire exceedingly lengthy.

The use of qualitative research methods could prove beneficial (220). Although this study was not structured to gather qualitative data, there was a qualitative "richness" to the results because many respondents offered their perceptions, observations and anecdotes about their dogs' QOL. Such data could identify aspects of QOL that require further investigation, such as breed preferences and the effect of canine personality on QOL. Qualitative research methods such as ethnography, thick description (74,220), focus groups, and one-on-one interviews with dog owners, dog breeders and veterinarians using open-ended questions would be useful in gathering more insight and ideas about canine QOL.

In order to make the Canine QOL Questionnaire more concise, the Delphi technique (221) might be of assistance and could justify the deletion of weak questions from the instrument, and identify issues that warrant inclusion in a revised version of the C-QOL-Q.

Advanced statistical methods such as factor analysis (213,222,223) and principal components analysis (222) could be useful in improving the construct validity and efficiency of the Canine QOL Questionnaire by determining specific domains of canine QOL and assigning weights to different factors affecting canine QOL. Preference and motivation testing of pet dogs might also be helpful in determining appropriate weights for different aspects of canine QOL. Compared to dogs in laboratory and shelter environments, the lives of pet dogs are considerably more variable, and since QOL is unique to the individual, factors such as breed, personality, and environment need to be taken into account during such studies and in QOL assessment in general. Breed factors should also be considered and would require breed-specific ethograms.

Compared to questions about objective and observable aspects of canine QOL, questions that were more subjective (e.g. questions regarding the dog's pain experience, and enjoyment of various activities) demonstrated poor reliability (Chapter 2). This indicates a need for more research on the reliability of proxies. Longitudinal studies of proxy assessment would be useful in identifying what domains of QOL proxies emphasize (224) and in evaluating correlation in proxies' ratings over time (167). In addition, the effect of proxy characteristics (e.g. employment status; experience as a dog owner; income; marital status) on pet dogs' QOL should be examined. The effect of factors such as owner routine and illness on dogs' QOL could also be evaluated by longitudinal studies. It would also be worthwhile to compare owners' QOL ratings to their dogs' QOL score.

It is possible that by adding more items about physical health to the Canine QOL Questionnaire, its discriminative ability could improve. A modular approach might be

used (73). By creating short, multiple item measures that address clinical signs specific to a variety of diseases (e.g. diabetes mellitus) or conditions (e.g. loss of a limb due to amputation) it might be possible to calculate a QOL Score that represented the assessment of the body in conjunction with the evaluation of state of the animal's mind and the extent to which its nature is satisfied.

The regression results (Chapter 3) suggested that health status did not have a significant effect on the dogs' QOL. To further investigate the effect of health status on QOL, in a study like the one here, attending clinicians could classify patients at the time of presentation using a checklist of "sickness" (incorporating criteria such as the intensity, duration and frequency of illness). This would reduce speculation on the part of a third person observer. Regression analyses could then be repeated.

4.1 Future uses for the instrument

With further refinement, the C-QOL-Q could serve as a useful adjunct to an animal's medical record because it would complement data about the state of the animal's physical health (e.g. the results of physical examination and diagnostic work-up). In order to make the C-QOL-Q a more user-friendly and cost- and time-effective QOL measure for veterinary practice, it would be worthwhile to develop a computer software version of the C-QOL-Q so that QOL assessment of pets could become routine (84,225). Computers are becoming more commonplace in veterinary practices, and by having a computer administer the questionnaire (i.e. computer-adapted testing (84)), it would be possible for pet owners to complete the C-QOL-Q in the waiting room. A hard copy of the patient's QOL Score bar graph (84) could then be reviewed by both the

attending veterinarian and the pet owner during the appointment. The graph could be incorporated into the pet's medical record as an integral component of the animal's evaluation. A computer-adapted version of the C-QOL-Q would require the current instrument to be re-designed and tested as a written version since a validated phone questionnaire does not necessarily ensure validity when administered as a written questionnaire (12).

The Canine QOL Questionnaire has the potential to be a useful and practical tool for veterinarians to use when counselling clients about their pets. This instrument could also be refined and adapted to assess the QOL of dogs in a variety of different contexts and environments. Possibilities include:

- An evaluative QOL instrument could be used for dogs with chronic conditions (e.g. arthritis, diabetes mellitus, cardiac disease) or for dogs undergoing intensive treatment (e.g. chemotherapy, limb amputation)
- An evaluative QOL instrument could also be developed for service and working dogs, and for dogs in confinement (e.g. dogs in shelters and laboratories, and dogs hospitalized for prolonged periods) to monitor for distress due to limited environmental control
- A predictive QOL instrument would be applicable to adoption counselling in animal shelters

Although the Canine QOL Questionnaire cannot yet be used to make a definitive statement about dogs in the general population, the results of this preliminary study are

important in terms of hypothesis generation and encouraging further research in this newly emerging field. By recognizing and encouraging animal QOL assessment as a legitimate field of research within the context of veterinary medicine, the term "QOL" will evolve to represent something more meaningful than simply a catch-phrase in the minds and on the tongues of veterinarians.

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Appendix A Glossary of terms relevant to the Canine QOL Study

Healthy dog	a dog with no current medical or surgical condition(s); or a dog that has a surgical or medical condition, but whose physical function is stable (i.e. not showing clinical signs) due to therapeutic intervention.
Sick dog	a dog with any medical or surgical condition that is listed in *The 5-Minute Veterinary Consult: Canine and Feline – Second edition* (214). The dog's physical function is not stable (i.e. showing clinical signs).
Treatment	management and care of a patient, this includes medication (PO, IV, IM, SQ, aurally, intraocularly) or other therapeutic interventions such as corrective surgery, dentistry, acupunture, chiropractics, therapeutic massage, bathing/grooming.
Clinical signs	the abnormalities of structure and function (internal or external) that manifest in abnormal behaviour or visible lesions which are observed in the patient by the veterinarian or the client, and these abnormalities interfere with or impair the animal/dog's ability to function in a normal capacity. These are customarily graded according to severity e.g. severe, moderate, mild, and according to speed of onset and progress, e.g. peracute, acute, subacute, chronic, intermittent." (modified the definition of "clinical signs" in: (44))
Need	"any requirement that is necessary for an organism to develop normally and to maintain its physical and psychological health." (39)

For the purpose of this study:

Telos need	an external factor that is necessary for the individual's nature to be satisfied. For a dog, this includes social contact, environmental control.
Basic need	something that is necessary in order to sustain the life of the individual. For a dog, this includes food, water, and shelter.

Appendix B Canine Quality of Life Questionnaire (male version)

ID #: _____

CANINE QUALITY OF LIFE QUESTIONNAIRE

Dog's name: _____

Introduction

Hello, this is Dr. Nina Wojciechowska calling from the Atlantic Veterinary College. May I please speak to *client's name*?

If the person is not home: When would be a convenient time for me to call back to speak to *client's name*? _____ Thank-you. I will call back then. Have a nice day/evening. Bye.

If this is the FIRST interview:

I'm calling as we arranged, to interview you about _____ for our Canine QOL Study. The interview will take about 40 minutes to complete. Is it still ok to do a phone interview at this time?

If not a good time: When would be a convenient time for me to call back? *Try to set up an appointment for a callback.*

If ok, continue:

That's great. Just to remind you, all of the information that you volunteer during this interview will be completely confidential If I come to any question that you would prefer not to answer, just let me know and I'll skip over it. Ok? If you need me to repeat anything as we're going along, please interrupt me. Ok? Please have the list of questions that I sent you by mail handy. I'll let you know when we come to a question from that list of questions that I asked you to think about. (*These questions will have an asterisk "*" beside them).* Do you have that list of questions handy? *If YES, go to next page.*

If NO ⇨ It would probably be a good idea to have it handy so that you can refer to it when we come to those questions on the list. *Give the respondent a few moments to get the list.*

If this is the SECOND interview:

I'm calling as we arranged to re-interview you about _____ for our Canine QOL Study. As you know, the interview will take about 40 minutes to complete. Is it still ok to do the interview at this time?

If not a good time: When would be a convenient time for me to call back? *Try to set up an appointment for a callback.*

If ok, continue:

That's great. If you need me to repeat anything as we're going along, please interrupt me. Ok?

Skip to DOMAIN #1: Nutrition and Diet on p.3

Owner information:

The gender of the respondent is:

1 MALE
2 FEMALE

Dog information

To begin, I would first like to confirm some information about your dog.

Q-1 How old is _____? (*Probe if owner is not sure*: If you're not sure, give an approximate age.) _____ 1 [ ]

Q-2 Is _____ male or female? 2 [ ]

1 MALE
2 FEMALE

Q-3i What breed is _____? _____ 3i [ ]

Q-3ii Is _____ a purebred _____? 3ii [ ]

1 YES ⇨ **Skip to Q-4**
2 NO
3 NOT SURE

Q-3iii What is the predominant breed in the mix? (*Probe:* what breed does _____ most resemble?*)* _____ 3iii [ ]

Q-4 Is _____ spayed/neutered? 4 [ ]

1 YES
2 NO

Q-5 How much does _____ weigh approximately? _____ **lbs kg** *(Circle the appropriate units.)* 5 [ ]

Q-6 What is the reason for _____'s upcoming appointment at the Atlantic Veterinary College? 6 [ ]

_____

Q-7 How long have you owned _____? 7 [ ]

_____

Q-8i Because the responsibilities of owning a dog are often shared or alternatively, one person in a household may assume more responsibility for the dog's care in terms of feeding, exercise, grooming, etc. In the last seven days, how familiar have you been with _____'s care and routine? (*Probe:* How acquainted you are with _____'s care and routine?) 8i [ ]

1 VERY FAMILIAR?
2 SOMEWHAT FAMILIAR?
3 HARDLY FAMILIAR?
4 NOT AT ALL FAMILIAR WITH _____'s ROUTINE?

Q-8ii Often, circumstances require us to be away from home, and therefore, away from our pets, for brief periods. Have you been away/apart from _____ for more than 24 hours in the last seven days? 8ii [ ]

1 YES ⇨ How many days were you away from _____? _____
2 NO

SECTION #1: Nutrition and Diet

Thank you. Now I would like to ask some questions about _____'s feeding habits. I'd like you to think about when _____ is fed his meals, that is his regular food. This does not include treats - we'll talk about treats later on.

Q-9i Please think back over the last seven days. Did _____ have access to his food: 9i [ ]

O ALL OF THE TIME? (that is, he was fed ad libitum/free choice) ⇨ **Skip to Q10**
1 ONLY AT MEALTIMES? (that is, he was meal-fed)

Q-9ii During the last seven days was _____ fed his meals at the same time every day: 9ii [ ]

A MOST OF THE TIME?
B SOME OF THE TIME?
C NEVER? (that is, meal time was NEVER consistent)

Q-10 Was _____ able to eat his food in peace? That is, without interference or interruption from people or animals. Thinking back over the last seven days, would you say that _____ ate his food in peace: 10 [ ]

O ALWAYS?
A MOST OF THE TIME?
B SOME OF THE TIME?
C NEVER?

Q-11 Thinking about the last seven days, would you say that _____ enjoyed his food: 11 [ ]

O VERY MUCH?
A SOMEWHAT?
B A LITTLE?
C HE DOES NOT SEEM TO ENJOY IT?

Now I'd like to ask about any food treats that _____ gets. Treats include things like dog biscuits, tablescraps, or any type of food reward that you give.

Q-12i Thinking about the last seven days, would you say that _____ enjoyed food treats? 12i [ ]

1 YES
2 NO ⇨ **Skip to Q-13**
3 NOT SURE ⇨ **Skip to Q-13**
4 IT DEPENDS ⇨ **Skip to Q-13**
5 NOT APPLICABLE ⇨ **Skip to Q-13**

Q-12ii Please think back over the last seven days. On average, how many times during a typical day (that is, a 24 hour period) has _____ eaten treats? 12ii [ ]

O MORE THAN 3 TIMES PER DAY
A 2-3 TIMES PER DAY
B ONE PER DAY
C LESS THAN ONCE DAILY (i.e. received a treat(s) every few days)

SECTION #2: Environment

Now I would like to ask some questions about _____'s environment.

Q-13 How would you describe the area where you live. Is it: 13 [ ]

1 URBAN?
2 SUBURBAN?
3 RURAL?

Q-14 Which of the following best describes your living situation/residence? 14 [ ]

1 APARTMENT
2 MOBILE HOME
3 SINGLE HOUSE
4 TOWNHOUSE OR DUPLEX
5 FARM
6 OTHER _____

Q-15 In the last seven days, where did _____ spend the majority of his time? 15 [ ]

1 INDOORS
2 OUTDOORS ⇨ Does _____ spend *any* time indoors?
1 YES
2 NO ⇨ **Skip to Q-18**

Q-16i By "indoors" do you mean: 16i [ ]

1 IN YOUR HOME?
2 IN A BARN?
C IN A GARAGE? ⇨ **Skip to Q-17**
3 OTHER? (Have owner specify what they mean by "other".) _____

Q-16ii In the last seven days, when _____ has been in _____ (*insert the appropriate word)* while someone was home, would you say that he had access to: 16ii [ ]

O ALL OF IT?
A MOST OF IT?
B SOME OF IT?
C ONE SMALL ROOM/AREA?

Q-17 During the last seven days, how often was _____ able to move freely between indoors and outdoors? (*Have owner describe their schedule, and the dog's ability to communicate its preference or need to inside or outside, and whether there is a doggie door available for the dog.*) 17 [ ]

_____

Based on respondent's answer, choose from the options below:
O ALL OF THE TIME?
A MOST OF THE TIME?
B SOME OF THE TIME?
C NEVER?

Q-18 In the last seven days, when _____ was outside did she have access to shelter, other than the _____ (*insert the appropriate word)*? (*Probe:* "shelter" is any place _____ can go to get away from the elements, such as a dog house, or an enclosed porch) 18 [ ]

O ALWAYS?
A MOST OF THE TIME?
B SOME OF THE TIME?
C NEVER?
D NOT APPLICABLE (because _____ has not been outside unsupervised in the last 7 days)

Next I'd like to talk about when _____ was outside, this does not include when he went out for walks. The next two questions are the first on that list of questions that I asked you to think about. You might need to refer to that list as you're answering these questions. Ok?

