The Role of Duty of Care in Companion Dog Care and Management

Carmen Rose Glanville (BSc)

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Animal Welfare Science Centre

University of Melbourne

Parkville, Victoria
Australia

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ABSTRACT

The current literature surrounding the behaviour, health, and management of companion dogs suggests that in many cases their welfare is compromised. While there are many factors that have the potential to influence the welfare of companion dogs, carer behaviour is likely to be the most influential. Relevant carer behaviour includes direct interactions that contribute to the human-animal relationship such as petting and playing, as well as management behaviours such as walking and preventative health measures. Therefore, in order to improve the welfare of companion dogs, it is vital to understand the general and specific human factors that underpin carer behaviour. One such factor that has received no attention in the scientific literature is Duty of Care. Hence, the overall aim of this thesis is to provide a preliminary investigation of Duty of Care and its role in predicting carer behaviour.

Duty of Care to non-human animals can be defined as both the legal and ethical obligation of a person to reasonably satisfy the physical and psychological needs of animals in their care, thus facilitating a good state of welfare. The degree to which an individual accepts this premise is a fundamental belief with regard to our interactions with other animals. As such, according to psychological theory, this basic belief should sit within a hierarchy of cognitive elements that provide the internal motivation to care for one's dog. Through the amalgamation of Homer & Kahle's Cognitive Hierarchy Model, the Schwartz Theory of Basic Human Values, Ajzen's Theory of Planned Behaviour, and Hemsworth & Coleman's Animal-Carer Model, a hypothesised model of the Duty of Care paradigm was constructed, which served as the basis for the ensuing investigation.

A questionnaire was developed to evaluate the key elements of the hypothesised model. More specifically, the questionnaire aimed to explore the values and beliefs that underpin an individual's personal conception of Duty of Care, as well as how this relates to higher order attitudes, carer behaviour, and dog welfare. Seven specific carer behaviours encompassing both management and interactive behaviours were chosen for analysis: flea and worm prevention, veterinary checkups and vaccination, exercise, provision of enrichment items, petting, playing, and spending time. The

questionnaire was disseminated online utilising snowball sampling through social media with a total of 1,092 Australian companion dog carers surveyed.

Statistical analysis provided support for the hypothesised model, revealing strong pairwise relationships between the model elements. Values related to the welfare of both animals in general, as well as pets specifically, were good predictors of basic beliefs about dogs. In turn, beliefs about dogs, specifically their cognitive capacities and to a lesser extent, their status with respect to humans, were found to be good predictors of a person's beliefs about Duty of Care. These duty beliefs were in turn predictive of a person's general attitudes towards caring for their dog, behaviour-specific attitudes, carer behaviour, and dog welfare measures.

As the first of its kind, this study provides novel evidence for the important role of Duty of Care in companion dog care and welfare. These findings have useful applications for education and intervention strategies and highlight a range of topics for future investigation. While the present study has only begun to scratch the surface of this complex topic, it provides the basis for a new and exciting dimension of human-animal research.

DECLARATION

This is to certify that:

(i) this thesis comprises only my original work toward the Bachelor of Science with Honours,

(ii) due acknowledgement has been made in the text to all other material used,

(iii) the body of the thesis is less than 20, 000 words in length, exclusive of tables, figures, references and appendices.

Carmen Rose Glanville

Signed... Date....**20/10/2017**.............................

1. Introduction

1.1. Dog Welfare and Management

Non-human animals are an integral part of today's society, playing a number of different roles. For many people, the most prominent animals in their lives are their companion animals, those they share their homes and daily lives with. Pet keeping is widespread throughout almost all human cultures (Serpell and Paul, 1994). Indeed, 62% of Australian households accommodate a companion animal, the most popular being the domestic dog (*Canis lupus familiaris*) with a population of approximately 4.8 million nationally (Animal Medicines Australia, 2016). While the welfare of animals kept in other settings such as food production has become an issue of increasing societal concern, the welfare of companion animals has received far less attention from both the general public and the scientific community (Hosey and Melfi, 2014). Pets are typically perceived as having good welfare and most pet owners consider they care for them appropriately (Howell et al., 2016, Rohlf et al., 2010a). However, the limited information that is available on dog behaviour, management, lifestyle-related diseases, changing lifestyles, relinquishment, and neglect, suggest that pet dogs today face significant welfare challenges. For a comprehensive review of companion dog welfare see Hubrecht et al. (2017), Sandøe & Palmer (2016a), Sonntag & Overall (2014), or Stafford (2007),

While there are many factors that have the potential to influence the welfare of companion dogs, carer behaviour and management is likely to be the most influential (Stafford, 2007). Dogs have been selectively bred for millennia to maximise their affinity with, and consequently their dependency on, humans (Serpell, 2017a). Modern ownership practices render pet dogs almost completely reliant on their human carers to provide for both their physical and psychological needs. By keeping them in a captive environment and controlling access to key resources, humans dictate almost every aspect of their lives. In many cases human carers control when and what dogs eat; their opportunities for exercise, exploratory, and other natural behaviours; when and where they eliminate; what behaviours are deemed acceptable; and if, when, and with whom they can socialise or procreate.

The ways in which pet dogs are kept and managed in today's society vary dramatically (Kobelt et al., 2003). Where working dogs in the past spent the majority of their time in close association with their owner or handler, performing mentally stimulating tasks and engaging in physical activity, the majority of dogs today are confined to backyards and left alone for long periods of time with little to do (Howell et al., 2016, Kobelt et al., 2007). While most developed countries have legislation outlining basic care requirements, enforcement of such regulations is difficult, with compliance being largely voluntary (Rohlf et al., 2010a). In the livestock industries, stockpersons are typically required to undertake training and must adhere to various codes of practice. They are further motivated to provide the best care for their animals due to the link between animal welfare, productivity, and ultimately profit (Hemsworth and Coleman, 2011). Companion animal ownership is not subject to these conditions and it is left to the owner's discretion as to how the dog is managed on a day-to-day basis. These management decisions can have a significant impact on the dog's behaviour, health, and welfare (Rohlf et al., 2010a).

Another key aspect of carer behaviour that is likely to have a significant impact on dog welfare is the direct interactions they have with their dog that contribute to the quality of the human-animal relationship (HAR). Research in shelters and laboratories has repeatedly shown that positive human interaction reduces stress and is essential for dog welfare (Wells, 2004). Although very little work has been conducted in the home environment, one study by Kobelt et al. (2007) suggested that the quality of human-dog relationship (as characterised by the sum of interactions) may be even more important for dog welfare than the dog's physical environment.

Owing to the importance of both carer management and interactive behaviours for the welfare of companion dogs, understanding the general and specific human factors that underpin these behaviours may provide the best opportunity to improve dog welfare. Hence, the aim of this thesis is to identify and evaluate some of these factors.

1.2. Knowledge and Education

Mismanagement of companion animals is often thought to be the result of ignorance (RSPCA Victoria, 2016). In an attempt to improve pet management, a large number of organisations around the world have turned to educational programs and campaigns. These programs aim to equip carers with the knowledge to adequately care for their pets, typically focusing on management practices such as desexing and microchipping, as well as the day-to-day needs of pets. This knowledge is clearly an important factor, as being aware of an animal's needs is necessary in order to fulfill those needs. While standardised training and competencies exist for stockpeople (Coleman and Hemsworth, 2014), there is no such equivalent for companion animal carers. Consequently, the knowledge and skills of carers can vary dramatically. Although information is lacking, a few studies have highlighted an apparent lack of carer knowledge in relation to critical topics, including reproduction (Welsh et al., 2014), body condition (Howell et al., 2016, Rohlf et al., 2010b), body language (Kerswell et al., 2009), and pain management (Heuberger et al., 2016).

Fisher & Fisher (1992) proposed the Information-Motivation-Behavioural Skills model (figure 1) to account for the direct and indirect influence of both knowledge (information) and motivation on behaviour.
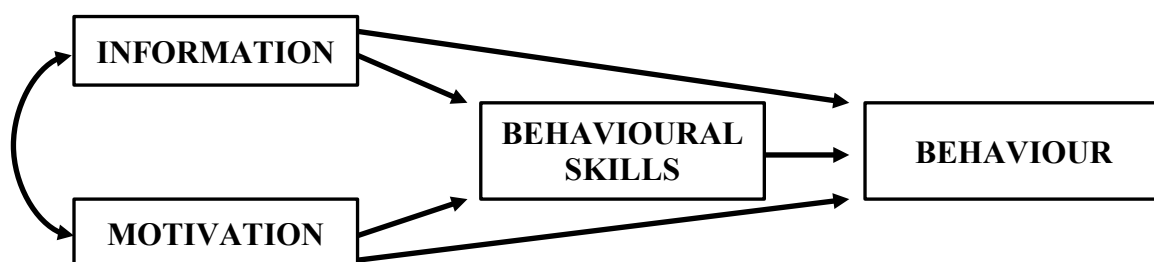
Figure 1 Fisher & Fisher's Information-Motivation-Behaviour Model [adapted from Fisher & Fisher (1992)]

However, empirical testing of this model found information to be a relatively poor predictor of behaviour in comparison to motivation. When a knowledge effect was found, it was either very small or had only an indirect effect as mediated by behavioural skills (Alexander et al., 2017, Fisher et al., 1994, Shrestha et al., 2017, Zhu et al., 2013). Indeed, despite its somewhat intuitive role, research has consistently

found knowledge to be ineffectual in predicting behaviour (Wallace, 2002). This lack of predictive value is particularly evident in studies of preventable disease and self-protective behaviours. Examples include the lack of relationship between knowledge of HIV/AIDS and engaging in safe-sex practices (Marie and Barry, 1997), knowledge about colorectal cancer screening and actual screening behaviour (Guerra et al., 2005), knowledge about diabetes and compliance with an appropriate health regime (Chan and Molassiotis, 1999), knowledge about osteoporosis and partaking in preventative measures such as exercise and appropriate calcium intake (Wallace, 2002), and knowledge about the negative effects of alcohol and drinking behaviour (Ajzen et al., 2011). Outside of self-protective behaviours, environmental knowledge has also been shown to have no effect on energy conservation behaviours (Ajzen et al., 2011). Furthermore, in 2008, Switzerland introduced legislation making it mandatory for all dog owners to attend practical and theoretical training. However, this was repealed in 2016 after a review found the measures had little influence on carer behaviour (Swiss Info, 2016). These examples suggest that increasing carer knowledge about responsible dog care, will not guarantee the translation of that knowledge into positive management behaviours. Importantly, subjects must be sufficiently *motivated* to perform the behaviours in question. Behavioural motivation has been conceptualised in many ways, most notably by Icek Ajzen's Theory of Planned Behaviour.