*Q-19 Please think back over the last seven days. Which of the following statements best describes _____'s situation when he was **OUTDOORS WITHOUT SUPERVISION**? (If more than one option applies, choose the most common scenario.) So, the options are: 19 [ ]

O _____ WAS COMPLETELY FREE TO ROAM ANYWHERE
A _____ WAS FREE TO ROAM AN AREA THAT WAS ENCLOSED BY A FENCE (for example, an area like your yard)
B _____ WAS CONFINED TO A RUN/KENNEL OR WAS KEPT ON A LEASH/CHAIN
C THE QUESTION IS NOT APPLICABLE (because he was always supervised when outside)

*Q-20 Please think back over the last seven days. Which of the following statements best describes _____'s situation when he was **OUTDOORS UNDER SOMEONE'S SUPERVISION**? **This does not include going for walks.** For example, it could be when you and your dog were in the yard for whatever reason, or when you and your dog were visiting the local dog park. (If more than one option applies, choose the most common scenario.) So, the options are: 20 [ ]

C NOT APPLICABLE (because he only went outdoors with supervision when he was taken for walks)
O _____ WAS COMPLETELY FREE TO ROAM ANYWHERE
A _____ WAS FREE TO ROAM AN AREA THAT WAS ENCLOSED BY A FENCE (for example, an area like your yard or the local dog park)
B _____ WAS CONFINED TO A RUN/KENNEL OR WAS KEPT ON A LEASH/CHAIN

*Q-21 Thinking about the last seven days, would you say that _____ enjoyed going for walks? A walk is when you or someone else accompanies _____ over a reasonable distance as a way of exercising or entertaining/giving pleasure to the dog. 21 [ ]
(*Probe:* This does not refer to the anticipation of the walk, but to the walk itself.)

1 YES
2 NO ⇨ **Skip to Q-22ii**
3 NOT SURE ⇨ Was _____ taken for a walk in the last seven days?
YES ⇨ **Skip to Q-24**
NO ⇨ **Skip to Q-26**

4 IT DEPENDS ⇨ Was _____ taken for a walk in the last seven days?
1 YES ⇨ **Skip to Q-24**
2 NO ⇨ **Skip to Q-26**

5 NOT APPLICABLE ⇨ **Skip to Q-26**

*Q-22i For different reasons it's not always possible to take dogs for walks every day. During the last seven days, how often would you say that _____ has been taken for a walk? 22i [ ]

O AT LEAST TWICE DAILY ⇨ **Skip to Q-23i**
A ONCE DAILY ⇨ **Skip to Q-23i**
B NOT DAILY, BUT A FEW TIMES ⇨ **Skip to Q-23i**
C ONCE IN THE LAST SEVEN DAYS ⇨ **Skip to Q-23i**

*Q-22ii For different reasons it's not always possible to take dogs for walks every day. During the last seven days, how often would you say that _____ has been taken for a walk? 22ii [ ]

C AT LEAST TWICE DAILY ⇨ **Skip to Q-23ii**
B ONCE DAILY ⇨ **Skip to Q-23ii**
A NOT DAILY, BUT A FEW TIMES ⇨ **Skip to Q-23ii**
O ONCE IN THE LAST SEVEN DAYS ⇨ **Skip to Q-23ii**

Q-23i During the last seven days, what was the average length of time of a walk in minutes? 23i [ ]

O MORE THAN 30 MINUTES ⇨ **Skip to Q-24**
A 20-30 MINUTES ⇨ **Skip to Q-24**
B 10-19 MINUTES ⇨ **Skip to Q-24**
C LESS THAN 10 MINUTES ⇨ **Skip to Q-24**

Q-23ii During the last seven days, what was the average length of time of a walk in minutes? 23ii [ ]

C MORE THAN 30 MINUTES
B 20-30 MINUTES
A 10-19 MINUTES
O LESS THAN 10 MINUTES

Q-24 When _____ was taken for a walk, was he leashed: 24 [ ]

C ALWAYS?
B MOST OF THE TIME?
A SOME OF THE TIME?
O NEVER? ⇨ **Skip to Q-26i**

Q-25 What type of collar does _____ wear when taken for a walk? 25 [ ]

_____

(*If respondent not sure which option to choose, have him/her describe the dog's collar.*)

O ADJUSTABLE FLAT COLLAR (a collar that goes around the neck and is secured by a buckle or plastic clasp)
O BODY HARNESS
A HEAD HALTER
B CHOKE CHAIN COLLAR
C PRONG COLLAR

Now I'd like to ask you a couple questions about when _____ was left alone, such as when no one was at home because household members go to work or school, or when _____ was left in an unfamiliar environment, such as a hospital or grooming facility. The next two questions are on the list that you have – they're questions 3i and 3ii on your list. Ok? Ready?

*Q-26i Please think back over the last seven days. In a typical day, that is a 24 hour period, what was the longest period that _____ was left alone? 26i [ ]

_____ **minutes/hours** (*circle appropriate one*)

Code:
1 LESS THAN 4 HOURS
2 BETWEEN 4-8 HOURS
3 MORE THAN 8 HOURS
O NOT APPLICABLE (because was not left alone at all) ⇨ **Skip to Q-28**

*Q-26iiDuring that period where or how was he confined? 26ii [ ]

_____

(*Probe if necessary. Don't read list, but probe for clarity*)

PUT ____ IN A CRATE/KENNEL/CAGE

CONFINED TO A ROOM(S) OR RUN

FREE TO ROAM INSIDE/OUTSIDE

TIED A LONG LEASH/CHAIN (more than 6ft long)

TIED ON A SHORT LEASH/CHAIN (less than 6ft long) INSIDE OR OUTSIDE

Code:

LESS THAN 4 HOURS		BETWEEN 4-8 HOURS		MORE THAN 8 HRS	
O	Free to roam	A	Free to roam	B	Free to roam
A	Confined to room(s)/ run	B	Confined to room(s) or run	C	Confined to room(s) or run
A	Long leash	B	Long leash	C	Long leash
A	Short leash	C	Short leash	C	Short leash
A	Confined to crate/cage	C	Confined to crate/cage	C	Confined to crate/cage

Q-27i When _____ is left alone, does he do any of the following: 27i [ ]

a) Whine or bark as you (or other household members) are leaving?
YES
NO

b) Exhibit destructive behaviour, such as chewing things or scratching things?
YES
NO

c) Urinate indoors?
YES
NO

d) Defecate indoors?
YES
NO

1 YES - If "yes" to any of the above
O NO to all of the above ⇨ **Skip to Q-28**

This next question is question 3iii on your list.

*Q-27ii Please think back over the last seven days. On average, how many times per day was _____ left alone? 27ii [ ]

Answer: _____ times

Code:
O NOT ONCE
A ONCE
B 2-3 TIMES
C MORE THAN 3 TIMES

SECTION #3: Physical function

Now I'd like to ask a couple general questions about _____'s health.

Q-28 Is _____ currently experiencing any health problems? 28 [ ]

1 YES
2 NO ⇨ **Skip to Q-30**

Q-29 How long have you been aware that _____ has had this/these problem(s)? 29 [ ]

_____

1 LESS THAN ONE WEEK
2 1-3 WEEKS
3 ABOUT A MONTH
4 A FEW MONTHS
5 ABOUT A YEAR
6 MORE THAN ONE YEAR

Q-30 I would like to know if _____ has experienced pain in the last seven days. By pain I mean physical discomfort. How often during the last seven days, would you say that _____ experienced pain? 30 [ ]

O NEVER
A OCCASIONALLY
B MOST OF THE TIME
C ALL OF THE TIME

SECTION #4: Behaviour

I would now like to ask some questions about _____'s behaviour. Many of the questions in this section will be familiar to you because they were also on that list of "questions to think about". So you might need to refer to the list that I sent you.

Also, some of the questions in this section will ask about _____'s enjoyment of various experiences, individuals and animals. These questions are referring to his enjoyment **at the present time,** that is, based on the experiences of the last seven days.

But before I get to those questions, I'm going to ask a few questions about your household dynamics in order to get an idea of _____'s daily routine and his interactions with others.

Q-31 How many people currently live in your household, including you? _____ 31 [ ]

If just one, clarify by asking:

So, does that mean you live alone?

1 YES ⇨ **Skip to Q-34i**
2 NO

Q-32i How many are children (people less than 17 years of age)? _____ 32i [ ]

Q-32ii And how old are they? _____ 32ii [ ]

Now I'd like you to think about everyone in your household and their interaction with _____. The following questions are on your list, starting at Q-4i. Got it? Ok, great.

*Q-33i Thinking about the last seven days, would you say that _____ got along with everyone living in your household? 33i [ ]

O YES ⇨ **Skip to Q-34i**
1 NO
2 NOT SURE ⇨ **Skip to Q-34i**
3 IT DEPENDS ⇨ **Skip to Q-34i**

*Q-33ii Thinking about the individual(s) that _____ did not get along with, in the last seven days would you say that _____ and this person(s) have been together: 33ii [ ]

C ALL OF THE TIME?
B MOST OF THE TIME?
A SOME OF THE TIME?
O NEVER?

*Q-34i Is there anyone who regularly spends at least 20 hours per week at your home, but is not a member of your household? This would include people like a babysitter, a domestic helper/assistant. 34i [ ]

1 YES ⇨ Could you explain who this person(s) is? _____
2 NO ⇨ **Skip to Q-36**

*Q-34ii Has _____ had contact with this person/these people in the last seven days? 34ii [ ]

1 YES
2 NO ⇨ **Skip to Q-36**

*Q-35i Thinking about the last seven days, would you say that _____ got along with this person/these people? 35i [ ]

O YES ⇨ **Skip to Q-36**
1 NO
2 NOT SURE ⇨ **Skip to Q-36**
3 IT DEPENDS ⇨ **Skip to Q-36**

Q-35ii How often in the last seven days has _____ been around this person/these people: 35ii [ ]

C 6-7 DAYS?
B 4-5 DAYS?
A 2-3 DAYS?
O ONE DAY OUT OF THE LAST SEVEN?

This next question is #6 on your list. Ok?

*Q-36 I would like to know how much time is spent with _____. Please think back over the last seven days. On average, how many hours out of 24 did you (and/or other household members and/or *name person(s) mentioned in Q-34i*) spend with _____ during the **WEEKDAYS**? For example, this would include things like playing with him, petting him, talking to him, or having him in the same room while you're asleep or watching TV. (*Probe:* The question in your list said you "all" – this does not mean you all had to be with _____ at the same time; it implies the time that each of you, two of you, or all of you spent with _____ collectively.)

Answer: _____ hours out of 24 36 [ ]

Code:
O MORE THAN 12 HOURS
A 8-12 HOURS
B 4-7 HOURS
C LESS THAN 4 HOURS

*Q-37 How about during the last **WEEKEND**? How much time per day, on average, did you (and/or other household members and/or *name person(s) mentioned in Q-34i*) spend in the company of _____?

Answer: _____ hours out of 24 37 [ ]

Code:
O MORE THAN 12 HOURS
A 8-12 HOURS
B 4-7 HOURS
C LESS THAN 4 HOURS

*Q-38i In the last seven days, has _____ been around strangers (i.e. people he's not familiar with)? 38i [ ]

1 YES
2 NO ⇨ **Skip to Q-40**

*Q-38ii Thinking about the last seven days, would you say that _____ enjoyed being around strangers? That is, physically interacted with them or was simply in their presence. 38ii [ ]

1 YES
2 NO ⇨ **Skip to 39ii**
3 NOT SURE ⇨ **Skip to Q-40**
4 IT DEPENDS ⇨ **Skip to Q-40**

*Q-39i How often during the last seven days has _____ been around or had contact with strangers? (*Probe:* physically interacted with them or was simply in their presence.) 39i [ ]

O 6-7 DAYS ⇨ **Skip to Q-40**
A 4-5 DAYS ⇨ **Skip to Q-40**
B 2-3 DAYS ⇨ **Skip to Q-40**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-40**

*Q-39ii How often during the last seven days has _____ been around or had contact with strangers? (*Probe:* physically interacted with them or was simply in their presence.) 39ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

This next question is #8 on your list. Ok?