1.3. Attitudes, Intentions, and Behaviour: The Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB) is one of the most influential and widely cited models of human behaviour (Ajzen, 2011). The TPB employs a cognitive approach to predict volitional behaviour, linking specific behaviours with their underlying causal factors. It is an extension of Fishbein and Ajzen's Theory of Reasoned Action which identified the immediate determinant of behaviour to be a person's *intention* to perform that behaviour (Ajzen, 1985). That is, where a particular behaviour is under the person's volitional control, they will usually do what they intend. A person's intention is considered to encompass the various underlying cognitive elements that are relevant to the behaviour in question (Ajzen, 1991). These cognitions include behaviour-specific beliefs and attitudes, which will be discussed in

greater detail shortly. The TPB built upon this concept by incorporating the influence of *perceived behavioural control* on behaviours that may have incomplete volitional control. Hence, according to the TPB, behaviour is driven by both *intention* and *perceived behavioural control* (figure 2).
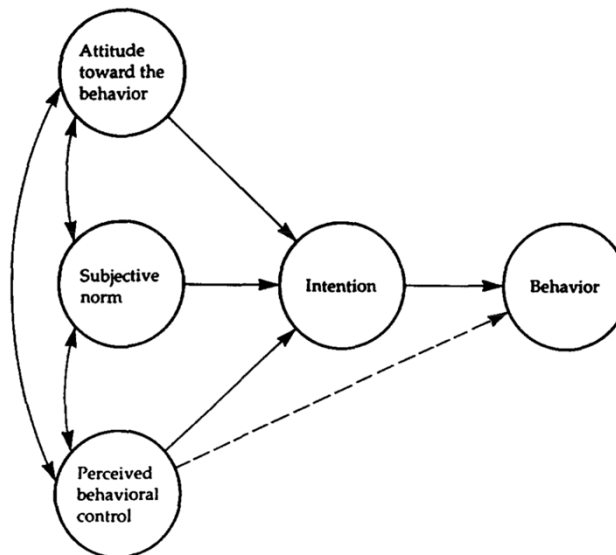
Figure 2 The Theory of Planned Behaviour (Ajzen, 1991)

As shown in figure 2, behavioural intention is in turn the product of 3 specific cognitive elements: *attitude towards the behaviour, subjective norms,* and *perceived behavioural control.* Importantly, unlike other attitudinal models, these attitudes are specific to the behaviour in question. A person's *attitude towards the behaviour* is a personal evaluation of the behaviour and its outcomes as positive or negative. *Subjective norms* refer to the individual's perception of social pressures combined with their inclination to comply with such pressures. Finally, *perceived behavioural control* reflects the perceived level of difficulty in performing the behaviour and the extent to which the individual has control over achieving the behaviour. This factor has an influence on both behavioural intention and behaviour itself. Notably, the relative importance of the three elements will vary across situations and with different target behaviours (Ajzen, 1991).

While empirical testing has found these attitudinal elements to be the best dispositional predictors of behaviour, we are often more interested in *explaining* or *understanding* behaviour. Hence the question is then, where do these behaviour-

specific attitudes come from? Figure 3 provides a detailed representation of the precursors to attitudes according to the TPB.
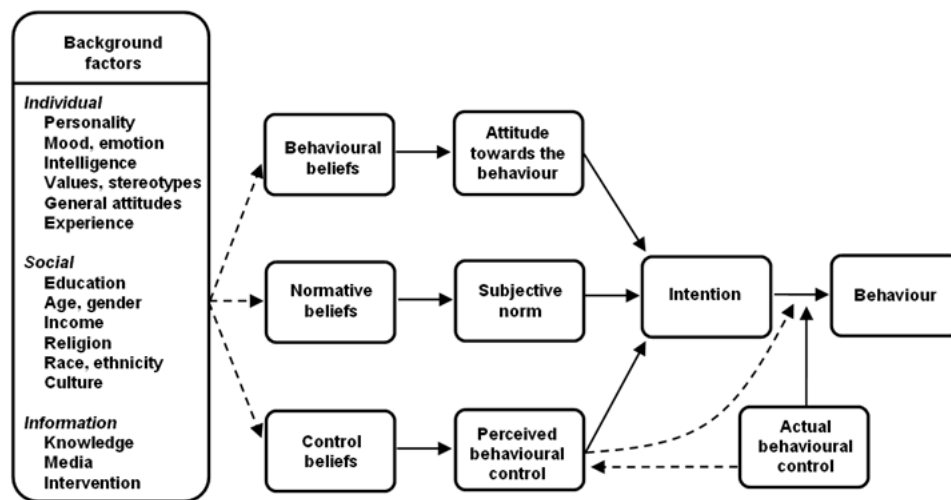
Figure 3 An expanded representation of the Theory of Planned Behaviour with the precursors to attitudes (Adapted by Hemsworth and Coleman, 2011, from Albarracin et al., 2005)

As demonstrated in figure 3, the three attitudinal factors are a direct product of their associated salient beliefs. Beliefs are personal perceptions of truth, or subjective facts, and serve as the basis of attitudinal evaluations. *Behavioural beliefs* are ideas about how the behaviour in question relates to particular outcomes. For example, dog carers may believe that walking their dog (behaviour) makes their dog happy (outcome). Individual attitudes towards the behaviour then arise from the evaluation of the outcome (whether it is positive or negative) and the strength of the association between the behaviour and the outcome. Where a person believes a behaviour will lead to positive outcomes, they will typically hold positive attitudes towards that behaviour, while the opposite is true for negative outcomes (Ajzen, 1985). Subjective norms are informed by *normative beliefs*; that is, beliefs about how other people whose opinions matter to them (e.g. friends or family) would expect them to behave. If a person believes that important others would expect them to perform a certain behaviour and they have a desire to comply with such expectations, this would result in perceived social pressure to do so: a positive subjective norm. Finally, perceived behavioural control is determined by a person's *control beliefs*, which are beliefs about any factors that affect their control over successfully performing the behaviour. These may include internal factors such as self-efficacy, will-power, personal skills

and abilities, emotions, and compulsions, as well as external situational factors such as time, opportunity, resources, and dependency on others (Ajzen, 1985). Importantly, attitudes cannot be directly measured, but can be inferred from a person's responses to statements regarding these salient beliefs (Hemsworth and Coleman, 2011). Hence, a person's intention to perform a specific management behaviour, such as walking their dog, could in theory be accurately predicted from their responses to belief statements that target these three types of beliefs. For example, 'Walking exercise is important for dogs to be happy and healthy', 'My family would expect me to walk my dog regularly', and 'I don't have the time to walk my dog as often as I should'.

1.4. Application of the Theory of Planned Behaviour

A substantial body of work has applied these principles in animal care settings and supports the predictive value of beliefs and attitudes in animal management behaviour (Hemsworth and Coleman, 2011). The majority of this work has been conducted in the livestock industries with regard to animal handling. Various studies with pigs, broiler chickens, laying hens, and dairy cattle have found that the attitudes of stockpeople, as measured by a series of belief statements, reliably predict handling behaviour (Hemsworth and Coleman, 2011). Negative attitudes towards interacting with these animals are correlated with negative handling behaviours (Hemsworth and Coleman, 2011). Such negative handling leads to increased fear of humans, which in turn, through the physiological effects of chronic stress, causes suppression of growth, reproductive processes, and immune function (Hemsworth et al., 2009). Furthermore, positive attitudes are correlated with positive handling behaviours, low levels of fear, increased production (eggs and milk), growth, reproductive success, and stronger immune systems (Hemsworth and Coleman, 2011).

With regard to companion animals, a handful of studies also support the important role of attitudes in management behaviour. Rohlf et al. (2010) found that subjective norms were the most frequent independent predictor of a range of dog management practices including registration, microchipping, desexing, and socialisation. Furthermore, the belief that socialisation, microchipping, and desexing is difficult (i.e. negative perceived behavioural control), significantly reduced the likelihood of those management practices being performed (Rohlf et al., 2010a). Blackshaw and Day

(1994) similarly found that owners who failed to desex their dogs held negative attitudes towards desexing as reflected by belief statements that it is unnecessary, expensive, or that they don't agree with the practice. Based on their extensive work in this field, Hemsworth & Coleman have proposed the following model (figure 4) of the animal-carer relationship (Hemsworth et al., *in press*). The present model builds on their previously published and highly influential model of stockperson-livestock interactions to incorporate management behaviours.
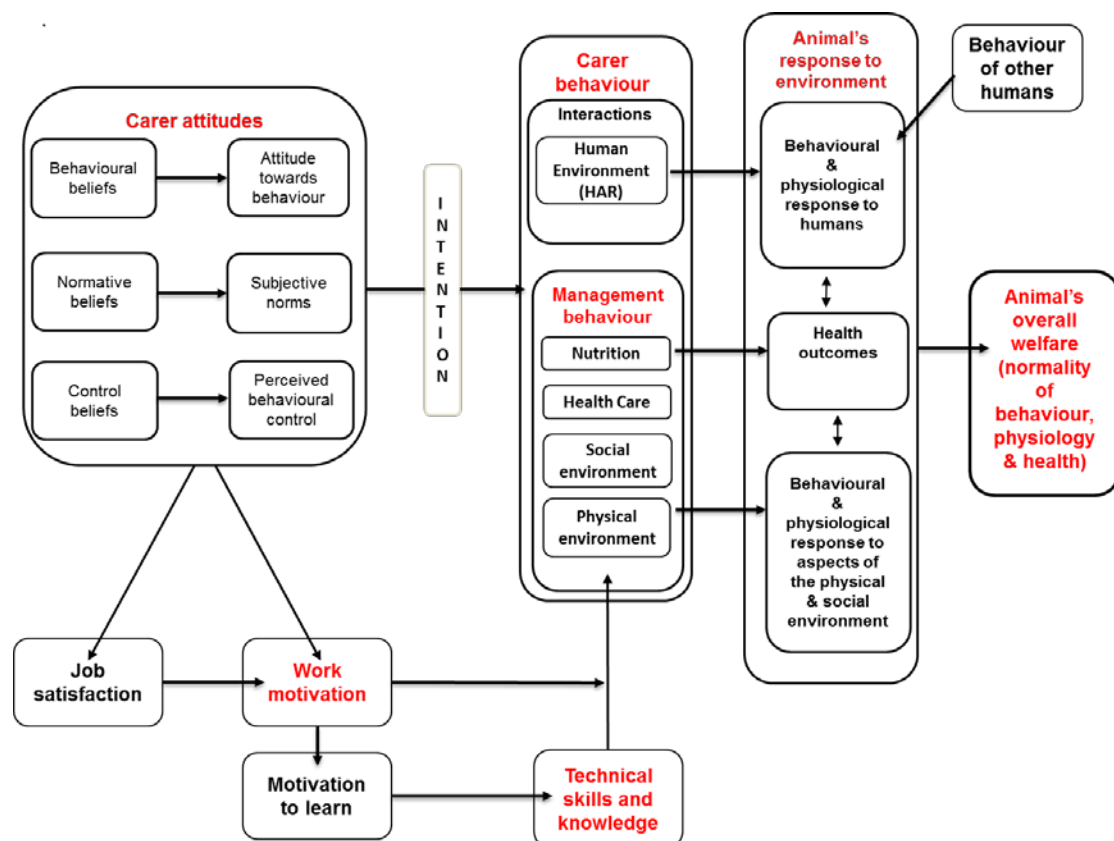
Figure 4 Hemsworth and Coleman's model of the animal-carer relationship (Hemsworth et al., *in press*)

In all, the current evidence highlights the importance of attitudes and their salient beliefs in animal management and handling behaviour. However, little work has attempted to delve deeper into what cognitive factors inform these behaviour-specific attitudes. In other words, what sits to the left of the model presented above in figure 4? The TPB lists a range of background factors that are thought to influence these behaviour specific attitudes (figure 3). Indeed there is some correlational evidence of various human characteristics influencing attitudes to animals, animal management, and animal behaviour. These include age (Howell et al., 2016, Kubinyi et al., 2009),

gender (Degeling et al., 2012, Kubinyi et al., 2009, Taylor and Signal, 2005, Vitulli, 2006), education (Dotson and Hyatt, 2008), experience (Bennett and Rohlf, 2007, Jagoe and Serpell, 1996, Kobelt et al., 2003), marital status (Marinelli et al., 2007), culture (Blouin, 2013, Serpell, 2009), and various personality traits (Furnham et al., 2003, Hemsworth, 2003). Although these are interesting findings and help to inform how attitudes develop, many of these demographic factors are historical and unable to be changed. Hence, when the ultimate goal of understanding animal management behaviour is to alter this behaviour in some way, our focus should arguably be on the *cognitive* aspects that are learned and open to intervention.

Although these cognitive factors are acknowledged in the TPB, they are perhaps more clearly articulated by the Cognitive Hierarchy Model (CHM) also known as the values-attitude-behaviour hierarchy (Homer and Kahle, 1988). This theory identifies core values as the cognitive foundation from which increasingly specific beliefs and attitudes develop, ultimately leading to behaviour (figure 5).

TPB elements

- Behaviour
- Behavioural Intention
- High Order Attitudes and Norms
- Multiple Levels of General Attitudes and Beliefs
- Basic Beliefs
- Values

- A Great Many
- Peripheral
- Faster changing

- Very Few
- Central
- Slow changing
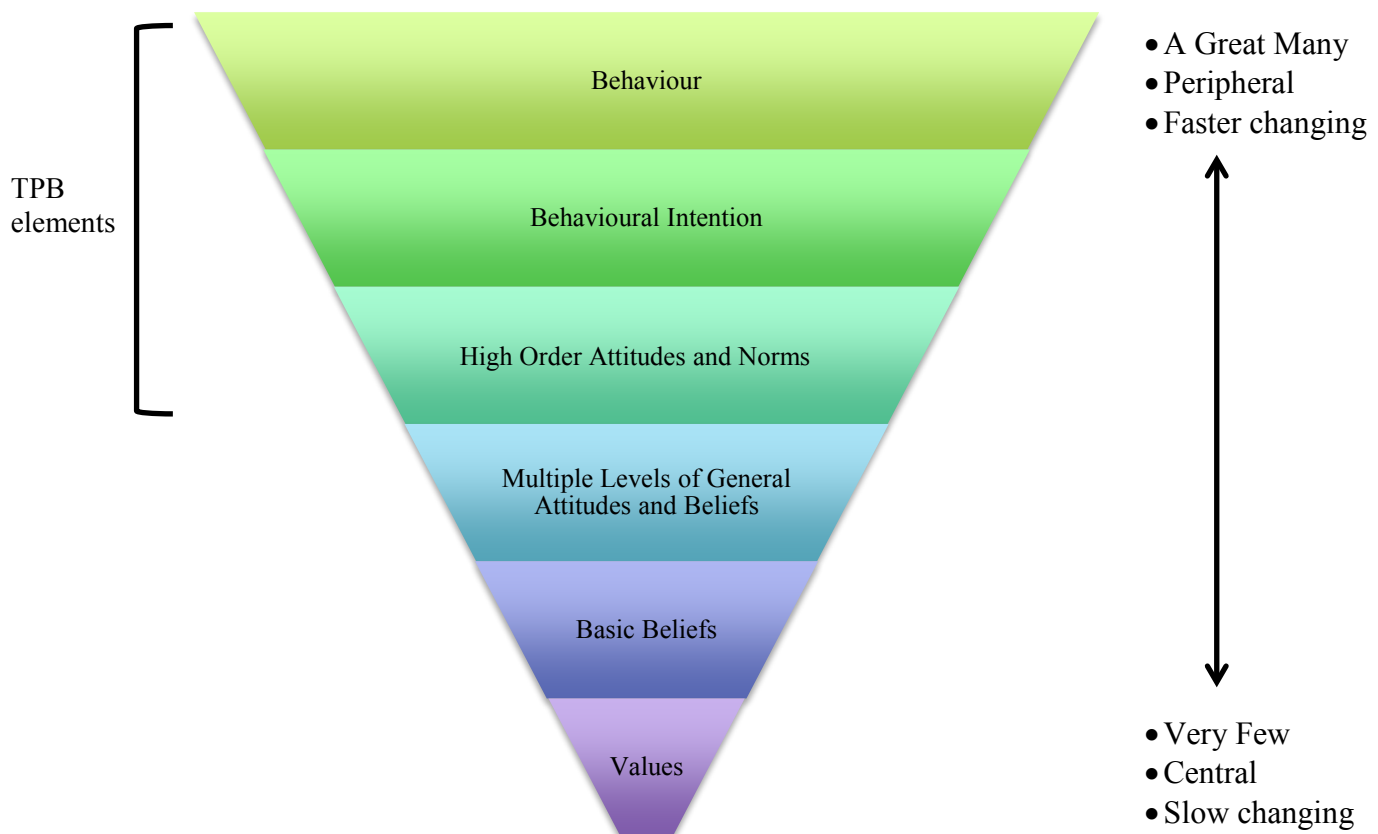
Figure 5 Homer & Kahle's Cognitive Hierarchy Model adapted from Fulton et al. (1996)

1.5. Values: The Cognitive Foundation of Behaviour

Values are the overarching guiding principles in an individual's life and can be considered as trans-situational goals that motivate action in order to achieve those goals (Schwartz et al., 2012). Unlike attitudes and beliefs, values are abstract, non-specific, and fairly stable in nature (Fulton et al., 1996). Furthermore, they are considered to be relatively universal and few in number. The most prolific and influential voice on this topic, Schwartz, considered this to be because of their derivation from three basic requirements of human existence: 1) the needs of individuals as biological organisms, 2) requisites of coordinated social interaction, and 3) the functioning and survival of groups (Schwartz, 1994). From these three basic needs, Schwartz originally proposed 10 motivationally distinct human values: Self-direction, Stimulation, Hedonism, Achievement, Power, Security, Conformity, Tradition, Benevolence, and Universalism (Schwartz, 1992). These have since been expanded to include a number of subtypes for more accurate evaluation (Schwartz et al., 2012). Table 1 lists and defines these 19 values in terms of their relevant motivational goal.

Table 1 Schwartz 19 Basic Human Values (Schwartz et al., 2012)

Value	Conceptual definition in terms of motivational goals
Self-Direction (thought)	Freedom to cultivate one's own ideas and abilities
Self-Direction (action)	Freedom to determine one's own actions
Stimulation	Excitement, novelty, and change
Hedonism	Pleasure and sensuous gratification
Achievement	Success according to social standards
Power (dominance)	Power through exercising control over people
Power (resources)	Power through control of material and social resources
Face	Security and power through maintaining one's public image and avoiding humiliation
Security (personal)	Safety in one's immediate environment
Security (societal)	Safety and stability in the wider society
Tradition	Maintaining and preserving cultural, family, or religious traditions
Conformity (rules)	Compliance with rules, laws, and formal obligations
Conformity (interpersonal)	Avoidance of upsetting or harming other people
Humility	Recognising one's insignificance in the larger scheme of things
Benevolence (dependability)	Being a reliable and trustworthy member of the in-group

Benevolence (caring)	Devotion to the welfare of in-group members
Universalism (concern)	Commitment to equality, justice, and protection for all people
Universalism (nature)	Preservation of the natural environment
Universalism (tolerance)	Acceptance and understanding of those who are different from oneself

Empirical testing has found these values to be universal across human cultures, though the relative importance placed on each value varies (Schwartz et al., 2012). It is this difference in value priorities that leads, in part, to the varied attitudes and behaviour of people despite the universal nature of the values themselves.

A central element of the Schwartz Theory of Basic Human Values is the structuring of values as a circular motivational continuum (figure 6) (Schwartz et al., 2012). This reflects the dynamic relationships between the different values and any actions in pursuit of them. Actions serving those values positioned next to each other are relatively compatible, while those opposite each other are typically conflicting. For example, actions of benevolence and universalism would typically be compatible as they are both concerned with the welfare of others, yet they may conflict with the pursuit of such self-focused values as achievement and power.

Figure 6 Circular motivational continuum of the 19 Schwartz values with bipolar organisational dimensions [adapted from Schwartz et al. (2012)]

Schwartz's circular model also highlights that the motivational bases of values are continuous rather than discrete and can be further organised in terms of two bipolar motivational dimensions: self-enhancement vs. self transcendence and conservation vs. openness to change (figure 6).

Importantly, values serve as a set of standards or criteria for the evaluation of specific circumstances and the subsequent development of attitudes (Schwartz, 1992). As mentioned previously, attitudes are evaluations of beliefs about an attitude object[1] as positive or negative. Values serve as the criteria by which we evaluate these objects. If our beliefs about an attitude object are consistent with our values or serve to attain a value-based goal, we will evaluate that object positively and have a favourable attitude towards it. On the contrary, if the attitude object is perceived to be contradictory to our values or inhibits attainment, we will evaluate it negatively and have an unfavourable attitude towards it. In this way, values have an indirect but important influence on behaviour through their effect on attitudes.

The role of values in guiding and influencing animal management attitudes and behaviour has not been previously investigated. However, there has been some research into the values that underlie attitudes towards animals in other contexts, including wildlife conservation (Dietz et al., 2017, Fulton et al., 1996) and animal-derived food choices (Cembalo et al., 2016, Hayley et al., 2015). Those that utilise the Schwartz model have found that the values related to self-transcendence (Universalism and Benevolence) are associated with more favourable attitudes and actions with regard to animals and animal welfare (Cembalo et al., 2016). Furthermore, those who place higher value on Power and Security have more negative attitudes towards reducing meat consumption (Hayley et al., 2015).