*Q-40 Now I'd like to know if _____ has ever been around or been exposed to children in the time that you've had him? 40 [ ]

1 YES
2 NO ⇨ **Skip to Q-47i on p.15**

*Q-41i I'm interested to know if _____ gets along with children of different ages. First I'd like to know about toddlers. In the last seven days has _____ been around TODDLERS (i.e. children less than 4 years old)? By this I mean that he physically interacted with them or was simply in their presence. 41i [ ]

1 YES
2 NO ⇨ **Skip to Q-43i**

*Q-41ii Thinking about the last seven days, would you say that _____ enjoyed being around TODDLERS? (*Probe:* physically interacted with them or was simply in their presence.) 41ii [ ]

1 YES
2 NO ⇨ **Skip to Q-42ii**
3 NOT SURE ⇨ **Skip to Q-43i**
4 IT DEPENDS ⇨ **Skip to Q-43i**

*Q-42i How often during the last seven days has _____ been around or had contact with toddlers? (*Probe:* physically interacted with them or was simply in their presence.) 42i [ ]

O 6-7 DAYS ⇨ **Skip to Q-43i**
A 4-5 DAYS ⇨ **Skip to Q-43i**
B 2-3 DAYS ⇨ **Skip to Q-43i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-43i**

*Q-42ii How often during the last seven days has _____ been around or had contact with toddlers? (*Probe:* physically interacted with them or was simply in their presence.) 42ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

*Q-43i In the last seven days has _____ been around children who are between 4-9 years of age? That is, physically interacted with them or was simply in their presence. 43i [ ]

1 YES
2 NO ⇨ **Skip to Q-45i**

*Q-43ii Thinking about the last seven days, would you say that _____ enjoyed being around children of this age group? (*Probe:* physically interacted with them or was simply in their presence.) 43ii [ ]

1 YES
2 NO ⇨ **Skip to Q-44ii**
3 NOT SURE ⇨ **Skip to Q-45i**
4 IT DEPENDS ⇨ **Skip to Q-45i**

*Q-44i How often during the last seven days has _____ been around or had contact with children who are between 4-9 years of age? (*Probe:* physically interacted with them or was simply in their presence.) 44i [ ]

O 6-7 DAYS ⇨ **Skip to Q-45i**
A 4-5 DAYS ⇨ **Skip to Q-45i**
B 2-3 DAYS ⇨ **Skip to Q-45i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-45i**

*Q-44ii How often during the last seven days has _____ been around or had contact with children who are between 4-9 years of age? (*Probe:* physically interacted with them or was simply in their presence.) 44ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

*Q-45i In the last seven days, has _____ been around children who are at least 10 years of age? That is, physically interacted with them or was simply in their presence. 45i [ ]
45ii [ ]

1 YES
2 NO ⇨ **Skip to Q-47i**

*Q-45ii Thinking about the last seven days, would you say that _____ enjoyed being around children of this age group? 45ii [ ]

1 YES
2 NO ⇨ **Skip to Q-46ii**
3 NOT SURE ⇨ **Skip to Q-47i**
4 IT DEPENDS ⇨ **Skip to Q-47i**

*Q-46i How often during the last seven days has _____ been around or had contact with children who are at least 10 years of age? (*Probe:* physically interacted with them or was simply in their presence.) 46i [ ]

O 6-7 DAYS ⇨ **Skip to Q-47i**
A 4-5 DAYS ⇨ **Skip to Q-47i**
B 2-3 DAYS ⇨ **Skip to Q-47i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-47i**

*Q-46ii How often during the last seven days has _____ been around or had contact with children who are at least 10 years of age? (*Probe:* physically interacted with them or was simply in their presence.) 46ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

*Q-47i Moving on to Q-9 on your list... Apart from household members, children, strangers and other people that we've talked about, is there anyone we haven't talked about who causes _____ to be distressed? For example, the mailman, a neighbour, etc. 47i [ ]

1 YES
2 NO ⇨ **Skip to Q-48i**

*Q-47ii How often during the last seven days would you say that _____ has come in contact with this person/these people? 47ii [ ]

C EVERY DAY
B A FEW TIMES, BUT NOT EVERY DAY
A ONE DAY OUT OF SEVEN
O NOT ONCE

*Q-48i Now I'd like to ask some questions about _____'s interaction with animals. The next few questions refer to Q-10 on your list.
In the last seven days, has _____ been around dogs? That is, was physically interacting with them or was simply in their presence. 48i [ ]

1 YES
2 NO ⇨ **Skip to Q-50i**

*Q-48ii Thinking about the last seven days, would you say that _____ enjoyed being around or interacting with dogs? 48ii [ ]

1 YES
2 NO ⇨ **Skip to Q-49ii**
3 NOT SURE ⇨ **Skip to Q-50i**
4 IT DEPENDS ⇨ **Skip to Q-50i**

*Q-49i How often during the last seven days has _____ been around or interacted with dogs? (*Probe:* physically interacted with them or was simply in their presence.) 49i [ ]

O 6-7 DAYS ⇨ **Skip to Q-50i**
A 4-5 DAYS ⇨ **Skip to Q-50i**
B 2-3 DAYS ⇨ **Skip to Q-50i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-50i**

*Q-49ii How often during the last seven days has _____ been around or interacted with dogs? (*Probe:* physically interacted with them or was simply in their presence.) 49ii [ ]

C 6-7 DAYS

B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

*Q-50i In the last seven days has _____ been around or interacted with any other species of animals, that is besides dogs? (*Probe:* For example, cats, horses, cows, rabbits, squirrels, etc) 50i [ ]

1 YES
2 NO ⇨ **Skip to Q-52i**

*Q-50ii Thinking about the last seven days, would you say that _____ enjoyed being around or interacting with other species of animals besides dogs? 50ii [ ]

1 YES
2 NO ⇨ **Skip to Q-51ii**
3 NOT SURE ⇨ **Skip to Q-52i**
4 IT DEPENDS ⇨ **Skip to Q-52i**

*Q-51i How often during the last seven days has _____ been around or interacted with other species of animals besides dogs? 51i [ ]

O 6-7 DAYS ⇨ **Skip to Q-52i**
A 4-5 DAYS ⇨ **Skip to Q-52i**
B 2-3 DAYS ⇨ **Skip to Q-52i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-52i**

*Q-51ii How often during the last seven days has _____ been around or interacted with other species of animals besides dogs? 51ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

Ok, we're moving along well… I'd now like to ask some questions about _____'s play behaviour.

Q-52i In the last seven days, has _____ played with toys by himself? For example, balls, ropes, sticks, kongs, stuffed animals, squeaky toys, etc. 52i [ ]

1 YES
2 NO ⇨ **Skip to Q-53**

Q-52ii How often during the last seven days did you see _____ using or playing with a toy(s)? 52ii [ ]

O 6-7 DAYS?
A 4-5 DAYS?
B 2-3 DAYS?
C ONE DAY IN THE LAST SEVEN?

Q-53 In the last seven days did _____ have access to toys: 53 [ ]

O ALL OF THE TIME?
A MOST OF THE TIME?
B SOME OF THE TIME?
C NEVER?

Q-54i In the last seven days has _____ played with people? For example, having a ball or stick thrown for him or having people chase him. (*Probe:* ...or any other games that you play with _____ – *have respondent describe the game*) 54i [ ]

1 YES
2 NO ⇨ **Skip to Q-57i**

Q-54ii Thinking about the last seven days, would you say that _____ enjoyed playing with people? 54ii [ ]

1 YES
2 NO ⇨ **Skip to Q-55ii**
3 NOT SURE ⇨ **Skip to Q-57i**
4 IT DEPENDS ⇨ **Skip to Q-57i**

Q-55i During the last seven days, how often would you say that someone played with _____? 55i [ ]

O AT LEAST TWICE DAILY ⇨ **Skip to Q-56i**
A ONCE DAILY ⇨ **Skip to Q-56i**
B NOT DAILY, BUT A FEW TIMES ⇨ **Skip to Q-56i**
C ONCE IN THE LAST SEVEN DAYS ⇨ **Skip to Q-56i**

Q-55ii During the last seven days, how often would you say that someone played with _____? 55ii [ ]

C AT LEAST TWICE DAILY ⇨ **Skip to Q-56ii**
B ONCE DAILY ⇨ **Skip to Q-56ii**
A NOT DAILY, BUT A FEW TIMES ⇨ **Skip to Q-56ii**
O ONCE IN THE LAST SEVEN DAYS ⇨ **Skip to Q-56ii**

Q-56i During the last seven days, what was the average length of time of a play session? 56i [ ]

Answer: _____ minutes ⇨ **Skip to Q-57i**

Code:
O MORE THAN 15 MINUTES ⇨ **Skip to Q-57i**
A 10-15 MINUTES ⇨ **Skip to Q-57i**
B 5-9 MINUTES ⇨ **Skip to Q-57i**
C LESS THAN 5 MINUTES ⇨ **Skip to Q-57i**

Q-56ii During the last seven days, what was the average length of time of a play session? 56ii [ ]

Answer: _____ minutes

Code:
C MORE THAN 15 MINUTES
B 10-15 MINUTES
A 5-9 MINUTES
O LESS THAN 5 MINUTES

Q-57i Now I would like to ask some questions about _____'s grooming. Grooming would include brushing, bathing, or having his nails trimmed; it can be done by you or someone else.
Has _____ been bathed in the last seven days? 57i [ ]

1 YES
2 NO ⇨ **Skip to Q-59i**

Q-57ii Would you say that _____ enjoyed being bathed? 57ii [ ]

1 YES
2 NO ⇨ **Skip to Q-58ii**
3 NOT SURE ⇨ **Skip to Q-59i**
4 IT DEPENDS ⇨ **Skip to Q-59i**

Q-58i How often during the last seven days was _____ bathed? 58i [ ]

O 6-7 DAYS ⇨ **Skip to Q-59i**
A 4-5 DAYS ⇨ **Skip to Q-59i**
B 2-3 DAYS ⇨ **Skip to Q-59i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-59i**

Q-58ii How often during the last seven days was _____ bathed? 58ii [ ]

C 6-7 DAYS
B 4-5 DAYS

A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

Q-59i Has _____ been brushed in the last seven days? 59i [ ]

1 YES
2 NO ⇨ **Skip to Q-61i**

Q-59ii Would you say that _____ enjoyed being brushed? 59ii [ ]

1 YES
2 NO ⇨ **Skip to Q-60ii**
3 NOT SURE ⇨ **Skip to Q-61i**
4 IT DEPENDS ⇨ **Skip to Q-61i**

Q-60i How often during the last seven days was _____ brushed? 60i [ ]

O 6-7 DAYS ⇨ **Skip to Q-61i**
A 4-5 DAYS ⇨ **Skip to Q-61i**
B 2-3 DAYS ⇨ **Skip to Q-61i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-61i**

Q-60ii How often during the last seven days was _____ brushed? 60ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

Q-61i Has _____ had his nails trimmed in the last seven days? 61i [ ]

1 YES
2 NO ⇨ **Skip to Q-63**

Q-61ii Would you say that _____ enjoyed having his nails trimmed? 61ii [ ]

1 YES
2 NO ⇨ **Skip to Q-62ii**
3 NOT SURE ⇨ **Skip to Q-63**
4 IT DEPENDS ⇨ **Skip to Q-63**

Q-62i How often during the last seven days did _____ have his nails trimmed? 62i [ ]

O 6-7 DAYS ⇨ **Skip to Q-63**
A 4-5 DAYS ⇨ **Skip to Q-63**
B 2-3 DAYS ⇨ **Skip to Q-63**

C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-63**

Q-62ii How often during the last seven days did _____ have his nails trimmed? 62ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

Q-63 Ok, moving on…It's not unusual for dogs to misbehave every once in a while. For example, they may chew up a pair of shoes or jump up to take food off of the table. When dogs do things they're not supposed to, it's not uncommon for people to correct the dog in some way. For example, to scold the dog, correct the dog physically with a swat or confine the dog to a kennel or room.
Please think back over the last seven days. How often have you scolded _____ or physically corrected his behaviour? 63 [ ]

C MORE THAN ONCE DAILY
B ONCE DAILY
A NOT DAILY BUT AT LEAST ONCE IN THE LAST SEVEN DAYS
O NOT ONCE

I would now like to ask you about activities that _____ is currently involved in.

Q-64i In the last seven days has _____ participated in OBEDIENCE TRAINING? This includes training at home or going to obedience classes? 64i [ ]

1 YES
2 NO ⇨ **Skip to Q-66i**

Q-64ii Thinking about the last seven days, would you say that _____ enjoyed obedience training? 64ii [ ]

1 YES
2 NO ⇨ **Skip to Q-65ii**
3 NOT SURE ⇨ **Skip to Q-66i**
4 IT DEPENDS ⇨ **Skip to Q-66i**

Q-65i How often during the last seven days has _____ engaged in obedience training? 65i [ ]

O 6-7 DAYS ⇨ **Skip to Q-66i**
A 4-5 DAYS ⇨ **Skip Q-66i**
B 2-3 DAYS ⇨ **Skip to Q-66i**
C ONE DAY IN THE LAST SEVEN ⇨ **Skip to Q-66i**

Q-65ii How often during the last seven days has _____ engaged in obedience training? 65ii [ ]

C 6-7 DAYS
B 4-5 DAYS
A 2-3 DAYS
O ONE DAY IN THE LAST SEVEN

Q-66i In the last seven days has _____ participated in COMPETITIVE SPORTS such as flyball, agility, or herding? This includes training and competition. 66i [ ]

1 YES
2 NO ⇨ **Skip to Q-68i**

Q-66ii Thinking about the last seven days, would you say that _____ enjoyed participating in competitive sports? 66ii [ ]

1 YES
2 NO ⇨ **Skip to Q-67ii**
3 NOT SURE ⇨ **Skip to Q-68i**
4 IT DEPENDS ⇨ **Skip to Q-68i**

Q-67i How often during the last seven days did _____ participate in competitive sports? 67i [ ]

O AT LEAST FOUR TIMES ⇨ **Skip to Q-68i**
A THREE TIMES ⇨ **Skip to Q-68i**
B TWICE ⇨ **Skip Q-68i**
C ONCE ⇨ **Skip to Q-68i**

Q-67ii How often during the last seven days did _____ participate in competitive sports? 67ii [ ]

C AT LEAST FOUR TIMES
B THREE TIMES
A TWICE
O ONCE

*Q-68i We're getting to the end now. I just have a few more questions I'd like to ask. This next question is Q-11i on your list. 68i [ ]
I am interested to know if there is any THING or any EVENT that causes _____ distress? That is, apart from any of the things that we've already talked about. So this would include things like thunderstorms and going to the vet clinic.

1 YES

2 NO ⇨ **Go to Conclusion**

Q-68ii **If YES**, what? 68ii [ ]

_____

Q-68iii How often during the last seven days would you say that _____ has come in contact with/experienced *fill in the blank*? 68iii[ ]

C EVERY DAY
B A FEW TIMES, BUT NOT EVERY DAY
A ONCE
O NOT ONCE

CONCLUSION:
Ok, we're all done. Thank you very much for your patience.

If this is the FIRST interview:

I really appreciate your participation in this study. By doing so, you have helped us to improve quality of life assessment in dogs. We will be sending you a cheque for $20 as a small token of our appreciation – you should receive this in December when the data collection for this study is complete. And next summer, when the entire project is complete, we will send you a summary of the findings.

Do you have any comments or questions about the project? I'd be interested to know how you felt about the interview?

Address any questions/concerns.

As you may recall from the information package that we sent, some owners will be selected to be re-interviewed. The purpose of doing this is to assess whether the questionnaire performs consistently over time. So, this means that I may need to interview you again 3 weeks from today, which would bring us to *date 3 weeks from today's date*. To avoid playing telephone tag it would be easier to set up a tentative callback time now and in the event that you are selected to be re-interviewed we'll call you a couple days beforehand to confirm the date and time of the second interview. If you don't hear back from us, this means that there will not be a second interview.