Interestingly, with the exception of Universalism (nature), all of the currently identified values within the Schwartz framework are human-focused. While investigating values with regards to environmental-decision making, Dietz et al. (2017) identified a 'concern for animals' value orientation. Critically, they found this to be distinct from other human and nature-focused values commonly cited in this

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[1] Attitude objects refers to anything that could be evaluated including, but not limited to, people, animals, behaviours, concepts, and events.

field of research. Indeed, connectedness with other animals has been described as a basic human need (Hosey and Melfi, 2014). The Biophilia hypothesis, made popular by Edward O. Wilson, asserts that humans have an innate and biologically-based attraction to other forms of life, including other animals (Coleman et al., 2016). Hence, as values stem from basic human needs, it is likely that there are basic human values with regard to non-human animals that are absent from the dominant value theories. The identification of these may aid in explaining the range of attitudes people have towards animals and caring for them.

1.6. General Beliefs and Attitudes

Immediately adjacent to values in Homer & Kahle's cognitive hierarchy are 'basic beliefs' and 'multiple levels of general attitudes and beliefs' (figure 5). These general cognitions are the link between abstract basic values (Schwartz) and behaviour-specific attitudes (TPB). With regard to dog management behaviour, such general attitudes would logically include an individual's beliefs about and attitudes towards animals and dogs themselves.

1.6.1. Animal Qualities

It is widely accepted that human attitudes towards animals are heavily affected by various qualities of the animal itself. Perceived similarity to humans tends to stimulate feelings of empathy (Hills, 1995). Identification in animals of those attributes that humans value in themselves is associated with more positive attitudes towards them (Serpell, 2004). One particularly important attribute of animals is their cognitive capacities. Indeed, studies have shown a positive relationship between an individual's beliefs about the extent to which animals have awareness, thoughts, and feelings, and their empathy for those animals (Hills, 1995). Furthermore, greater levels of 'belief in animal mind' are also related to reduced support for animal use (Knight et al., 2004).

In general, dogs tend to be perceived quite favourably in this regard (Davis and Cheeke, 1998, Howell et al., 2013). Of a range of animals, Wilkins et al. (2015) found that people considered dogs to be the most likely to experience both primary emotions

(joy, fear, anger and sadness) and secondary emotions (pride, guilt, jealousy) (figure 7).
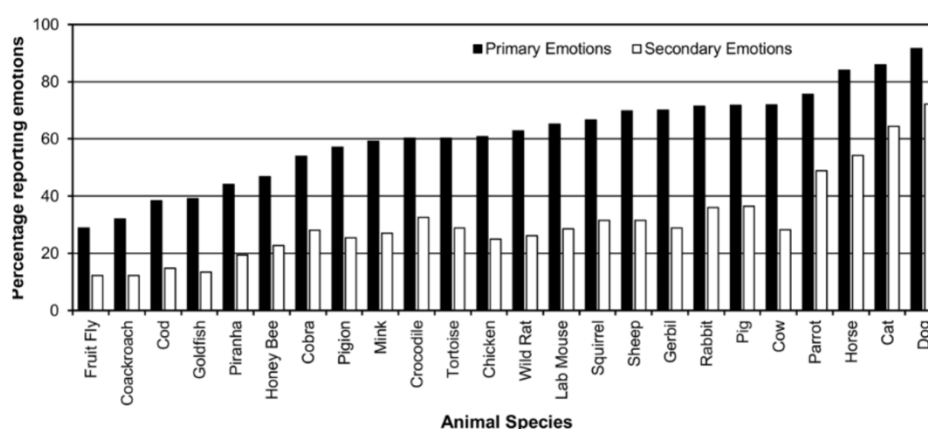
Figure 7 Attribution of primary emotions (joy, fear, anger, sadness) and secondary emotions (pride, guilt, jealousy) to different animal species (Wilkins et al., 2015)

In a survey of psychology students, both dog-owners and non-dog-owners considered that dogs have souls and can feel love and compassion (Vitulli, 2006). From a range of animals, dogs have also been rated the most intelligent (Davis and Cheeke, 1998), the most likely to have an afterlife (Royal et al., 2016), and are thought to be able to understand how their owners are feeling (Howell et al., 2013, Maharaj and Haney, 2015, Vitulli, 2006). Howell et al. (2013) also reported that 45.7% of dog owners surveyed considered dogs to have the intelligence of a 3-5 year old human child. In the same survey, belief in canine cognitive ability was positively correlated with emotional owner-dog closeness (Howell et al., 2013).

1.6.2. The Role of the Dog

Another concept that frequently appears in the literature concerning attitudes towards dogs is the dog's role or status. Companion dogs are viewed in a range of different ways: as property, prized possessions, ornamental objects, play things, status symbols, mutual benefactors, guardians, teachers, family members, companions, or surrogate children (Hens, 2009, Hurn, 2012, Sandøe et al., 2016). Despite this wide range of attitudes that exist, Blouin (2013) identifies 3 fundamental patterns of attitudes towards companion dogs, which he refers to as the 'dominionist', 'protectionist', and 'humanist' orientations. While these attitude orientations are quite general in nature

and, in reality, most people will hold a view based on a combination of them, they provide a useful framework for discussion of a complex topic.

Dominionists consider dogs to be inferior to humans and value them primarily for their utility. They tend to view them as 'objects' rather than 'subjects' and may not consider dogs to have interests of their own. In keeping with the traditional Western world-view, these types of attitudes are informed by the categorical division between humans and other animals. This may be the result of a range of beliefs such as that animals don't have souls, they aren't intelligent, that they exist to serve humans, or that they are the property of humans. As Hens (2009) asserts, this type of carer-dog relationship may be characterised by the owner's 'desire to dominate'. Alternatively, it may be perceived in terms of a type of mutual/symbiotic relationship whereby the dog provides a service and in return we care for them. Although they typically have some degree of affection for their dogs, of the three attitude orientations, dominionists have the lowest regard for dogs themselves.

Humanists consider their own dogs to be surrogate humans not 'just animals' and value them for their companionship and unconditional love. They form strong emotional attachments with individual animals and often refer to their pets as their 'children' or 'fur babies'. In these instances, dogs have transcended the human-animal divide and adopted a quasi-human status (Serpell, 2017b). They are heavily anthropomorphised and often 'spoilt' with toys, accessories, and premium foods. Although humanists care deeply for their dogs, there remains a strong element of anthropocentrism. These relationships are fundamentally based, perhaps subconsciously, on the owner's wants and needs and what the dog/s provide them emotionally. Furthermore, the humanist's concern and love for animals is reserved for their own dog, rather than animals in general.

Finally, protectionists have a deep respect for *all* animals, including dogs, considering them to have intrinsic value in and of themselves. Importantly, they believe other animals have an equal moral standing to humans and respect them not only for their similarities to humans, but also their differences. They recognise that dogs and all animals are different to humans, but unlike dominionists do not consider this to mean that they are morally inferior. They view dogs as valued companions or family

members, forming strong relationships that focus on the animal's needs as opposed to that of the human.

Table 2 outlines how these different attitude orientations may influence various aspects of dog management and the carer-dog relationship. However, this is yet to be empirically tested.

Table 2 Generalised dog owner attitude orientations (Blouin, 2013)

Attitude/Behavior	Humanistic	Protectionistic	Dominionistic
Status of Own Dog(s)	Elevated status. Equal to humans. Cherished pet, child	Elevated status. Equivalent or superior to humans	Below humans
Owner's View of Self	Parent, friend	Caretaker, guardian, companion	Owner, boss
Role of Dog(s) in Household	Cherished child, best friend	Best friend, companion	Useful in some capacity, such as for protection, entertainment
Attitudes toward Other Animals	Concern is with own dog. May be partial to dogs in general, but indifferent to other animals	Universal concern for welfare of animals	Different types of animals have different purposes. Indifferent about animal welfare
Animal Advocacy Involvement	Limited. May give to dog or cat related causes	Often volunteer for, and/or give money to, organizations and causes	Rare. May give to dog- or cat-related causes
Dog's "Home"	Usually inside. Sleeps in owners' bed or has bed of own	Varies. Inside and/or outside. Whatever is "best" for dog	Often kept outside. Varies based on dog's role
Veterinary Visits	Often. More than once a year, but even more for older dogs	Often. More than once a year, but even more for older dogs	Rarely. Once a year or less
Relinquishment Attitudes and Practices	Would never relinquish current dog, but may have done so in past, with less cherished pets	Would never relinquish. Consider such behavior mistreatment	Likely to relinquish dog if dog becomes inconvenient or problems arise
Reaction to Pet's Death or Impending Death	Very difficult. May dissuade from having another dog in the future. Likely to attempt to delay pet's death	Very difficult. Have dog's interest in mind when dealing with end of life situations	Difficult, but dog can be replaced

In Australia, there has been a significant shift in attitudes towards the role of dogs and it would appear that the majority of dog owners now employ some version of a humanistic or protectionsitic orientation towards their dogs. Even within the last decade, the number of owners considering their dog to be 'part of the family' has increased from 59% in 2013 to 65% in 2016 (Animal Medicines Australia, 2016). We have seen the emergence of the 'fur-baby' and dog owners are increasingly identifying as 'parents' (Greenebaum, 2004, Maharaj and Haney, 2015). This change in attitudes is also reflected by the recent boom in pet related services and a 42%

increase in pet-related expenditure between 2013-2016, now equaling $12.2 billion a year (Animal Medicines Australia, 2016). The same report showed that a further 24% of Australians consider their dogs to be 'companions', while 6% are 'fun for the children', and 2% are 'ornamental'. So although the majority of dogs are considered to be members of the family, there remains a range of attitudes within the Australian dog-owning community.

While there has been a reasonable amount of work looking at attitudes towards dogs, there is a dearth of information regarding how this actually affects carer behaviour and animal welfare. Although the evidence outlined here suggests that people *generally* have more favourable attitudes towards pet dogs than other animals, *individual* beliefs and attitudes are often complex, inconsistent, and can vary significantly (O'Farrell, 1997, Serpell, 2017b). It is these differing individual attitudes and beliefs that are likely to influence and help explain variations in management behaviour and direct human-dog interactions that contribute to the human-animal relationship. Furthermore, there has been little work looking at other potentially important beliefs, specifically those that inform attitudes about *caring* for one's animals, not just about the animals themselves. One such concept that is prevalent in animal protection discourse and fundamental to our relations with other animals, yet has received no attention in the scientific literature, is Duty of Care (DoC).

1.6.3. Duties to Non-Human Animals

Duties to non-human animals have been a topic of controversy for centuries. For many years, mainstream ethical discourse (influenced heavily by philosophers such as René Descartes and Immanuel Kant) maintained that humans have no direct duties to non-human animals owing to the latter's lack of moral status (Sanders, 1999). Animals were denied ethical consideration or entry into the 'moral community' for a number of reasons including their supposed lack of autonomy, rationality, or consciousness. Judeo-Christian views further informed a hierarchical view of the world whereby all other animals existed to serve humans. However, there has been a gradual shift in societal attitudes towards the treatment of animals, which has been reflected in the introduction and evolution of animal protection legislation around the world. With the Cruel Treatment of Cattle Act of 1822, Britain became the first

country to adopt some form of national animal protection legislation (Eadie, 2011). Early legislation such as this was enacted to protect animals from wanton acts of cruelty, but did not recognise humans as having any particular obligations with regard to their care or management. Furthermore, early conceptions of duties to animals were often of an indirect nature, whereby harming an animal was deemed wrong, as in doing so one would harm their owner.

With the intensification of animal production and the rise of 'factory farming', public concern for animal welfare began to increase in the 1960's, particularly fueled by Ruth Harrison's seminal book 'Animal Machines' in 1964 (Sandøe et al., 2016). In response, the Brambell Report, commissioned by the British Government, was released in 1965 with recommendations for animal treatment that were later developed into the '5 freedoms' (table 3).

Table 3 The 5 Freedoms and Associated Provisions (Mellor 2016)

Freedoms	Provisions
1. Freedom from thirst, hunger and malnutrition	By providing ready access to fresh water and a diet to maintain full health and vigour
2. Freedom from discomfort and exposure	By providing an appropriate environment including shelter and a comfortable resting area
3. Freedom from pain, injury, and disease	By prevention or rapid diagnosis and treatment
4. Freedom from fear and distress	By ensuring conditions and treatment which avoid mental suffering
5. Freedom to express normal behaviour	By providing sufficient space, proper facilities and company of the animal's own kind

The acceptance of the 5 freedoms and the associated provisions required to achieve them sparked the shift from legislation simply prohibiting acts of cruelty to promoting a *Duty of Care* towards animals (Sandøe et al., 2016). Since Duty of Care first appeared in the British Agriculture (Miscellaneous Provisions) Act 1968, the idea that humans have certain obligations to care for other animals has been incorporated into animal protection legislation around the world (Eadie, 2011). In Australia, where this legislation is administered at the state level, there are differences in judicial approaches to such obligations. In Queensland, the Northern Territory and the Australian Capital territory, legislation explicitly states that a person in charge of an animal has a Duty of Care to them and breaching that Duty of Care is an offence.

However, in Victoria, New South Wales, Western Australia, and South Australia, the term Duty of Care is not used but those in charge of an animal do have certain responsibilities to care for them under the law.

1.6.4. Defining Duty of Care (DoC)

Although the term 'Duty of Care' is now frequently used in animal protection discourse, it is rarely defined in a consistent and comprehensive way. Hence, returning to the essence of what the phrase means is a helpful exercise. The term in itself is the product of two distinct concepts: duty and care. A *duty* is a moral or legal obligation arising from deontological or so-called 'duty-based' ethics. Where a duty exists, there is a commitment to some form of action[2] in order to fulfill one's obligations. In the case of DoC to animals, that action is for a person to provide *care* for animals[3] they are in charge of[4]. Care can be defined as "the provision of what is necessary for the health, welfare, maintenance, and protection of someone or something" (Oxford Dictionary, 2017). Health, maintenance, and protection can all be considered elements of animal welfare, which is a product of the animal's physical and psychological well-being. Thus, DoC can be defined as both the legal and ethical obligation of a person to reasonably satisfy the physical and psychological needs of animals in their care, thus facilitating a good state of welfare.

The degree of individual acceptance of this premise is in itself a basic belief, which is likely to be the product of a range of values and beliefs about animals themselves. Hence, with regard to psychological theory, DoC can be considered as a belief system that provides an internal motivation to care for animals through a cognitive hierarchy of increasingly specific beliefs and attitudes. In such specific cases as pet ownership, an individual's personal beliefs with regard to DoC would theoretically translate into a more specific set of attitudes towards caring for one's own dog.

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[2] Refraining from action is also considered an action in itself, for instance in refraining from doing harm.

[3] The definition of 'animal' is specific to the legislation. Typically it includes all live vertebrates. Variations exist as to the inclusion of invertebrates but often include species of the classes Cephalopoda (octopi, squid) and Malacostraca (crabs, crayfish, lobsters, prawns).

[4] A person is typically considered 'in charge' of an animal if they are the owner of the animal or the animal is in their custody.

For such a fundamental concept with regard to the care and management of animals, DoC has received very little academic attention. In the field of animal welfare science, it is typically mentioned in passing, as more or less a given from which discussion of other aspects of management derive. Hence, an exploration of DoC and the role it plays in driving carer behaviour is warranted. This study will provide a preliminary investigation of DoC to companion dogs with three key aims:

1. Identify the values and beliefs associated with DoC in companion dog carers.
2. Evaluate the link between DoC, carer attitudes, management and interaction behaviours, and dog behaviour/welfare.
3. Develop a proposed model of the DoC paradigm that may be used to inform intervention/educational programs.

1.7. Hypothesised Model of the Duty of Care Paradigm

Through the amalgamation of the Cognitive Hierarchy Model, the Schwartz Theory of Basic Human Values, the Theory of Planned Behaviour, and Hemsworth & Coleman's Animal-Carer Model, a hypothesised model of the Duty of Care paradigm was constructed (figure 8). This model served as the basis of the ensuing investigation.
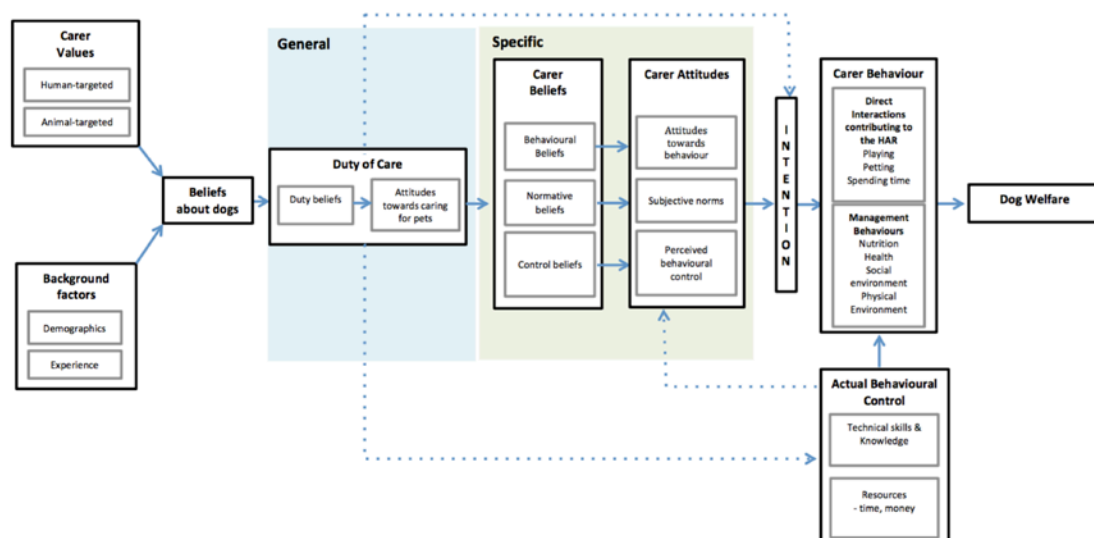
Figure 8 Hypothesised model of the Duty of Care paradigm

2. Methods

2.1. Human Research Ethics

The following research was conducted in accordance with the guidelines and regulations outlined in the *National Statement on Ethical Conduct in Human Research (2007).* Ethics approval (ID: 1749215) was granted by the University of Melbourne Veterinary and Agricultural Sciences Human Ethics Advisory Group.

2.2. Development of the Questionnaire

Using the hypothesised model as a conceptual framework, a questionnaire was developed to target each of the key elements of interest (appendix 1). These included basic demographics, universal values, beliefs about dogs, duty beliefs, general attitudes towards caring for dogs, behaviour-specific beliefs, reported carer management and interactive behaviours, and dog welfare. Figure 9 highlights in red, the components of the hypothesised model that were assessed in this study.
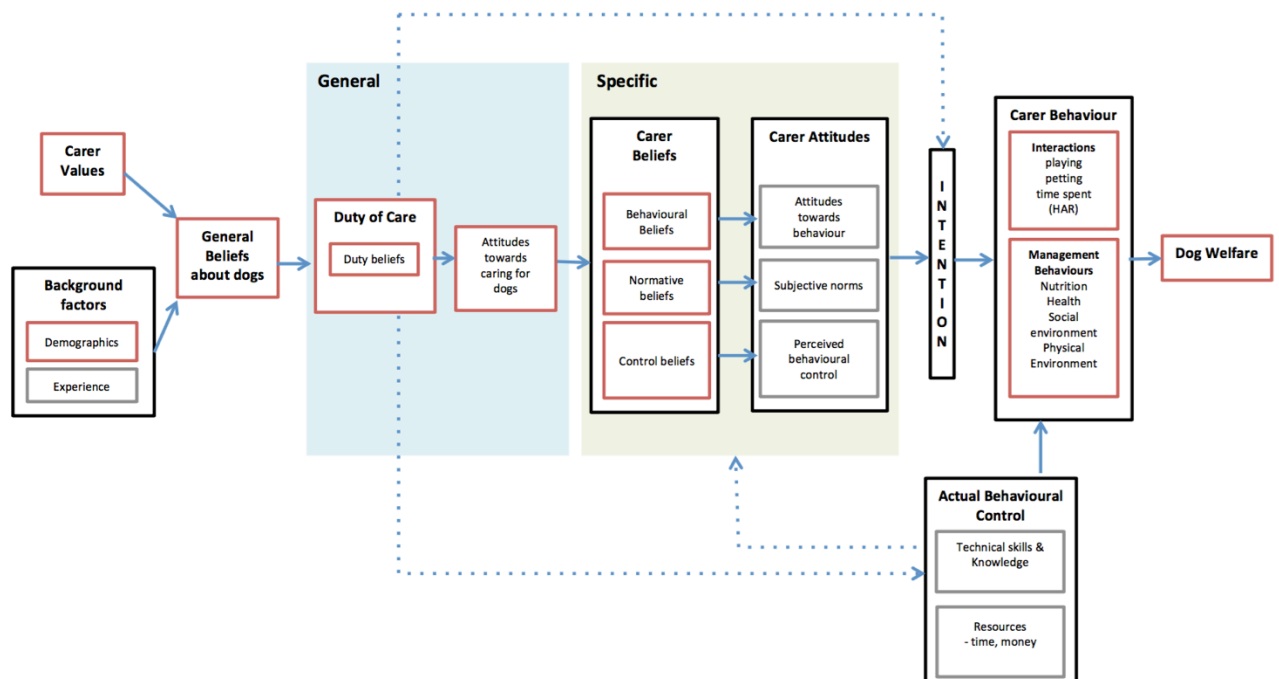
Figure 9 Components of the hypothesised Duty of Care model assessed in the present study (outlined in red)

The survey consisted of 171 items, the majority of which employed a 5-point Likert scale. As with any survey, compromises had to be made with regard to the desirable amount of information to be acquired and the length of the survey. Hence, using the existing literature as a guide, only concepts considered likely to be particularly influential and directly related to DoC were included.