So in the event that you are selected to do a 2nd interview, would it be ok to call you back on *date*?

1 YES ⇨ What time would be most convenient to call you back?

_____

Great. So, I have you tentatively scheduled for a second interview at *date and time.* I will call you to confirm this if you're selected to do a second interview. Thank you very much for your time. Have a nice afternoon/evening/morning/weekend. Bye.

2 NO ⇨ Would it be possible to do it the day before or the day after? We need to

be as close to 3 weeks as possible in order to be consistent in the study. *Set up date and time for next interview.*

Great. So, I have you tentatively scheduled for a second interview on *date and time.* Thank you very much for your time. Have a nice afternoon/evening/morning/ weekend. Bye.

Terminate call.

If this is the SECOND interview:

I appreciate your participation in this study. By doing so, you have helped us improve quality of life assessment in dogs. Because you completed 2 interviews, we will be sending you a cheque for $40 as a small token of our appreciation – you should receive this in December when the data collection for this study is complete. And next summer, when the entire project is complete we will send you a summary of the findings.

Do you have any comments or questions about the project? I'd be interested to know how you felt about the interview?
Address any questions/concerns.

Again, thank you very much. And have a nice evening/morning/afternoon/ weekend.

Terminate call.

Appendix C Instrument questions according to the Objective List

Question number	Comments	Telos needs	Opportunities for pleasure	Absence of fear and distress
1-8	Descriptive information			
9	Environmental control/predictability	✓		
10	Environmental control	✓		
11			✓	
12	There are 3 different scenarios to consider: the dog who enjoys treats and has eaten them, the dog who enjoys treats and has not eaten them, and the dog that does not get offered treats. For the dog who does not get treats, the item is N/A and does not factor into the final analysis of QOL for that dog. If a dog does not normally enjoy treats, owners will know this and not impose it on the dog (i.e. will not force the dog to eat treats). For a dog that does not enjoy treats, this could mean that the dog, who normally likes treats was offered them this week and for some reason (illness perhaps) does not like them. This item is really geared to those dogs that are currently enjoying treats – we're trying to assess how often they are receiving this pleasure.		✓	
13-15	Descriptive information			
16	Environmental control	✓		
17	Environmental control	✓		
18	Environmental control/predictability	✓		
19	Environmental control	✓		
20	Environmental control	✓		

Question number	Comments	Telos needs	Opportunities for pleasure	Absence of fear and distress
21-23	Since walking is exercise, we consider it to be a physical need, but as a physical need we feel it is too difficult to make a judgement about how many walks are necessary for optimal health (no one knows this; depends on a lot of factors including breed, etc). However, we feel it's important to assess whether the dog derives pleasure from walking. E.g. for sick dogs, walks may be a source of distress or discomfort.		✓	✓
24	Environmental control	✓		
25	For this item, we are thinking about the worst case scenario i.e. when a dog is pulling on the leash or being controlled by the owner, the prong and choke chain collars are more likely to cause discomfort and possibly, injury. The head halter is more restrictive than a flat collar or a body harness.			✓
26	Assess extent of social isolation (from people) and dog's environmental control during that time. Dogs require social contact ∴ never being left alone is optimal (Grade O) for the dog's QOL.	✓		
27	The purpose of this item is to address separation anxiety. Being left alone is something that is imposed on the dog (e.g. the owner has to go to work); it is unavoidable for the dog. That is why if the dog does not get distressed when left alone, it is assigned a Grade O. Conversely, if a dog experiences distress when left alone, then each time it is left alone is a distressing event.			✓
28-29	Descriptive information			

Question number	Comments	Telos needs	Opportunities for pleasure	Absence of fear and distress
30	Fear and distress can result from the presence of pain			✓
31-32	Descriptive information			
33	The purpose of this item is to determine if there are individual(s) in the household that makes the dog nervous/anxious. As in item #26, the presence of household members and regular visitors is something that is imposed on the dog (i.e. it is unavoidable from the dog's perspective). Therefore, if the dog gets along with everyone, that's optimal for the dog's QOL.			✓
34-35	To determine if regular visitors to the house make the dog nervous/anxious.			✓
36	Since dogs are social animals, social interaction is considered to be a telos need.	✓		
37	As above	✓		
38-39	The company of strangers can either be a source of pleasure or a source of distress.		✓	✓
40	General question about children – the answer to this question will decide whether respondent will be asked questions #40-45.			
41-42	The company of toddlers can be a source of pleasure or distress.		✓	✓
43-44	The company of children aged 4-9 years can be a source of pleasure or distress.		✓	✓
45-46	The company of children at least 10 years old can be a source of pleasure or distress.		✓	✓
47				✓

Question number	Comments	Telos needs	Opportunities for pleasure	Absence of fear and distress
48-49	Opportunities for social interaction with their own kind is important. In some cases though, some dogs may not be accustomed to other dogs (i.e. were not properly socialized with other dogs), therefore, it can cause fear and distress.	✓	✓	✓
50-51	Opportunities to interact with other species of animals offer variety to the dog.		✓	✓
52	If the dog does not enjoy toys then it can make the choice not to play with the toys. Playing with toys is not usually imposed on the dog (unlike walks) i.e. if the dog does not want to chase the ball, it won't. That is why, if the dog does not enjoy toys then this QOL factor is considered "neutral". Any items that are "neutral" and will not factor in to the final analysis of QOL for that dog.		✓	
53	Environmental control – by having access to toys the dog can make the choice to play with them or not.	✓		
54	Most dog owners realize if their dog likes to play with them or not – it's not usually imposed.		✓	
55	As above		✓	
56				
57-62	Grooming activities such as brushing are common daily activities for certain breeds of dogs. Dogs that have dermatological problems such as seborrhea may be bathed a number of times in a week. The different aspects of grooming are being assessed from the enjoyment/fear standpoint.		✓	✓

Question number	Comments	Telos needs	Opportunities for pleasure	Absence of fear and distress
63	There is the potential for respondents to "fake good". But we feel it is an important question to ask. Tried to word it as delicately as possible. Punishment is usually inconsistent and unpredictable (from the dog's perspective) ∴ it interferes with environmental control and predictability.	✓		✓
64-65	A common activity for dogs – a possible opportunity for pleasure or distress.		✓	✓
66-67	As above		✓	✓
68				✓

Appendix D Physical health questions that were eliminated from the final version of the Canine Quality of Life Questionnaire

Q-1 How would you describe Rover's MOBILITY at present?

O EXCELLENT
A GOOD
B FAIR
C POOR

Q-2i Does Rover currently have any skin problems?

1 YES
O NO

Q-2ii Please think back over the last seven days. Would you say that Rover's skin problem causes him/her to be itchy and/or uncomfortable:

A NEVER?
B SOME OF THE TIME?
C ALL OF THE TIME?

Q-3 Which of the following statements best describes Rover's EYESIGHT?

O EXCELLENT (*probe:* has no problems with vision)
A CAN SEE, BUT VISION IS SOMEWHAT LIMITED (*probe:* occasionally bumps into things and has occasional problems identifying objects)
B NOT COMPLETELY BLIND, BUT VISION IS EXTREMELY LIMITED (*probe:* seems to see only shadows)
C COMPLETELY BLIND

Q-4 Which of the following best describes Rover's HEARING?

O EXCELLENT (*probe:* no problems)
A CAN HEAR MOST SOUNDS
B CAN HEAR ONLY LOUD NOISES
C COMPLETELY DEAF (*probe:* does not respond to any sounds)

Q-5 Which of the following best describes Rover's BLADDER CONTROL (this does not refer to when dogs urinate when excited/submissive)?

O NO BLADDER PROBLEMS (*probe:* i.e. never dribbles urine)
A DRIBBLES URINE OCCASIONALLY
B DRIBBLES URINE OFTEN
C COMPLETELY INCONTINENT (*probe:* i.e. dribbles urine all the time, does not seem to have any bladder control)

Q-6 How would you describe Rover's BOWEL CONTROL? This does not refer to problems with house training, but to medical conditions that result in reduced bowel control.

O NO PROBLEMS (bowel control is good)
A HAS THE ODD ACCIDENT
B HAS SOME CONTROL, BUT HAS ACCIDENTS REGULARLY
C HAS NO CONTROL WHATSOEVER (i.e. he/she defecates wherever and whenever, that is, Rover is fecally incontinent)

Q-7 How often during the last seven days has Rover had vomiting or diarrhea or both?

O NEVER
A ONE DAY
B 2-3 DAYS
C MORE THAN 3 DAYS OUT OF SEVEN

Q-8 Please think back over the last seven days. Would you say that Rover slept poorly (i.e. was restless or whining, etc):

C MORE THAN 3 NIGHTS OUT OF SEVEN?
B 2-3 NIGHTS OUT OF SEVEN?
A ONE NIGHT?
O NOT ONE NIGHT?

Appendix E Summary of questions and general comments and ideas from the focus group

The focus group met July 2002 and involved 5 dog owners with varied experience as owners. The purpose of the focus group was to understand dog owners' perceptions about animal feelings and canine QOL (i.e. what factors contribute to it) and to gain insight into how owners interpret canine behaviour. The results were useful in the refinement of the Canine QOL Questionnaire during its developmental stages.

The following outlines the questions (in bold) and issues discussed in the focus group.

1) **Introduction – participants were asked to give a brief description of the dogs that they owned (including their names, their respective ages, gender, breed, and any illnesses/condition they had). They were also asked to describe their dog's personality, in one or two words.**

Participant #1 – 3 dogs: "**Jake**", an 8 year old neutered male mixed breed
Health status: healthy
Described as "easy-going, friendly; a charmer"

"**Fletcher**", a 5 year old neutered male Rottweiler
Health status: healthy
Described as "extremely protective; wary of people"

"**Sasha**", a 5 year old spayed female Rottweiler
Health status: healthy
Described as "friendly, soft; a sweetie"

Participant #2 – 2 dogs: "**Charlotte**", 3 and1/2 year old spayed female Boxer
Health status: healthy
Described as "fearless, playful"

"**Thelma**", a 10 year old spayed female mixed breed
Health status: healthy
Described as "calm, protective"

Participant #3 – 2 dogs: "**Roo**", 10 year old spayed female Australian cattle dog
Health status: suffers from ankylosing spondylosis. On medication to control pain.
Described as "dominant, aloof; doesn't like new people in the house, but is friendly once she gets to know strangers"

"**Wharton**", a 3 year old neutered male Australian cattle dog
Health status: healthy
Described as "pleasant, cheerful"

Participant #4 – 1 dog: "**Bubba**", an 8 year old spayed female Border Collie
Health status: healthy
Described as "smart; lovable with family"

Participant #5 – 1 dog: "**Lilly**", an 18 month old spayed female Corgi
Health status: healthy
Described as "friendly and assertive"

2) **Now getting to the QOL issue, we know that many factors affect our QOL. What factors do you feel significantly affects your dog's QOL?**

***If all are positive, probe*: Are there factors that negatively affect your dog's QOL? (e.g. being crated while you're at work, being outside/inside)**

The following were considered important contributors to canine QOL:

- walks, exercise
- a certain degree of freedom
- routine and predictability
- the company of people
- playing (for some dogs)
- food and treats (for some dogs)

3) **For this next part, I'd like to get an idea of whether certain common scenarios are a source of pleasure or distress for your dog/dogs. I'm going to distribute these diagrams for you to refer to for one of the questions.** (In an effort to understand how dog owners interpret canine behaviour, drawings of various canine postures (226) were distributed.)

Does your dog ENJOY .... ? And what does he/she do to make you think he/she does or does not enjoy _____? Of the pictures representing different postures of the dog, which one best represents your dog's behaviour in each of the situations? I realize that the dog in the diagrams may not look like your dog(s), but the general body language should be familiar.

- **the company of children?**
- **the company of strangers?**
- **the company of dogs in general?**
- **the company of other household pets (i.e. cats, pet rabbits, etc – does not include dogs)?**
- **the company of other animals (other than dogs and household pets – i.e. horses, cows, squirrels, raccoons, etc)**
- **playing?**

Participants were asked to explain yes/no answers to these questions. They were also asked how often the dog encountered each of the above scenarios on a daily/weekly basis.

4) **After having gone through those scenarios, do you find it easy to judge whether your dog is enjoying him/herself?**

Overall, the participants felt that they are good judges of whether or not their dog enjoys a particular activity.

5) **To help me decide whether or not to use pictures in my study (i.e. have dog owners refer to pictures during an interview) would you say that the diagrams were easy or difficult to use? Why?**

The use of diagrams

For each diagram, participants were asked to describe (in one word) how the dog was feeling. There were no objections to using the diagrams and group members felt that they would be comfortable using them during an interview. One participant made the comment that she could not get the idea of motion from the pictures, which she felt was a drawback.

Summary of comments about the labelled pictures

A few of the pictures were described with similar words, while others were described differently by all participants. Because of this inconsistency and because the diagrams were not exhaustive, diagrams were not included in the Canine QOL Questionnaire.

Appendix F Summary of comments (via email or oral communication) by experts about the content validity of the C-QOL-Q

Bold text – comments by experts
Normal text – Author's response

Dr. M. Appleby
Animal welfare scientist
Vice president for Farm Animals and Sustainable Agriculture
Humane Society of the United States

Explain why you're using the phrase Quality of Life rather than welfare, or whatever.

After a thorough review of the human QOL and animal welfare literature, we (JW and CH) feel that "welfare" and "quality of life" are interchangeable - that is, there is no distinction between the two. As you say, I will have to justify why I opted to choose the term "quality of life" (QOL) rather than "welfare". It essentially boils down to semantics - in North America people tend to equate "welfare" with social assistance. Considering this, we feel that the term QOL is more acceptable.

I largely agree (that "QOL comprises the state of an animal's mind and body, and the extent to which its nature is satisfied" (33) because as you know I think these are three important aspects of welfare, although (a) again this needs discussion, as some people think that only one is important and all people emphasise the three aspects differently; (b) this summary is over-brief, particularly as these aspects may be contradictory.

a) I feel that the "mind, body and nature" model of animal welfare is most appropriate as the foundation for this study because I want to emphasize that quality of life is more than just physical health, which is what veterinarians tend to focus on. Consideration of the animal's mind (feelings) and the extent to which its nature is satisfied is just as important. Granted, these are more difficult to assess because it introduces the element of subjectivity, but because the assessment of QOL is new in the context of veterinary medicine, one has to start somewhere.
b) This summary is brief because I wanted to provide a general overview of the project that would be understood by all readers (i.e. animal welfare scientists, practice veterinarians) and wouldn't take too much time to read (as I realize you're all busy people!).

> "***The underlying premise is that, for optimal QOL, a pet dog requires the following: satisfaction of physical needs (pertaining to physical and mental health), high degree of biological functioning, satisfaction of telos needs (e.g., social contact, environmental control), opportunities for pleasure, and minimal distress.***"

When I first read this I agreed with it. However, (a) I discovered later that this isn't just a general list of ideas but a distinct list of five categories, shown in your last table. I'm not sure either why you have decided on these five categories (as opposed to either of the tripartite categorizations described in our 'Philosophical debate' paper), or how you will use them.

I'm not sure I understand what you mean by "tripartite categorizations". Are you referring to feelings, pleasure/suffering and preferences? The five categories are based on the idea that QOL is about the mind (fear and distress, opportunities for pleasure, mental health), body (biological function, physical health), and nature (environmental control, social contact).

I think you are using terminology in idiosyncratic rather than commonly-accepted ways. Is 'telos needs' your own derivation?

I feel that the term "telos needs" is useful because it encompasses environmental control and social interaction and therefore, avoids creating more categories (i.e. 5 instead of 6).

And I think you are using the term 'objective list' in a different way from how I understand it – you are using it as all-embracing, rather than including only objectively measurable 'goods'.

I may be mistaken, but I thought that "objective list" implied that in order for an individual to have a "good life" he/she must have certain things or must realize certain things in his/her life. (Or at least that was the impression I got from the Appleby and Sandøe (2002) paper.) I didn't realize that the "objective" in objective list meant "objectively measurable". I'll have to review Kagan's account of objective list theories to clarify this. However, Appleby and Sandøe (2002) quote Kagan's account of objective list which does not refer to how measured but rather to independence from subject's perception of the item's importance.

Re objectively measurable goods and whether our 5 categories constitute these. There hasn't been research on canine needs/welfare in the way that there has been farm animal welfare research. However, (i) studies on learned helplessness in dogs point to need for environmental control; (ii) studies on raising pups in social isolation, observations of stereotypies in lab dogs, point to need for social contact; (iii) high degree of biological functioning is obvious and is the basis for veterinary medicine; likewise physical needs (as these help maintain a high degree of BF). All these are objectively measurable or have been objectively measured. Pleasure hasn't been but could be in the way that fear and distress have been - behaviour, physical effects.

What does 'pretested' mean?

Pre-test is standard terminology with respect to questionnaire development and assessment. Essentially a pre-test is like a pilot test. Pre-testing is done to assess a questionnaire's face validity i.e. it's a way of determining if respondents will understand

the questions correctly. Items that are misunderstood by pretest respondents are corrected before the questionnaire is used for data collection.

The questions are interesting, but I have several responses. Probably unavoidably, they largely reflect the owner's view of their animal's welfare – few are 'objective' in the sense of leaving little room for opinion.

The assumption is that the owner is most familiar with the dog's routine, environment, etc. while the veterinarian is most knowledgeable about the dog's health status. Both individuals bring important information to the table, so to speak. After reviewing the human QOL literature, I am aware of the disadvantages of using proxies, but since animals cannot directly express their feelings I feel that using the dog's owner as a proxy is the most logical approach. Similarly, parents, doctors and nurses are often used as proxies for infants. Having said this, I think it is important to be aware of the drawbacks and concerns surrounding proxy assessment, but for the purpose of this study, owners as proxies are valuable.

Perhaps unavoidably, there is a lot of your own subjective opinion in the grading.

As a veterinarian, I'd like to think that it's grading that is based on experience, and not simply my own subjective opinion. With the grading I have set limits that I feel are appropriate and logical based on my practical experience and limited (but increasing!) knowledge of animal welfare. I'm hoping that feedback from practice veterinarians and animal welfare scientists about the instrument's grading scheme, etc will let me know if I am misguided in setting such boundaries.

For example, if the owner thinks the dog enjoys walks then more walks leads to a high grade, and vice versa. But you have already noted that there are different aspects of welfare, and it could certainly be argued that walks benefit physical welfare even for a dog who (the owner thinks) doesn't enjoy walks; perhaps the physical advantages actually outweigh the displeasure.

I absolutely agree. A specific example would be a young dog that has a fractured femur. The dog enjoys going for walks, but in order to promote bone healing it is better that the dog rest. Therefore, under such circumstances it is in the best interest of the dog's physical health that the number of daily walks is minimized. This then means that the dog's mental health may suffer i.e. dog may become bored. Having said that, I am still trying to figure out how I will resolve this in terms of grading because in this example "physical needs" would be assigned a different grade than "opportunities for pleasure".

Perhaps you would benefit from simplifying and clarifying your framework, and how the questions are to address the issues involved.

I think our framework is clear: we are obtaining information relevant to the areas of body, mind and nature that in some unidentifiable combination constitute QOL. Until considerably more research is done, the relative weighting of the three areas in dogs

cannot be known. However, by proposing a comprehensive framework and obtaining crude data from it, we have a tool for use that is more systematic than vets' current approach and we can clarify the issues that need particular research.
Yes, I realize the questionnaire is quite long, but I feel that it is important to identify all factors that impact on a pet dog's QOL. Future studies on validity will likely reduce the length of the instrument by identifying those items that are not valid.

Perhaps you need to discuss your individual questions and gradings with a number of well-informed dog people. Would some sort of focus group approach help? If the end results are to be meaningful this stage is critical

A focus group of dog owners was organized in order to ensure important aspects of canine QOL were not neglected (i.e. to get the dog owners' perspective). The instrument was also submitted to a number of experts in canine behaviour.

I don't understand why your grading is O/A/B/C. Mellor and Reid used O/A/B/C/X which was clever because it prevents people taking an average (as they might with numerical scores), but in their scale O and X were qualitatively different from A, B and C.

I am not sure why O and X are qualitatively different. Mellor and Reid's grading constitutes ordered categorical responses, just like ours.

Does O mean optimal here, which seems to involve dangerous assumptions, or is there a danger that people (like me!) will think it does? As it stands, it looks as if you'd be as well to use A/B/C/D.

You're right, we could use A, B, C, D just like we could use X, P, Y, M. What O represents is the most desirable situation regarding that item. I realize we're making assumptions here, but the same can be said for Mellor and Reid. Assumptions are necessary in order to rank.
Although Mellor and Reid steer clear of numbers in grades, the definitions of each grade do in fact involve quantitative methods e.g "mild fever" "appropriate amount" "rapidly" - these terms are inevitably understood in numerical terms, however unconsciously. Thus, not true that their grades are purely qualitative; the grades represent qualitative labels for objectively quantifiable measurements.
It's important to note that Mellor and Reid's scheme was developed to make a judgement about a PROCEDURE, not about an animal's quality of life/welfare. Their focus is assessing the extent of compromise a laboratory procedure will inflict on given animal(s). Also, the framework was theoretical, but was not actually tested.
We, on the other hand, are developing an instrument to make a judgement about a dog's QOL. This instrument will be implemented in a practical setting (i.e. a veterinary hospital).

It seems that most of the questionnaire is about the dog over a relatively long time-scale (Does he enjoy going for walks?) rather than, say, this month.

Actually the respondents are asked to base their answers on the "last seven days", a brief and relatively short time frame.
I will add the word "currently" to the question that you cite (Does he CURRENTLY enjoy going for walks?)

So it doesn't seem likely to be able to relate closely to whether the dog is healthy or sick at this moment.

Yes, this instrument is designed for when owners of sick dog ask the vet if their animal is suffering. We want to see to what extent it discriminates between "suffering - poor QOL" and "non-suffering" dogs. It may discriminate (- then we need to see, if we can, what domains/items ⇨ discrimination. Are they all biological function ones or not necessarily?) or it may not discriminate (raising questions about sample size or possibility that sickness is not a useful criterion for degree of suffering - much more to QOL than presence of clinical signs. This would then raise questions of the extent to which our scale represents the correct balance of e.g. lack of enjoyment vs. physical health benefits)

Is it realistic to distinguish between healthy and sick dogs, as two categories, rather than rating healthiness/sickness on a scale (which is of course also relevant to QOL)?

Yes, because this is what practice veterinarians deal with on a daily basis.

Why will only owners of healthy dogs be re-interviewed?

The purpose of this is to assess test-retest reliability. We're assuming that within a 3 week period no significant changes will occur in the lives of the healthy dogs, therefore the answers that the owners give in the second QOL interview should more or less be the same as the answers they gave in the first interview. With the sick dogs, it is very likely that the health status of these dogs will improve or deteriorate in a 3-week period. Therefore, the answers in the second QOL interview may be quite different from those given in the first interview. The aim of this study is to assess the instrument's discriminative ability; its evaluative ability will be assessed in the future.

Dr. P. Foley
Small animal veterinarian
Dept. Companion Animals
Atlantic Veterinary College
University of Prince Edward Island

-had questions about the weighting ⇨ *in his opinion,* being itchy/pruritic all of the time is worse than bladder incontinence ⇨ he wanted to know how items would be weighted. At this time, we're going to make all the items equally weighted, knowing that certain things/factors are more important than others for different individuals, but we have no

quick and easy way of determining this. Determining weights for the items will likely be the focus of another research project i.e. thru preference testing, controlled studies, etc.
-did not have any more ideas/recommendations for items – he felt it was comprehensive in that sense
-suggested a future use for the instrument ⇨ modifying the instrument to use for adoption counselling in humane societies i.e. using it with prospective pet owners to see if the owner's routine and environment would be conducive to providing the dog/cat with "good" QOL (the instrument used for this purpose would be a PREDICTIVE instrument)

Dr. H. Gelens
Assistant professor (Small Animal Internal Medicine)
Dept. Companion Animals
Atlantic Veterinary College
University of Prince Edward Island

-feels it's very comprehensive, but is concerned about the length ⇨ I told him that since this is one of the first studies of its kind, it's best to have more than less because it can always be whittled down in the future. With validity studies, we'll be able to determine the questions that are key (i.e. most valid) to assessing canine QOL. Possibly use factor analysis in the future.
-explained the practicality of the instrument ⇨ as a vet you want to be able to identify and address the areas of concern in the dog's life; this is important in decision-making
-talked about getting permission from clinicians, residents, interns to interview potential clients ⇨he gave permission/consent on behalf of the locums
-he drew comparisons to pain assessment ⇨ the assessment of pain and QOL are subjective

---

Ms. Anna MacNeill-Allcock
Graduate student (Animal welfare)
University of British Columbia

What are your major plan is for the instrument for veterinarians. Are you simply using veterinarians as way to gather data, or is it to be used for making medical decisions?

I am hoping that in the future this instrument will have a variety of uses and will be used in a variety of contexts/situations (i.e. decision-making by owners and vets; assessing the QOL of dogs in shelters; comparing the QOL of dogs experiencing different treatment for the same condition e.g. cancer, etc).

With respect to Domain #1:
Does feeding ad lib really improve QOL?

Does having treats 3 times a day improve QOL? (She used the example that having cake 3 times a day does not improve her QOL.) I always think of Pit fighters stating that the dogs 'want' to fight and are willing to fight, therefore it is okay to let them fight. Sometimes having what we want is not good for us.

What we are trying to assess is the dog's degree of environmental control. Does the dog have the freedom/control to eat whenever it wants? We realize that obesity is a potential consequence of over-eating (due to ad lib feeding), but this is for the veterinarian to decide. It's the vet's responsibility to make judgements about the dog's physical health. But why do dogs have a tendency to overeat given the chance? Likely because they enjoy it. This is what we want to assess – what things/events in the dog's life give him pleasure. Why do I indulge in chocolate? Because I love it; it's a treat. I can eat chocolate whenever I want to, but I *choose* not to. So, when dogs are meal-fed it's the owner who is choosing at what time the dog will eat.

With respect to Domain #2:
How does level of risk play into the QOL? For example, if roaming unsupervised increases the risk of being hit by a car, does it really improve QOL.

Again, it's about the dog's control of its environment. By being off-leash it can choose to sniff, explore, etc. Yes, there is the potential for accidents, injury. But this instrument is a DISCRIMINATIVE instrument – that is we're assessing QOL at one point time (i.e. in the last seven day). Therefore, the risk of being hit by car is irrelevant. It would be relevant if we were developing a PREDICTIVE instrument.

Not all dogs enjoy being off-leash (very small and nervous dogs). Many dogs despise the head halter and would prefer a chain collar.

Interestingly, I have read a paper (unfortunately I can't find the article at this very moment) that uses objective parameters to determine if wearing a head halter is worse for a dog (in terms of stress response) than a flat, adjustable collar. The study concluded that dogs may seem more annoyed by the head halter, but essentially the parameters that the researchers measured showed that there is no difference between head halters and collars in terms of stress response.

With respect to Domain #3:
What pain evaluation will you be using?

We're only asking one general question about pain because the purpose of this instrument is to identify areas of concern. There are specific instruments available for pain assessment of dogs.

With respect to Domain #4:
59. Need to determine what type of punishment used, and what type of positive reinforcement used.

As you can imagine, punishment is a sensitive subject. We've tried to word the question as delicately as possible. We figured that if we tried to probe more about the type of punishment delivered, the intensity and the frequency it is likely that the respondents would give us answers that they thought we would want to hear (i.e. faking good). As it stands, the pretest are respondents are happy with the current wording of the question, so I guess we'll stick with that for now!