2.2.1. Values

The Schwartz Portrait Value Questionnaire (PVQ) (Schwartz et al., 2012) was used to assess basic values. The PVQ provides short 'portraits' of different people. The questionnaire was programmed so that the pronouns used in the portraits matched the respondent's identified gender. An example portrait is: 'It is important to her to be loyal to those who are close to her'. The participant is then asked to indicate how much like them the person described is, using a 6-point scale ranging from 'not at all like me' to 'very much like me'. Each portrait relates to one of the 19 identified subtypes of basic values. However, including all 19 values (each with 3 portraits) would have rendered the questionnaire too long. Hence, only 3 original Schwartz values, with five subtypes, were retained: Benevolence (dependability and caring), Universalism (tolerance and concern), and Power (dominance). The values related to self-transcendence (Benevolence and Universalism) were included because of their previously identified connection to attitudes towards animals (Cembalo et al., 2016, Hayley et al., 2015). Power was also included because of the unequal power relationship between dogs and their owners, and the inverse relationship Power has with values of self-transcendence (Schwartz et al., 2012).

In order to investigate the concept of animal-specific values, a separate animal-targeted value was also developed for each of the original values used. As the human-focused Benevolence value relates to the 'in-group' or those with whom the person is in frequent contact, the animal benevolence subtype targeted pets. In contrast, human Universalism relates to the 'out-group', those outside of one's immediate social circle. Hence, 'all animals' was the target of this subtype. The devised animal value subtypes and their portraits are outlined in table 4.

Table 4 Devised animal specific values (female participant version)

Value	Value portraits
Power (Pets)	She wants her companion animal to obey her commands. Having control over her companion animal is important to her. It is important to her to be 'the boss' of her companion animal.
Benevolence (Pets)	It is important to her to care for her companion animal. She cares strongly about the welfare of her companion animal. She tries hard to understand and respond to her companion animal's needs.
Universalism (Animals)	She appreciates and respects all animals equally. She cares about the welfare of all animals. Protecting the welfare of all animals is important to her.

2.2.2. Dog Beliefs

In accordance with the literature on attitudes towards dogs, the beliefs targeted were those relating to dogs' capacities and position or role with regard to humans. Capacity items ranged from basic sentience such as 'dogs can suffer', to higher cognitive or emotional capabilities such as 'dogs are intelligent' and 'dogs can feel love'. Beliefs about the dog's position with regard to humans were evaluated with statements such as 'dogs exist to serve humans' and 'dogs aren't as important as humans'.

Participants were also asked to rate their general feelings towards dogs on a sliding scale from 0-100 where 0 was 'hate' and 100 was 'love'. This was included as a measure of generalised affect, which has been identified as an important component of attitudes towards animals (Serpell, 2004).

2.2.3. Duty Beliefs

Two separate sections were included to investigate two different elements of duty-based beliefs: *why* we have duties to dogs and *what* those duties are. These elements were included and analysed separately as it was thought that the reason for why a

person considers they have duties to their dog might inform the extent of what those duties are. For example, someone who thinks that they must look after their dog primarily because that is the law might understandably consider the extent of those duties to be somewhat basic as per the legislative requirements.

Respondents were asked to rank reasons as to why they have duties to their dogs in order from most important to least important. Statements were based on a number of distinct factors including social norms ('Obligations to dogs are socially expected'), personal relationships ('Because I love my dog'), and mutual interests ('It is a give-and-take relationship- the dog provides a service [companionship, guarding, work, guide etc.] and in return we look after them'). Beliefs about the extent of our duties to dogs were assessed on a 5-point Likert scale. Statements in this section ranged from one extreme 'We don't have any particular obligations or duties to our dogs', to the other 'We have a similar obligation to our dogs as we do to our children'.

2.2.4. Care beliefs (general)

Statements in this section targeted general beliefs about the amount of effort and knowledge required to care for dogs, as well as how carer behaviour impacts dogs. For example, 'Little knowledge is required to look after dogs' and 'How I manage my dog affects his/her behaviour'. In this way, this element aimed to evaluate the participant's general attitude towards caring for dogs.

2.2.5. Theory of Planned Behaviour (TPB)

In accordance with Hemsworth and Coleman's model of the animal-carer relationship (figure 4), both management behaviours and carer-dog interactions were considered. A total of four areas of carer behaviour were chosen for investigation: preventative health measures, enrichment, exercise, and interaction. These carer behaviours were chosen owing to their volitional nature; that is, they are not required by law. It was expected that such behaviours of a discretionary nature would be more likely to show variation within a sample and be affected by personal beliefs and attitudes. From the four management areas, seven specific behaviours were targeted (table 5).

Table 5 Chosen areas of carer behaviour and corresponding target behaviours

Management area	Target Behaviour
Preventative Health	Flea and worm prevention
	Veterinary check-ups and vaccination
Enrichment	Provision of toys and enrichment items
Exercise	Walking
Interaction	Spending time
	Playing
	Petting

Belief statements and a 5-point Likert scale were used to measure the three attitudinal elements of the TPB; attitudes towards the behaviour, subjective norms, and perceived behavioural control were measured by behavioural beliefs, normative beliefs, and control beliefs, respectively. To improve reliability, three separate items were used to assess each of the attitudinal elements for each target behaviour (3 items × 3 attitudinal elements= 9 items in total for each target behaviour). Behavioural beliefs focused predominantly on how important the behaviour was and how the behaviour impacted the dog. For example, "It is important to play with your dog" and "Playing with my dog makes them happy". Control belief statements focused on time, energy, and expense, including statements such as 'I don't have time to prepare enrichment items for my dog', 'Preparing enrichment items for my dog requires too much effort', and 'Dog toys and enrichment items are too expensive'. Finally, normative beliefs focused on three groups of people whose opinions were considered likely to be influential: friends, family, and veterinarians. Statements included 'My friends would think it unnecessary for me to walk my dog regularly', 'My family would expect me to walk my dog regularly', and 'My vet would disapprove if I didn't walk my dog'.

2.2.6. Reported Carer Behaviour

Questions in this section assessed the extent to which the owner engaged in each of the seven targeted carer behaviours. These were mainly frequency based ('How often do you actively play with your dog?') or yes/no questions ('Do you regularly provide

your dog with any toys, playthings or puzzles?'). Clarifying responses ('please specify') were required for some answers to account for different perceptions of what constituted a positive response. For example, if a participant responded 'yes' to 'Do you provide any other forms of environmental enrichment for your dog?' they were then asked to specify what that enrichment was. This was done because some people may consider, for example, having a large backyard or another dog as being environmental enrichment. While this may be true, in the context of management behaviour it is not an active provisionary behaviour on the owner's part, and hence, not the subject of this study.

2.2.7. Animal Welfare

Assessment of animal welfare included owner-reported health measures and behavioural measures. Health measures were chosen that related directly to the target management behaviours of flea and worm prevention (frequency of parasites) as well as veterinary checks (body condition scoring using pictures).

Participants were initially asked to identify whether their dog exhibited any behaviour that they considered to be a problem, and if so, to specify the behaviour. They were then asked to indicate on a 5-point scale from 'never' to 'always', how frequently their dog engages in a range of different abnormal behaviours. The behavioural measures included represent current understanding of those that may be indicative of a welfare problem (Hubrecht et al., 2017, Zawistowski and Reid, 2017). Additionally, only those dog behaviours that could be related to the target carer behaviours were included.

Walking, provision of toys and enrichment items, playing and spending time with your dog are all ways to enrich the dog's life, limit boredom, and channel natural behaviour in a positive way. Hence, dog behaviours that may arise as a result of boredom or a lack of stimulation in the absence of these carer behaviours were included in the survey. These included barking, howling, whining, destructive behaviour, escaping, overexcitement, constant running around, and obsessive behaviours/stereotypies (Hubrecht et al., 2017, Kobelt, 2004, Zawistowski and Reid, 2017).

Dog behavioural outcomes for carer interaction behaviours are less clear. Interaction behaviours such as petting, spending time with your dog, and playing contribute to the human animal bond, which in turn may have an effect on fear and anxiety related behaviours (Hemsworth and Coleman, 2011, Hosey and Melfi, 2014, Kobelt, 2004). Hence, commonly accepted indicators of anxiety in dogs were included, such as howling, whining, destructive behaviour, urinating or defecating in inappropriate places, escaping, nervousness, hiding, listlessness/depression, and obsessive behaviours such as pacing, tail chasing, spinning, obsessive licking, and obsessive biting (Sonntag and Overall, 2014).

Play is a natural and rewarding behaviour for dogs, indicative of a positive affective state, and was thus included as a measure of positive welfare. Behaviours such as aggression that may be indicative of a welfare issue, but could not be directly linked to the reported carer behaviours, were not included.

2.3. Delivery of the Questionnaire

The questionnaire was hosted on Qualtrics software and delivered online, targeting Australians who currently own a dog and are the primary carer for that dog. Distribution was achieved through existing networks using social media. The survey link was initially posted on the Animal Welfare Science Centre Facebook page and followers were encouraged to share the link on their own pages. The link was also shared in a number of interest groups on Facebook (both dog-related groups and unrelated groups, such as 'buy, swap, and sell' pages) in order to widen the sample obtained. In this way, sampling was achieved by snowball effect and was not a random or representative sample of Australian dog owners. However, as this study is concerned with intra-individual correlations (i.e. between a particular individual's values, beliefs, and actions), not prevalence or representative views, this form of convenience sampling is considered to be adequate.

Feedback was received shortly after the release of the survey with concerns that dog age was not included in the survey. This was subsequently added to the questionnaire within 2 days of it being released.

2.4. Statistical Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS). A total of 1092 survey responses were recorded, 768 of which included dog age. Responses with less than 40% complete (i.e. did not complete any sections past dog beliefs) were deleted leaving a total of 937 responses for analysis (705 completed and 232 partially completed). Partially completed responses were retained for analysis using pairwise deletion of data. Hence, the sample size for each analysis varied in accordance with the available data for those questions, which was at a minimum, 705.

The data were initially screened for obvious outliers. Only one value was deleted (a dog age of 613). Answers where the respondent had selected 'other' and left a text answer were also screened and amended if they logically fell within one of the prescribed responses. For example, one respondent listed a bachelor degree as 'other education' though this should have been recorded as 'university undergraduate (bachelor) degree'. Similarly, questions where clarification was required (i.e. yes-please specify) were screened to determine if the response truly constituted a 'yes'. For example, some participants selected that, yes, they do provide their dog with 'other toys' and 'other enrichment', but their clarifying text revealed these were things such as other dogs, children, sticks, or a backyard/large property. As mentioned previously, the focus of this study is *active* carer behaviour and these forms of toys or enrichment do not require an active provisionary behaviour on the carer's part, hence, these answers were amended to 'no'. A number of categorical variables were also recoded, as the order in which they were included in the survey and were subsequently automatically assigned values in SPSS was not logical or consistent. For example, answers to 'What is your highest level of education' were listed in the survey in the following order and were assigned those associated numeric values in SPSS: 1. Primary school 2. Secondary school 3. TAFE college 4. University undergraduate (bachelor) degree 5. University post-graduate degree 6. No formal schooling 7. Other. Please specify. In this way, no formal schooling had a higher numeric value than post-graduate degree. Hence, the answers were recoded so they were ordered from 0. no formal schooling to 6. Postgraduate degree. 'Other' was

allocated a value of 3, as all text responses indicated a diploma or certificate qualification.