How are you going to weigh the sections in determining a final score in QOL. That is, some dogs love food more than interaction, others love playing ball more than food or interaction. Perhaps each score should be weighed depending on the individual dog. Maybe a final question can ask the owners to list the categories in order of importance to their dog and then you can use that information to determine the scoring procedure for each dog.

Yes, this is something that we've considered. For now, because this is preliminary research all items are weighted equally. We realize that dogs have preferences and some dogs will like walks more than others, some dogs like being around strangers and others do not, etc. We have considered having owners order the items in terms of preference/importance for their dog - this will likely be the aim of another study.

Dr. A. Luescher
Professor - Animal Behaviour
Director of Animal Behavior Clinic
Purdue University

In some places I do not agree with the interpretation of answers in terms of well-being. For instance, taking a dog on walks that does not enjoy going on walks may be good for the dog's well-being in the long term.

The purpose of this instrument is to assess the dog's mind and nature, because in terms of vet med these aspects of QOL are often neglected as veterinarians tend to focus on the dog's physical health (this is what vets are trained to do). But we feel that the dog's mind and the extent to which it's nature is satisfied are equally important as physical health. Our objective is to assess a dog's enjoyment/fear of common activities in a dog's life and to determine whether the dog is allowed to "doggie" things or things that are "natural" for a dog to do. The purpose of this instrument is to collect information from the dog owner that will complement the vet's knowledge of the dog's physical condition.

And even more so, not taking a dog on walks that does not enjoy going on walks does not indicate better welfare. The dog might be in chronic fear or anxiety and that is the reason why he does not want to go on walks.

That is exactly what we're trying to address – mental well-being (what causes fear, distress, pleasure)

I really have problems with interpretation of 15-19. Free to roam anywhere is not likely.

This is a discriminative instrument, not a predictive one. We're not assessing what COULD happen in the future, we're trying to assess what is happening NOW (i.e. what had been happening in the last seven days, which is our "now").

Question 60 - A dog that doesn't enjoy training, and does not get any may be better off than a dog that enjoys training and does not get any.

That's exactly what we're trying to assess – to determine if the dog has experienced the activity in the last seven days and if so, was it a pleasurable or distressing experience. If the dog has not experienced it in the last seven days then we can't assess it – if this was an evaluative instrument we would ask, "Has Rover ever competed in competitive sports?", "Did he enjoy it?". If YES, what is the reason for the dog not doing it now if it gave him pleasure before.

Q-61, 62 - I think a dog doing competitive sports and enjoying it contributes to welfare.

Yes, true, but as I alluded to above, his welfare could be better if he did it. Again, as I said above, if the dog has not participated in competitive sports in the last seven days then the owner (and in turn WE) cannot assess in terms of the dog's current QOL because it has not happened. We're only interested in assessing QOL *now* (i.e. in the last seven days). Therefore, if the dog has not been exposed to an event/situation/person in the last seven days, then it doesn't factor into the dog's QOL assessment. If it has not happened, then we can't expect the owner to make a judgement about the dog's experience. (i.e. it's QOL neutral)

However, a dog enjoying it and not doing it does not have reduced welfare, nor does one have increased welfare that does not enjoy and not do it.

You accept interpretive statements from owners, instead of having them simply describe things (such as he "enjoys" it, etc.)

I feel that with the answer options that we provide the owners it gives them the opportunity to choose the answer that best pertains to their dog. We realized during pretesting that for the "enjoyment" questions we were only giving the owner 2 options: YES, he enjoys it or NO, he does not enjoy it. And in several cases, owners said that they weren't confident to choose either option; some felt that they weren't sure how to interpret their dog's behaviour (e.g. children – some owners said their dog "tolerated" the company of children, but didn't feel that their dog enjoyed or did not enjoy being around children.). Therefore, we added "NOT SURE" as an answer option in order to capture the owner's uncertainty in interpreting their dog's behaviour.

In other cases, some owners said that the behaviour of their dog varied depending on the circumstances – for example, in the company of other dogs, some said that their dog enjoyed other dogs when not on leash, but seemed aggressive/anxious when another dog approached him/her when he/she was on leash. Consequently, we added "IT DEPENDS" as an answer option. A "NOT APPLICABLE" option was added for those questions where it's possible that the dog had not experienced the event. Thus, respondents were given a number of options. Efforts were made to make the questions as objective as possible, but we realize that with the enjoyment questions the owners are making a judgement and therefore, the answers are somewhat subjective. But in reality, this (i.e. the owner's interpretation) is what veterinarians must work with. These are the hazards of proxy assessment, but this is the best tool we have right now.

We could have collected information from owners in the form of an OPEN INTERVIEW i.e. asking open-ended questions and recording the interviews and then "picking out" relevant information from each individual's commentary. The problem with this is that it would likely be only possible to interview 10-12 people and transcribe and analyse the information. By developing this instrument, we've addressed issues that we, as vets, feel are important aspects of a dog's QOL. Yes, the answers are closed-ended – because it will make data analysis easier. Notes are taken during each interview because in most cases owners tend to elaborate on their dog's specific situation and circumstances. In some cases, owners justify or explain why their dog has not been taken for walks.

My comments in this preliminary stage of doing the interviews are that this questionnaire provides a useful framework to generate discussion about a dog's QOL; it stimulates discussion about various aspects of a dog's QOL. I'm not trying to make this interview like a "rigid survey" where I don't want owners to elaborate on their answers; in some cases it's necessary that owners elaborate because it ensures that the right answer option is being chosen.

Dr. H. Demille
Small animal veterinarian
Kingston, ON

Since dogs are pack animals with a strong sense of hierachy, what about the presence of other dogs in the household? Are dogs happier living with like-minded animals vs being with non-pack species? Does having a dog companion change the impact of being left alone?

Yes, you're right - dogs are by nature social animals, therefore in our opinion, opportunities for social interaction (whether with dogs, people, etc) is an important aspect of canine QOL. In this questionnaire we are trying to determine whether or not the dog in question has a variety of opportunites for social interaction. At the same time, we also realize that some dogs may not "enjoy" the company of other dogs, other species of animals, and certain people. Although we realize that owners may not be the best judges

of canine behaviour/body language, we feel that they are the best "tools" to use at this time i.e. owners are most familiar with the dog's routine, behaviour, etc.

What about the owners' understanding of a dog's pack needs? I often discuss this with clients, for example when they crate their puppy in "the laundry room" (or some other room away from the action) and wonder why he/she won't settle down. Or humans giving mixed signals to a particularly dominant or submissive dog? If a dog is in an environment where his/her hiearchy status is recognized and supported he/she will feel less stressed. (Or does a dominant dog need the challenge of defending his position to be happy?)

I think that for the purposes of this study it is too difficult to assess whether or not the owner has an understanding of the "pack needs" of dogs. This however, will likely play a factor in future studies when we will be assessing the validity of the instrument's questions. At this time, we're simply trying to develop an instrument that is comprehensive in terms of addressing all of the important aspects of canine QOL (eg. having the freedom to roam the house as opposed to being locked in the laundry room where there is limited space and prevents the dog from interacting with other pets, if there are any.). To our knowledge, this instrument will be a "first" in terms of QOL assessment in the context of veterinary medicine and we realize that a project like this has the potential for a lot of off-shoot projects.

For sick animals, does the frequency and type of visits to a vet clinic contribute to QOL? For example a dog on chemo who comes into the clinic weekly for a few hours for a CBC and injections - some dogs would find this pretty nasty, compared to a dog who loves visiting and being handled.

Yes, absolutely. I feel that we've tried to address this type of scenario with questions like, "How often during the last seven days has Rover experienced a distressing event?" - this assumes that the owner recognizes what makes the dog "happy" or "distressed".

Owners may rate some physical conditions differently than a veterinarian. I often encounter people who assume their arthritic dog is not painful because he/she is still eating and is not crying out. Do you think the pet's DVM should have input into the physical health questions?

Yes, this is very important. We're developing this instrument with the hope that it will serve as a useful tool for veterinarians in the future. We recognize that the veterinarian and the owner each bring important information to the table. This instrument is attempting to address those aspects (other than health status) of canine QOL that veterinarians may neglect to consider in the course of their assessment of a dog's QOL. By virtue of their training, vets focus on physical health - this is the information (i.e. physical exam findings, hematologic results, pathology results, etc) that vets bring to the table. This information is equally as important as the owner's knowledge of their pet's routine, behaviour, etc. So we recognize that each party has important information to contribute to the assessment of a dog's QOL.

The following individuals/experts also reviewed the instrument:

Dr. D. Fraser
Animal welfare scientist
Professor (Animal Welfare)
Faculty of Agricultural Sciences
University of British Columbia

Dr. N. Guy
Assistant professor (Animal Behaviour)
Dept. Biomedical Sciences
Atlantic Veterinary College
University of Prince Edward Island

Dr. B. Schneider
Small animal veterinarian and veterinary ethicist
New Brunswick

Dr. D. St. Julien
Small animal veterinarian
Princess Animal Hospital
Kingston, ON

Appendix G Entry criteria for the Canine Quality of Life Study

ID #: _____

INCLUSION and EXCLUSION CRITERIA for the Canine QOL Study

EXCLUSION CRITERIA

Exclude dog if ANY of the following apply:

	YES	NO
1) Dog is less than 7 months of age[1]		
2) Dog has been owned by the current owner for less than 5 months		
3) The dog is admitted to the AVC Small Animal Hospital as an emergency case (Based on the logistics it would not be possible to interview the owner prior to the dog's visit to the hospital)		
4) Dog is scheduled for a behaviour consultation at the AVC Small Animal Hospital (because it would be difficult to categorize them as "sick" or "healthy" given the definitions of "sick" and "healthy")		
5) The clinician assigned to the dog's case understands what is involved in the study and does not wish, for whatever reason, to have his/her clientele participate in the study		
6) The dog's medical records suggest that health status/physical function is ambiguous (e.g. due to incomplete medical records) and consequently, cannot be classified as "sick" or "healthy"		
7) On day of random sampling of clients from appointment book, dog's appointment is listed as "cancelled"		
8) The dog is a "working" dog, that is, he/she is trained and used primarily in service (e.g. police dog, seeing-eye dog, guard dog, etc.)[2]		
9) Emergency cases		
10) Dog owners from Quebec and the USA		

INCLUSION CRITERIA

Include dog if ALL of the following apply:

	YES	NO
1) Dog is at least 7 months of age		
2) Dog has been owned by the present owner for at least 5 months		
3) Dog has appointment at the AVC Small Animal Hospital in one of the following disciplines: surgery, medicine, ophthalmology, dermatology		
4) Dog's owner is capable of understanding what is involved in the study		
5) Dog can be categorized as either "sick" or "healthy" based on the study's definitions of "sick" and "healthy" dogs. If the dog's health status is ambiguous (e.g. due to incomplete medical records) and		

classification proves challenging, then dog will not be included in the study.		
6) The clinician assigned to the dog's case understands what is involved in the study and has given written/verbal permission for his/her clientele to take part in the study. For locum veterinarians whose consent it is not possible to obtain prior to their arrival at the teaching hospital, the staff coordinator (Dr. Gelens) gave consent on their behalf.		
7) The dog is a pet dog		

[1] Dogs that had been owned by their current owners for at least 5 months were eligible for inclusion in the study; it was reckoned that 5 months was an adequate period of time for an owner to become familiar with their dog's behaviour and temperament and have an established routine with the dog. The minimum age limit of 7 months was calculated by adding 5 months to 6-8 weeks, which is the average age that puppies are acquired (author's personal experience).

[2] Working or service dogs such as seeing-eye dogs were excluded from the study because the criteria for optimal QOL for these dogs would be different from those of pet dogs.

Appendix H Recruitment call dialogue for the Canine Quality of Life Study

Office use
Client's name:
Dog's name:
Phone #:
Date of call:

Recruitment Call for the Canine QOL Study

Hello, this is Dr. Nina Wojciechowska calling from the Atlantic Veterinary College. May I please speak to *client's name*?

If client not home: When would be a good time for me to reach him/her?
Set up an appointment for a callback. _____
I will call back then. Thank-you. Bye.

I am a veterinarian and a graduate student at the Atlantic Veterinary College. I am calling to see if you might like to participate in a research project on the quality of life of dogs. May I take a few minutes to tell you more about the project?

NO ⇨ I understand. Sorry to have bothered you. Thank you for your time. Bye. *Terminate call.*

YES ⇨ Thank you.

Q-1 Before I continue, could I please ask: Are you the owner of _____?

1 NO ⇨ Do you know when I could speak to _____'s owner? I will call back then. Thank you. Bye. *Terminate call.*
2 YES ⇨ *continue below*

Thank-you. This study involves pet dogs that are at least 7 months old and have been owned by their current owners for at least 5 months.

Q-2 How old is _____?
If less than 7 months old ⇨ I'm afraid we can't include _____ in the study because _____ doesn't meet the minimum age requirement for the study. I'm sorry to have taken up your time. Thank you for your interest. Have a nice day. Bye. *Terminate call.*

If at least 7 month old ⇨ Ok, that's great. *Continue below*

Q-3 And have you owned _____ for at least five months?

1 NO ⇨ I'm afraid _____ can't be included in the study because we're recruiting people who have owned their dog for at least 5 months. I'm sorry to have taken up your time. Thank you for your interest. Have a nice day. Bye. *Terminate call.*

2 YES ⇨ Ok, that's great. *Continue below.*

Q-4 Is _____ a pet dog?

1 YES
2 NO

Q-5 Is _____ MALE or FEMALE?

Now, to give you some background information about the study... Quality of life research is completely new in veterinary medicine and this study is the first of its kind. The main goal of my project is to develop a way to assess the QOL of pet dogs. We think that this is important in veterinary medicine because dogs cannot tell us how they are feeling. Instead pet owners and veterinarians have to somehow decide how a dog is doing, that is, whether or not it is suffering.

To help with this decision, we have developed a list of questions that we feel address important aspects of a dog's life. Things like social interaction and diet. My project involves asking dog owners these questions in a confidential telephone interview. The interview lasts about 40 minutes. The results of the study will show whether the questionnaire is a useful way to assess a dog's QOL.