Principal Component Analysis (PCA) was used initially to reduce the number of variables within a particular section of the questionnaire for subsequent analysis and identify underlying components. Sets of variables with multiple items measuring the same element of the model underwent PCA separately. Components with eigenvalues greater than 1 were extracted and small coefficients (absolute value less than 0.32) were suppressed (Tabachnick and Fidell, 2014, p.649). Either Varimax or Oblimin rotation was then used to find a solution that maximised individual loadings and minimised cross-loading of variables on multiple components. In accordance with convention, loadings of >0.71 were considered excellent, >0.63 very good, >0.55 good, >0.45 fair, and >0.32 poor (Tabachnick and Fidell, 2014, p.649). Variables that did not load were excluded from the solution and treated as independent variables. Component scores were then used for subsequent analyses.

Zero-order correlations (bivariate) were performed as part of an initial data screening to ensure linear relationships did exist before carrying out the subsequent multivariate statistics. These can be found in Appendix 2.

The extracted components and independent variables were then used for step-wise multiple regressions working pairwise through the various elements of the hypothesised model. This was done to determine the predictive power the variables within each element had with variables in the next element of the model. Figure 10 provides a diagrammatical representation of the regressions performed.
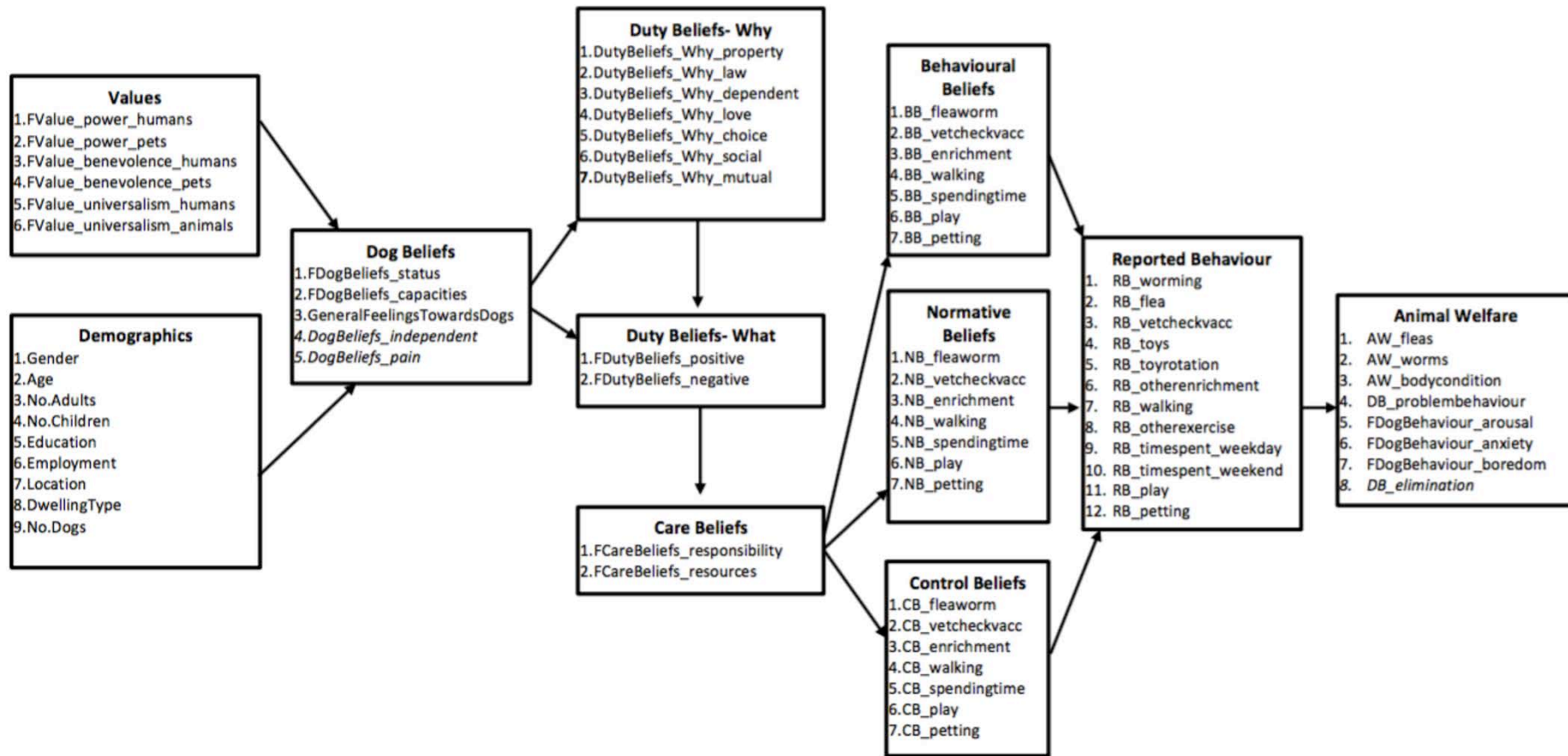
Figure 10 Graphical representation of regression analyses performed with each arrow representing a set of pairwise multiple regressions. Variables used within each element are numbered and variables beginning with 'F' were component scores.

Each individual regression was assessed to ensure that there was no gross violation of the assumptions of multicollinearity, homoscedasity, and normality. Multicollineary is considered present, and a violation of the underlying assumption, if the Variance Inflation Factor (VIF) is greater than 10 or the Tolerance is less than .10. Normality and homoscedasity were assessed using a Normal probability plot and a scatterplot of the regression standardised residuals.

As multiple regression can only have one dependent variable in any one analysis, it is not possible to get a broader picture of how sets of variables (model elements) are related. Consequently, canonical correlation analysis (CCA), which examines the relationship between multiple independent and multiple dependent variables, was used to assess the overall relationship between model elements. As the number of variables in each set is not a limitation for CCA, all original variables (questionnaire items) within each model element (see appendix 1) were used in these analyses as opposed to component scores. Significance was assessed using Wilks λ and effect size was determined by calculating the percentage of shared variance (R_c^2) accounted for by the whole canonical model. This can be found by taking $[(1-\lambda) \times 100]$ (Sherry and Henson, 2005). Finally, the overall canonical correlation coefficient (R_c), that is the correlation between the two model elements, was determined by taking the square root of the aforementioned R_c^2 value. In this way, the R_c represents the cumulative correlation of all canonical functions.

3. Results

3.1. Demographics

The majority of the 937 participants identified as female (80.6%), with 18.6% male, 0.3% non-binary/3rd gender and 0.5% undisclosed. Participants ranged from 18-83 years old, with an average age of 40 (SD= 13.73). Most were employed full time (52.5%), had some form of tertiary education (29.7% TAFE college, 29.3% Bachelor degree, 20.6% post-graduate degree) and lived in a house (74.2%) in suburbia (46.2%). In terms of dog ownership, most people cared for one (48.7%) or two (37.6%) dogs. Dogs ranged from 6 weeks to 20 years old, with an average age of 5.8 (SD= 3.9).

3.2. Principal Component Analysis (PCA)

PCA was performed for values (PVQ items), dog beliefs, duty beliefs (what), duty beliefs (why), care beliefs, TPB elements, and dog behaviour.

3.2.1. Values

All PVQ items loaded either very well or excellently on six extracted components, which accounted for 65.75% of the total variance (table 6). The two value subtypes of human-based benevolence (caring and dependability) loaded together on one component, as did the human-based universalism subtypes (tolerance and concern). Hence, the six extracted components logically corresponded to the broader value motivations assessed and were thus named accordingly: *Benevolence (humans), Power (humans), Universalism (humans), Benevolence (pets), Power (pets), and Universalism (animals)*.

Table 6 Component loadings for Portrait Value Questionnaire items. Components extracted using Principle Component Analysis with Oblimin rotation and Kaiser normalisation. Rotation converged in 10 iterations (n=730)

	Component					
PVQ item	Benevolence (humans)	Power (humans)	Benevolence (pets)	Universalism (animals)	Power (pets)	Universalism (humans)
Benevolence-caring						
Caring for the well-being of people they are close to is important to them.	.764					
They try always to be responsive to the needs of their family and friends.	.702					
It's very important to them to help the people dear to them.	.698					
Benevolence- dependability						
It is important to them to be loyal to those who are close to them.	.652					
They go out of their way to be a dependable and trustworthy friend.	.613					
They want those they spend time with to be able to rely on them completely.	.612					
Power- dominance						
It is important to them to be the one who tells others what to do.		.844				
It is important to them to be the most influential person in any group.		.830				
They want people to do what they say.		.825				
Benevolence- pets						
It is important to them to care for their companion animal.			.826			
They care strongly about the welfare of their companion animal.			.815			

They try hard to understand and respond to their companion animal's needs.		.738				
Universalism- animals						
They appreciate and respect all animals equally.			.910			
They care about the welfare of all animals.			.880			
Protecting the welfare of all animals is important to them.			.865			
Power- pets						
They want their companion animal to obey their commands.				.849		
Having control over their companion animal is important to them.				.838		
It is important to them to be 'the boss' of their companion animal				.765		
Universalism- tolerance						
They work to promote harmony and peace among diverse groups.					.776	
It is important to them to listen to people who are different from them.					.737	
Even when they disagree with people, it is important to them to understand them.					.661	
Universalism- concern						
They think it is important that every person in the world have equal opportunities in life.						.714
They want everyone to be treated justly, even people they don't know.						.684
Protecting society's weak and vulnerable members is important to them.						.636
% Variance Explained	29.75	11.86	7.62	6.31	5.71	4.50
Total % Variance Explained						**65.75**

3.2.2. Dog Beliefs

Two components were extracted for dog beliefs (table 7). The first was named *Capacities,* as its items relate to the cognitive or affective capacities of dogs, while those that loaded most strongly on the second reflect a perceived inferiority of dogs, thus named *Status*. Two items, 'Dogs don't feel physical pain like humans' and 'Dogs are independent animals' did not load on either component. Consequently, these items were excluded from the solution and treated as independent variables. Together, the two components accounted for 35.8% of the overall variance in dog belief responses.