If you're interested in participating in the study, I can send you more detailed information.

Q-5 Are you interested in participating?

1 NO ⇨ Ok. Well, thank you very much for your time. Have a pleasant day/evening. Bye. *Terminate call.*
2 YES ⇨ That's great. Thank you. *Continue below.*

We are looking to interview consenting owners **before** their appointment at AVC, so I shall send you an information package which you should receive by *state day {today + 2}*. I will then call you to see if you would like to participate in the study. Is there a convenient time for me to call you on *state {day + 2}*, to confirm whether you would like to take part?

And may I please have your **mailing address**?
Mr./Miss/Ms./Mrs.

Thank-you. So, I'll get the information package off to you right away. And I will call you on *date and time*. Thank you very much for your time. Have a pleasant day/evening/ weekend.

Terminate call.

Date and time of next phone call: _____

Appendix I Sample questions mailed to participants before the Quality of Life Interview

Questions in the Canine Quality of Life Interview

◆◆◆◆

Please read this if you decide to participate in the Canine QOL Study.

When we call you to obtain your decision to participate in the Canine Quality of Life (QOL) Study, we could go ahead with the Canine QOL Interview immediately after you give verbal consent to participate in the study. If not convenient, we would arrange another time to call back to do the Interview.

During the Interview, we will ask you about your dog that has the upcoming appointment at the Atlantic Veterinary College. Many of the questions will be about his/her routine and behaviour, and you will need time to think about them. Therefore, we have listed the questions here. Most of the questions ask you to "think back over the last seven days". This refers to the seven days **before the QOL Interview.**

If there is more than one person in your household, we recommend that you look at the questions together. **Please read through the list and jot down the answers before we call you for the interview.** Since many of the questions relate to your dog's daily care and routine, we would like to interview the person who is most familiar with your dog's care and routine. Therefore, the person we spoke to during the recruitment call does not necessarily have to be the person who does the QOL Interview. If this is the case, we will clarify this the next time we call you.

List of questions to think about:

1i Please think back over the last seven days. Which of the following statements best describes your dog's situation when he/she was **OUTDOORS WITHOUT SUPERVISION**? (If more than one option applies, choose the most common scenario.) The options are:

1 WAS COMPLETELY FREE TO ROAM ANYWHERE
2 WAS FREE TO ROAM AN AREA THAT WAS ENCLOSED BY A FENCE (for example, an area like your yard)
3 WAS CONFINED TO A RUN/KENNEL OR WAS KEPT ON A LEASH/CHAIN
4 THE QUESTION IS NOT APPLICABLE (because your dog was always supervised when outside)

1ii Please think back over the last seven days. Which of the following statements best describes your dog's situation when he/she was **OUTDOORS UNDER SOMEONE'S SUPERVISION**? **This does not include going for walks.** For example, it could be when you and your dog were in your yard for whatever

reason, or when you and your dog were visiting the local dog park. (If more than one option applies, choose the most common scenario.) The options are:

1 NOT APPLICABLE (because your dog only went outdoors with supervision when he/she was taken for walks)
2 WAS COMPLETELY FREE TO ROAM ANYWHERE
3 WAS FREE TO ROAM AN AREA THAT WAS ENCLOSED BY A FENCE (for example, an area like your yard or the local dog park)
4 WAS CONFINED TO A RUN/KENNEL OR WAS KEPT ON A LEASH/CHAIN

2i Thinking about the last seven days, does your dog enjoy going for walks?

2ii How often during the last seven days has your dog been taken for a walk?

1 AT LEAST TWICE DAILY
2 ONCE DAILY
3 NOT DAILY, BUT A FEW TIMES
4 ONCE IN THE LAST SEVEN DAYS
5 HE/SHE HAS NOT BEEN TAKEN FOR WALKS

3i Please think back over the last seven days. In a typical day (i.e. 24 hour period), what was the longest time that your dog was left alone?

_____ minutes/hours

3ii During that period where or how was your dog confined? (For example, was he/she confined to a room, run, crate or kennel? Was he/she left outside or inside to roam freely? Was he/she kept on a leash inside or outside?)

3iii Please think back over the last seven days. On average, how many times per day was your dog left alone?

_____ times per day

4i Thinking about the last seven days, does your dog get along with everyone living in your household?

4ii If there is an individual(s) in your household that your dog does not get along with:
In the last seven days, would you say that your dog and this person(s) have been together:

1 ALL OF THE TIME?
2 MOST OF THE TIME?
3 SOME OF THE TIME?
4 NEVER?

5i Is there anyone who regularly spends at least 20 hours per week at your home, but is not a member of your household? This would include people like a babysitter, a domestic cleaner, etc.

5ii Does this person(s) have contact with your dog?

5iii Thinking about the last seven days, does your dog get along with this person(s)?

6i Please think back over the last seven days. On average, how many hours out of 24 did you all* spend with your dog on a **weekday**?
This would include things like playing with him/her, petting him/her, talking to him/her, or having him/her in the same room while you're asleep or watching TV.
(* "All" refers to everyone who lives in your household as well any individuals from Question 5i. If you are the only person in your household, then consider only yourself.)

_____ hours out of 24

6ii How about during the last **weekend**?

_____ hours out of 24

Some of the following questions will ask about your dog's enjoyment of various experiences, individuals and animals. These questions are referring to his/her enjoyment **at the present time,** that is, based on the experiences of the **last seven days.**

7i Does your dog enjoy the company of strangers (i.e. people he/she is not familiar with)?

7ii How many days out of the last seven has your dog been around strangers?

8i Has your dog ever been around or been exposed to children or toddlers in the time that you've had him/her?

8ii Does your dog enjoy being around children of different ages? That is, does he/she enjoy being around:
-toddlers (i.e. children less than 4 years old)?
-children aged 4 to 9 years of age?
-children who are at least 10 years of age?

8iii How many days out of the last seven has your dog been around:
-toddlers (i.e. children less than 4 years old)?
-children aged 4 to 9 years of age?
-children who are at least 10 years of age?

9i Apart from household members, children and strangers and the individuals mentioned in Question 5i, is there anyone who causes your dog to become distressed? This could include people like the mailman, or a neighbour. "Distressed" implies that your dog becomes nervous or agitated.

9ii How many days out of the last seven has your dog come in contact with this person/these people?

10i Does your dog enjoy being around:
-dogs?
-other species of animals (besides dogs)?

10ii How many days out of the last seven has your dog been around or interacted with:
-dogs?
-other species of animals (besides dogs)?

11i Is there any **THING** or **EVENT** that causes your dog distress? This could include infrequent events such as a thunderstorm. Or common things like a noisy vacuum cleaner or a garden hose.

11ii How many days out of the last seven has your dog come in contact with or experienced the distressing thing(s) or event(s)?

Appendix J **Appointment log**

Recruitment call date: _____

AVC Small Animal Hospital Appointments

*Date in appointment book: _____

SURGERY: _____

#	✓/ ✗	Name	Breed	Reason for visit	Physician	Hospital #	Age
1	✓	*e.g. Rover X*	*Lab. Ret*	*Cruciate surgery*	*Jones*	*1234*	*7yrs*
-	✗	*e.g. Lucy Y*	*Cocker Spaniel*	*Spay*	*Brown*	*2356*	*5mths*

OPHTHALMOLOGY: _____

#	✓/ ✗	Name	Breed	Reason for visit	Physician	Hospital #	Age
2	✓	*e.g. Sonny Z*	*Mixed*	*Cataract surgery*	*Smith*	*3457*	*9yrs*

MEDICINE: _____

#	✓/ ✗	Name	Breed	Reason for visit	Physician	Hospital #	Age

DERMATOLOGY: _____

#	✓/ ✗	Name	Breed	Reason for visit	Physician	Hospital #	Age

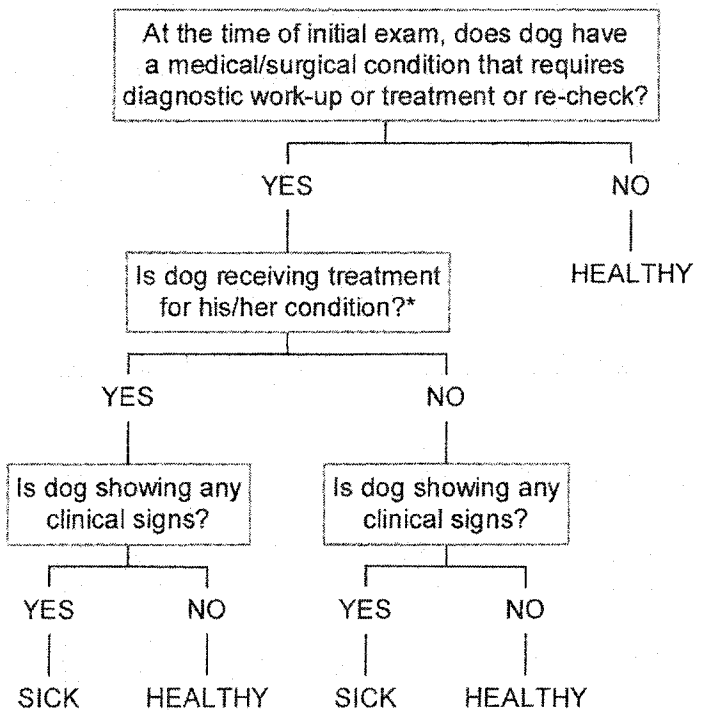
*Date in appointment book = Recruitment call date + 8 days

Appendix K Decision tree for classifying dogs as "sick" or "healthy"

ID#: _____

Decision-making tree for determining if dog is "sick" or "healthy" based on initial presentation at AVC on _____

Reason for visit: _____



*this does not include medication/ treatment given or prescribed during this visit

Appendix L Counts indicating applicability of QOL questions in Canine QOL Questionnaire to 39 healthy dogs[a] (Not all questions were relevant to all dogs)

Question number	Quality of Life issue	Number of dogs to whom the question was relevant for both interviews
9	Control over access to food	39
10	Eating without interference from people or animals	39
11	Enjoyment of regular food	39
12	Enjoyment of food treats	39
16	Extent of freedom when dog was indoors	39
17	Control over going indoors to outdoors and vice versa	39
18	Access to shelter when outdoors	39
19	Extent of freedom when dog was outdoors without supervision	39
20	Extent of freedom when dog was outdoors under supervision (excluding walks)	39
21, 22	Frequency of walks	27
21, 23	Duration of an average walk	27
24	Leashed during walks	29
25	Collar type (if leashed)	26
26	Average duration of being left home alone and dog's situation when left alone	39
27	Distressed when left alone	37
30	Frequency of pain	39
33	Getting along with household members	38
35	Getting along with regular visitors (people who spend at least 20/wk at the home)	5
36	Time spent with dog during a typical weekday	39
37	Time spent with dog during a typical weekend day	38
38, 39	Company of strangers	10
41, 42	Interaction with toddlers	5
43, 44	Interaction with children between 4-9 years of age	10
45, 46	Interaction with children ≥10 years old	7
47	Frequency of contact with distressing people	7
48, 49	Interaction with dogs	20
50, 51	Interaction with other species of animals (besides dogs)	8
52	Play with toys	28

Question number	Quality of Life issue	Number of dogs to whom the question was relevant for both interviews
53	Access to toys	39
54, 55	Play with people	36
56	Duration of play sessions with people	36
57, 58	Bathing	1
59, 60	Brushing	14
61, 62	Nail trimming	2
63	Frequency of punishment	39
64, 65	Obedience training	5
66, 67	Competitive sports	0
68	Frequency of contact with distressing things/events	32

[a] Where two questions are listed on the same line, the questions are identical, except that the grading of response options are in reverse order; this reflected whether the dog respectively enjoyed or did not enjoy the activity in question. See Appendix B.

Appendix M Physical health checklist to serve as an adjunct to the Canine Quality of Life Questionnaire

System	Cause for concern?		Comments
	Yes	No	
EYES -vision?			
EARS -hearing?			
NOSE and THROAT			
ORAL CAVITY -prehension?			
GASTROINTESTINAL -vomiting/diarrhea? -bowel control?			
RESPIRATORY -dyspnea?			
CARDIOVASCULAR -exercise tolerance?			
INTEGUMENTARY -pruritus?			
URINARY -incontinence?			
REPRODUCTIVE			
MUSCULOSKELETAL -degree of mobility?			
NERVOUS -quality of sleep?			
LYMPHATIC			

Appendix N Proportion of agreement between first and second QOL interviews, for each QOL question in the Canine Quality of Life Questionnaire

Q-9 Access to food

		Interview #2			
		A	B	O	Total
Interview #1	A	**25**	0	1	26
	B	0	**1**	0	1
	O	2	0	**10**	12
	Total	27	1	11	39

Q-10 Eating in peace

		Interview #2			
		A	C	O	Total
Interview #1	A	**2**	0	5	7
	B	3	0	0	3
	C	0	**2**	0	2
	O	6	0	**21**	27
	Total	11	2	26	39

Q-11 Enjoyment of regular food

		Interview #2		
		A	O	Total
Interview #1	A	**6**	5	11
	O	3	**25**	28
	Total	9	30	39

Q-12 Enjoyment of food treats

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**8**	3	0	3	14
	B	2	**1**	2	0	5
	C	1	1	**2**	0	4
	O	4	0	0	**12**	16
	Total	15	5	4	15	39

Q-16 Extent of freedom when dog was indoors

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**10**	0	0	1	11
	B	1	**1**	0	2	4
	C	0	1	**1**	0	2
	O	1	0	0	**21**	22
	Total	12	2	1	24	39

Q-17 Control over going indoors to outdoors and vice versa

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**21**	2	2	2	27
	B	3	**1**	0	0	4
	C	0	0	**4**	0	4
	O	1	0	0	**3**	4
	Total	25	3	6	5	39

Q-18 Access to shelter when outdoors

		Interview #2			
		C	D	O	Total
Interview #1	A	0	0	1	1
	B	0	0	1	1
	C	**8**	2	4	14
	D	0	**10**	1	11
	O	2	0	**10**	12
	Total	10	12	17	39

Q-19 Extent of freedom when dog was outdoors without supervision

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**10**	1	1	0	12
	B	0	**7**	1	0	8
	C	0	0	**10**	1	11
	O	0	1	0	**7**	8
	Total	10	9	12	8	39

Q-20 Extent of freedom when dog was outdoors under supervision

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**8**	0	0	4	12
	B	0	**6**	0	1	7
	C	1	1	**4**	0	6
	O	0	1	1	**12**	14
	Total	9	8	5	17	39

Q-22 Frequency of walks

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**4**	2	0	1	7
	B	0	**12**	1	0	13
	C	0	0	**1**	0	1
	O	1	0	0	**5**	6
	Total	5	14	2	6	27

Q-23 Duration of an average walk

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**6**	2	0	1	9
	B	2	**1**	0	1	4
	C	0	0	**1**	0	1
	O	6	1	0	**6**	13
	Total	14	4	1	8	27

Q-24 Leashed during walks

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**8**	0	0	1	9
	B	0	**3**	1	0	4
	C	0	1	**13**	0	14
	O	0	0	0	**2**	2
	Total	8	4	14	3	29

Q-25 Collar type (if leashed during walks)

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**2**	0	0	0	2
	B	0	**3**	0	0	3
	C	0	0	**1**	0	1
	O	0	1	0	**19**	20
	Total	2	4	1	19	26

Q-26 Average duration of being left at home alone and dog's situation when left alone

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**11**	2	0	2	15
	B	2	**3**	0	1	6
	C	0	1	**5**	0	6
	O	1	1	0	**10**	12
	Total	14	7	5	13	39

Q-27 Distressed when left alone

		Interview #2			
		A	B	O	Total
Interview #1	A	**2**	1	0	3
	O	4	0	**30**	34
	Total	6	1	30	37

Q-30 Frequency of pain experience

		Interview #2		
		A	O	Total
Interview #1	A	**1**	4	5
	O	3	**31**	34
	Total	4	35	39

Q-33 Dog got along with everyone living in the household

		Interview #2	
		O	Total
Interview #1	O	**38**	38
	Total	38	38

Q-35 Gets along with regular visitors (people who spend at least 20/wk at the home)

		Interview #2		
		3	O	Total
Interview #1	O	1	**4**	5
	Total	1	4	5

Q-36 Time spent with dog during a typical weekday

		Interview #2			
		A	B	O	Total
Interview #1	A	**2**	0	2	4
	B	1	**1**	0	2
	O	2	0	**31**	33
	Total	5	1	33	39

Q-37 Time spent with dog during the weekend

		Interview #2			
		A	B	O	Total
Interview #1	A	**2**	0	1	3
	B	0	**1**	0	1
	O	1	0	**33**	34
	Total	3	1	34	38

Q-39 Enjoyment of the company of strangers

		Interview #2			
		A	B	O	Total
Interview #1	A	**0**	1	0	1
	B	1	**3**	2	6
	O	0	2	**1**	3
	Total	1	6	3	10

Q-41 Enjoyment of the company of toddlers

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**1**	0	0	0	1
	C	0	1	**2**	0	3
	O	0	0	0	**1**	1
	Total	1	1	2	1	5

Q-44 Enjoyment of the company of children 4-9 years of age

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**1**	0	0	0	1
	C	1	1	**2**	0	4
	O	1	0	0	**4**	5
	Total	3	1	2	4	10

Q-46 Enjoyment of the company of children who are at least 10 years of age

		Interview #2			
		A	B	O	Total
Interview #1	C	0	1	0	1
	O	1	1	**4**	6
	Total	1	2	4	7

Q-47 Frequency of contact with distressing people

		Interview #2			
		B	C	O	Total
Interview #1	A	1	0	1	1
	B	**3**	0	0	3
	C	0	**1**	0	1
	O	0	0	**1**	1
	Total	4	1	2	7

Q-49 Enjoyment interacting with dogs

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**0**	1	0	1	2
	B	1	**2**	1	0	4
	C	0	0	**0**	1	1
	O	0	0	0	**13**	13
	Total	1	3	1	15	20

Q-51 Enjoyment interacting with other species of animals besides dogs

		Interview #2	
		O	Total
Interview #1	O	**8**	8
	Total	8	8

Q-52 Enjoyment playing with toys

		Interview #2		
		B	O	Total
Interview #1	A	1	0	1
	O	1	**26**	27
	Total	2	26	28

Q-53 Access to toys

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**5**	2	1	2	10
	B	0	**0**	1	0	1
	C	0	0	**2**	0	2
	O	1	0	1	**24**	26
	Total	6	2	5	26	39

Q-55 Enjoyment playing with people

		Interview #2			
		A	B	O	Total
Interview #1	A	**1**	1	4	6
	B	3	**1**	0	4
	O	4	1	**21**	26
	Total	8	3	25	36

Q-56 Duration of play sessions with people

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**7**	8	2	0	17
	B	2	**3**	2	0	7
	C	0	2	**1**	0	3
	O	1	0	0	**8**	9
	Total	10	13	5	8	36

Q-58 (Enjoyment of) baths

		Interview #2	
		C	Total
Interview #1	C	**1**	1
	Total	1	1

Q-60 (Enjoyment of) brushing

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**2**	1	0	2	5
	B	2	**3**	0	0	5
	C	0	0	**2**	0	2
	O	1	0	0	**1**	2
	Total	5	4	2	3	14

Q-62 (Enjoyment of) nail trimming

		Interview #2	
		A	Total
Interview #1	A	**2**	2
	Total	2	2

Q-63 Frequency of punishment

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**18**	2	0	6	26
	B	0	**2**	0	0	2
	C	0	0	**2**	0	2
	O	3	0	0	**6**	9
	Total	21	4	2	12	39

Q-65 (Enjoyment of) obedience training

		Interview #2			
		A	B	O	Total
Interview #1	A	**0**	1	0	1
	C	0	**1**	0	1
	O	2	0	**1**	3
	Total	2	2	1	5

Q-68 Frequency of contact with distressing things/events

		Interview #2				
		A	B	C	O	Total
Interview #1	A	**3**	6	0	1	10
	B	0	**6**	0	5	11
	C	0	0	**2**	0	2
	O	1	1	0	**7**	9
	Total	4	13	2	13	32

Appendix O Questions identified as problematic during data collection

Question	Problem	Recommended Change(s)
Q-8ii	Requires clarification	Change to "...for more than 24 *consecutive* hours"
Q-9	Requires a probe	Add a probe to clarify that for those dogs who pick at their food until it is done, but do *not* get their bowls refilled, their feeding would be classified as "meal-fed".
Q-16ii	Can be misinterpreted, particularly if the dog has a physical condition (e.g. fractured limb) that prevents it from accessing certain parts of the house.	Add a probe to clarify that the question refers to owner-imposed restrictions, *not* those related to the dog (e.g. fear of going up/down stairs prevents dog from going to upper part of the house).
Q-17	Ambiguity. The response options do not represent all possible situations.	Break down this multi-faceted question into several precise questions. For example, ask whether the dog has access to a doggie door and if he/she uses it. If "yes" to both, this would imply that the dog has a great degree of environmental control. It would also preclude asking Q-18 in those cases where the dogs have access to a doggie door. Also, ask a question to determine if the dog is on a schedule of when it is allowed to go in and out. Followed by a question about whether the owners oblige when the dog "asks" to go in/out (i.e. response options: always, most of the time, some of the time, never)
Q-18	Ambiguity	Preface the question by first asking if the dog has been outside unsupervised in the last 7 days. If "no", then skip to the next item.
Q-20	The response options do not address the situation of the dog that is not in a fenced yard, but is under voice command (i.e. is called back when he strays beyond certain boundaries)	Response option "A" should read: "Free to roam anywhere within certain boundaries i.e. delineated by voice command or by a physical barrier such as a fence"

Question	Problem	Recommended Change(s)
Q-21	None apparent	Add space next to "Not applicable" to make notes if owner elaborates (i.e. the dog *wants* to go for walks, but is prevented from doing so for whatever reason e.g. restricted exercise because of a physical condition)
Q-25	Requires rewording	Change "choke chain collar" to "choke collar" because some choke collars are fabric
Q-26	"Left alone" needs to be clearly defined.	Add to the existing question that "left alone" does not include sleeping time; it refers to when those individuals who are familiar with the dogs are not home.
	Response options require grades adjusted.	Adjust grading; change grades for "short leash" and "confined to crate" from A to B because compared to "confined to room/run" and "long leash" there is considerable difference in terms of size and restriction.
	Editing necessary	Delete example of "being left alone in an unfamiliar environment such as a hospital or grooming facility" because these events are not likely to be part of a "typical day"
Q-27ii	Requires clarification	Add probe to explain that this question addresses the process of being left alone, that is, people (identified in Q-31 and Q-34) coming and going.
	Minor editing of response option	Also, change response option "O" to LESS THAN ONCE PER DAY because some owners may not leave the house everyday.
Q-29	Does not accommodate those dogs that have multiple health problems	Re-word as an open-ended question so that respondent can list the dog's health problems and identify the duration/chronicity of each.
Q-30	Subject to owner interpretation	Add more questions about pain to improve validity.
Q-34i	Requires rewording	Rephrase as "Other than members of your household, is there anyone who regularly spends at least 20 hours per week with ____?"

Question	Problem	Recommended Change(s)
Q-38	Overlap with Q-47, Q-68 (i.e. not mutually exclusive)	Develop specific questions to assess for fear and territorial aggression. For example, probing questions about the *context* of the behaviour.
Q-47	Refer to Q-38	
Q-41i, Q43i, Q45i, Q47i, Q48i, Q50i, Q52i, Q54i, Q57i, Q59i, Q61i	No response option available for those respondents who are "not sure" about the occurrence of these events/activities	Add "NOT SURE" response option for these questions
Q-52, Q-54	Does not address those cases that are *denied* opportunities to play because of illness or physical impairment (e.g. enforced restricted exercise because of ruptured cruciate ligament)	Add probing questions if answers to these questions are "NO". If the dog was denied opportunities for pleasure (e.g. play), grades should be assigned accordingly.
Q-55, 56	Does not imply dog's choice (i.e. dog may choose to end play session after 5 minutes); the grading does not reflect this.	Add questions about who (people or dog) initiates play and who ends the play sessions (i.e. rephrase Q-55, "In the last seven days has a person/people played with ____?") Adjust response options to reflect that the greater degree of choice or control the dog had, the better the grade.
Q-61, 62	Doubtful that any dog actually "enjoys" having his/her nails trimmed	It is likely that this event would be described as "distressing" for most dogs; "distressing events" are addressed by Q-68). Therefore, recommend deleting these questions.
Q-63	Does not account for punishment inflicted by other household members	Rephrase, "How often have you *or other household members (or people identified in Q-34)* scolded..."
Q-68	Refer to Q-38	Also, change "going to the vet clinic" to "being at the vet clinic" Additional questions required to address whether the dog has the choice to escape the distressing event.

	For example, when the owner is vacuuming the dog may be able to retreat or hide in another part of the house. However, during a thunderstorm the dog has no such control.

The following issues were not addressed with the current instrument and therefore, additional items are required to address:

1) Whether the dog wears a shock collar and under what circumstances
2) Things/events that the dogs ENJOYS (ask in a style similar to Q-68)

Appendix P Questions represented on the x axis of the QOL Score graphs

Question #	QOL issue
1	Control over access to food
2	Eating without interference from people or animals
3	Enjoyment of regular food
4	Enjoyment of food treats
5	Extent of freedom when dog was indoors
6	Control over going indoors and outdoors
7	Access to shelter when outdoors
8	Extent of freedom when dog was outdoors without supervision
9	Extent of freedom when dog was outdoors with supervision
10	Frequency of walks
11	Duration of an average walk
12	Leashed during walks
13	Collar type during walks
14	Average duration of being left alone and dog's situation when left alone
15	Distressed when left alone
16	Frequency of pain
17	Got along with all household members
18	Got along with regular visitors
19	Time spent with dog during a typical weekday
20	Time spent with dog during a typical weekend
21	Company of strangers
22	Company of toddlers
23	Company of children between 4-9 years of age
24	Company of children at least 10 years of age
25	Frequency of contact with "distressing people"
26	Interaction with dogs
27	Interaction with other animals
28	Playing with toys
29	Access to toys
30	Playing with people
31	Duration of play sessions with people
32	Baths
33	Being brushed
34	Nailtrim
35	Frequency of punishment
36	Obedience training
37	Frequency of contact with distressing things or events
38	Competitive sports

Appendix Q Comparison of regression models with the influential observation present in and removed from dataset

Table 1 Coefficients of explanatory variables with standard errors, 95% confidence intervals and significance levels in the linear regression model for QOL Score (n=120)

Explanatory variable	Coefficient	Standard error	95% Confidence interval	p
Environment	-		-	0.037[a]
-suburban vs urban	0.85	1.4	-1.9-3.6	
-rural vs urban	2.9	1.2	0.5-5.4	
Duration of ownership[b]	-		-	0.049
-linear term	1.0	0.4	0.2-1.8	0.014
-quadratic term	-0.07	0.03	-0.1- 0.0	0.022

[a] p value represents the overall significance of the variable in the model
[b] Term transformed quadratically

R^2 for the final model = 10.5%
Adjusted R^2 = 7.4%

Table 2 Coefficients of explanatory variables with standard errors, 95% confidence intervals and significance levels in the linear regression model for QOL Score (n=119)

Explanatory variable	Coefficient	Standard error	95% Confidence interval	p
Environment	-		-	0.041[a]
-suburban vs urban	0.85	1.4	-1.9-3.6	
-rural vs urban	2.9	1.2	0.4-5.3	
Duration of ownership[b]	-		-	0.006
-linear term	1.6	0.5	0.6-2.6	0.001
-quadratic term	-0.13	0.04	-0.2-0.0	0.002

[a] p value represents the overall significance of the variable in the model
[b] Term transformed quadratically

R^2 for the final model = 13.6%
Adjusted R^2 = 10.6%