Table 7 Dog belief component loadings extracted using Principle Component Analysis with Oblimin rotation and Kaiser Normalisation. Rotation converged in 5 iterations (n=937)

Survey item	Component	
	Capacities	Status
Dogs have individual personalities	.714	
Dogs are intelligent	.640	
Dogs feel emotions like people	.639	
Dogs can feel love	.623	
Dogs can suffer	.591	
Dogs can get bored	.518	
Dogs are vulnerable	.497	
Dogs exist to serve humans		.719
Pet dogs are the property of their owners		.716
Dogs aren't as important as humans		.538
Dogs don't care what happens to them- they aren't aware		.486
Dogs are simple-minded animals		.486
Dogs have complex inner lives		-.388
All dogs are the same		.371
% Variance explained	25.45	10.35
Total % Variance explained		**35.80**

3.2.3. Duty Beliefs (Why)

PCA was trialed for this element of the model but variables did not load reliably or logically on components. This is undoubtedly owing to the independent nature of the

items as they were intended to represent distinct reasons for why we may have duties to dogs. Hence, they were kept as independent variables for subsequent analyses.

3.2.4. Duty Beliefs- What

Beliefs regarding what we owe dogs loaded well on two components, which together accounted for 48.57% of the total variance (table 8). The two components essentially reflect *Positive* or *Negative* attitudes regarding Duty of Care to dogs and were labeled accordingly.

Table 8 Component loadings for duty beliefs regarding *what* we owe dogs. Components were extracted using Principle Component Analysis with Oblimin rotation and Kaiser Normalisation. Rotation converged in 5 iterations (n=937)

Survey Item	Component	
	Positive	Negative
Dogs should be treated as family members	.795	
We have a similar obligation to our dogs as we do to our children	.767	
Dogs deserve respect	.705	
We owe it to dogs to ensure they lead a good life	.674	
I am responsible for my dog's well-being and happiness	.667	
Dogs are reliant on us for a good life	.466	
We are mainly obligated to reduce negative experiences for our dogs (e.g. hunger, pain, discomfort)		.703
As long as a dog is physically healthy, we have fulfilled our duties to them		.698
We are only obligated to provide for the basic physical needs of our dogs (food, water, shelter, health)		.657
We don't have any particular obligations or duties to our dogs		.613
We are not obligated to facilitate positive experiences for dogs		.555
% Variance explained	35.04	13.53
Total % Variance explained		**48.57**

3.2.5. Care Beliefs

45.03% of the overall variance in participant care beliefs was accounted for with a two-factor solution (table 9). All care belief items loaded on one of these components and no items were excluded. The first component primarily consists of items relating to the way a person's actions impact their dog and in this way, represents a sense of *Responsibility*. The second is concerned with the time, effort, and knowledge required to look after dogs and was consequently called *Resources*. 'I do not always have time to meet my dog's needs' loaded on Responsibility, despite it logically being more related to Resources. However, this was a poor loading of only -.384.

Table 9 Care belief component loadings extracted using Principle Component Analysis with Oblimin rotation and Kaiser Normalisation. Rotation converged in 5 iterations (n=921)

	Component		
Survey item	Responsibility	Resources	
How I manage my dog affects his/her behaviour	.762		
What we do impacts on our dog's well-being	.714		
My dog's welfare is dependent on my actions	.655		
My actions have no impact on my dog's behaviour	-.576		
My dog is a member of the family	.566		
I do not always have time to meet my dog's needs	-.384		
Dogs are easy to look after		.779	
Dogs are high maintenance pets		-.681	
Little time is required to look after dogs properly		.678	
Little knowledge is required to look after dogs properly		.626	
% Variance explained	27.81	17.22	
Total % Variance explained			**45.03**

3.2.6. Theory of Planned Behaviour (TPB) elements

PCA was conducted separately for the different TPB elements (behavioural, normative, and control beliefs) and for each of the individual management behaviours (table 10). Only one component was extracted for each element and hence, rotation did not occur. All items loaded well or excellently and components accounted for between 50.99-79.29% of the total variance.

Table 10 Component loadings of TPB elements (behavioural, normative, and control beliefs) for each target management behaviour. Components extracted using Principal Components Analysis (sample sizes varied with target behaviour and are consequently listed separately in the table)

1. Petting n= 791

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
Petting (patting, stroking, cuddling etc.) my dog is good for them	.890	My friends would expect me to pet my dog (patting, stroking, cuddling etc.)	.840	Petting my dog (patting, stroking, cuddling etc.) requires too much effort	.835
My dog enjoys being petted (patting, stroking, cuddling etc.)	.867	My family would disapprove if I didn't pet my dog (patting, stroking, cuddling etc.)	.789	I don't have time to pet my dog (patting, stroking, cuddling etc.)	.824
Petting dogs (patting, stroking, cuddling etc.) is unnecessary for their well-being	-.596	My vet would not think petting (patting, stroking, cuddling etc.) is important for dogs	-.690	I can't control my dog when I'm petting them (patting, stroking, cuddling etc.)	.746
Total % Variance explained	**63.33**		**60.17**		**64.41**

2. Playing n= 806

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
It is important to play with your dog	.869	My friends would approve of me playing with my dog	.864	I am too busy to play with my dog	.902
Playing with my dog makes them happy	.855	My family would think I should play with my dog	.845	I don't have the time to play with my dog	.891
Playing with my dog is not necessary for their well-being	-.645	My vet would not expect me to play with my dog	-.681	Playing with my dog requires too much energy	.753
Total % Variance explained	**63.42**		**64.12**		**72.48**

3. Spending Time n= 819

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
Spending time with my dog is important for his/her well-being	.819	My friends would expect me to spend time with my dog	.826	I have more important things to do than spend time with my dog	.834
Dogs are happiest when they are with their human companions	.758	My vet would think spending time with my dog is important	.805	Spending time with my dog requires too much effort	.792
My dog doesn't care if I spend time with them	-.737	My family would approve of me spending time with my dog	.803	I don't have enough time to spend with my dog	.690
Total % Variance explained	**59.65**		**65.84**		**59.92**

4. Walking n= 819

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
It is important to walk my dog regularly	.908	My family would expect me to walk my dog regularly	.819	Walking my dog requires too much effort	.823
Walking my dogs is good for them	.884	My vet would disapprove if I didn't walk my dog	.769	I don't have the time to walk my dog as often as I should	.746
Walking exercise is important for dogs to be happy and healthy	.879	My friends would think it unnecessary for me to walk my dog regularly	-.736	I can't control my dog well enough to take them for a walk	.702
Total % Variance explained	**79.29**		**60.17**		**57.56**

5. Enrichment n= 854

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
Toys and enrichment items (puzzles, food dispensing items) are a good source of mental stimulation	.846	My friends would expect me to provide my dog with toys and enrichment items (puzzles, food	.850	Preparing enrichment items (puzzles, food dispensing items etc.) for my dog requires too much effort	.879
My dog doesn't need toys or enrichment items (puzzles, food dispensing items etc.)	-.814	My family would disapprove if I didn't provide my dog with enrichment (puzzles, food dispensing	.821	I don't have time to prepare enrichment items (puzzles, food dispensing items etc.) for my dog	.879
Dogs need mental stimulation to be happy and healthy	.756	My vet would think toys and enrichment items (puzzles, food dispensing items etc.) are unnecessary	-.637	Dog toys and enrichment items (puzzles, food dispensing items etc.) are too expensive	.639
Total % Variance explained	**64.96**		**60.09**		**65.13**

6. Vet Check-ups and Vaccination n= 887

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
Vaccinations and regular (yearly) vet check ups are important to keep my dog healthy	.909	My family would expect me to take my dog for annual check ups	.849	Its too much trouble to take my dog to the vet when there's nothing wrong	.835
Vaccinations and regular (yearly) vet check ups protect my dog from disease and health issues	.888	My friends would disapprove if I didn't take my dog for vaccinations and check ups	.781	I don't have the time to take my dog to the vet for check ups (no apparent illness) and vaccinations	.808
Dogs only need to go to the vet when there is something wrong	-.742	My vet would expect to see my dog once a year	.736	Vaccinations and vet check ups (no apparent illness) are too expensive	.647
Total % Variance explained	**72.20**		**62.44**		**58.95**

7. Flea and Worm Prevention n= 911

Behavioural Beliefs	Component	Normative Beliefs	Component	Control Beliefs	Component
Flea and worming treatment isn't important	.810	My family would disapprove if I didn't treat my dog for fleas and worms regularly	.766	It is hard to remember to give my dog regular flea and worming treatments	.756
Dogs should receive preventative treatment for fleas and intestinal worms regularly	-.761	My friends would think it unnecessary to treat my dog for fleas and worms regularly	-.706	It is too hard to give my dog flea and worming treatments	.746
Getting fleas or worms isn't that bad for a dog	.674	My vet would expect me to treat my dog for fleas and worms regularly	.666	Flea and worming treatments are too expensive	.636
Total % Variance explained	**56.32**		**50.99**		**51.09**

3.2.7. <u>Dog Behaviour</u>

Three components were extracted for dog behaviour variables, together accounting for 46.09% of the total variance (table 11). The components were labeled according to commonly agreed behavioural motivations behind the observed behaviours. Behaviours loading on the first component can be considered as indicators of excessive *arousal*, those loading on the second component are often related to *anxiety/depression,* and those loading on the final component can be considered as expressions of *boredom or separation anxiety* (Kobelt, 2004). It should be noted that although these labels have been used for convenience, in the absence of external validation, it is not possible to truly define the underlying motivation of these behaviours for any individual dog.

One behaviour, inappropriate elimination, did not load on any of the three factors and was treated as an independent variable in subsequent analyses. Obsessive licking of self, others or objects loaded on both the arousal and anxiety/depression components. This is understandable as the behaviour has a complex aetiology and could be related to either underlying motivation (Zawistowski and Reid, 2017). However, it only loaded relatively weakly on arousal.

Table 11 Component loadings for reported dog behaviour extracted using Principle Component Analysis with Varimax rotation and Kaiser Normalisation. Rotation converged in 4 iterations (n=705)

Survey items	Component		
	Arousal	Anxiety/ Depression	Boredom/ Separation
Overexcitement	.705		
Constant running around	.697		
Play (with toys, people or other dogs)	.560		
Excessive digging, chewing or destructive behaviour	.554		
Pacing, tail chasing or spinning	.462		
Obsessive licking of self, others or objects	.380	.632	
Listlessness/depression		.614	
Nervousness		.610	
Obsessive chewing or biting of self		.582	
Hiding		.529	

Howling			.589	
Barking			.560	
Whining			.530	
Escapes property/roams			.384	
% Variance explained	20.55	10.87	8.45	
Total % Variance explained				**46.09**

3.3. Stepwise Multiple Regression

Stepwise multiple regression analysis revealed statistically significant relationships between all pairs of model elements. However, it should be noted that although *statistically* significant relationships were found, often these were weak and significant only because of the large sample size. All statistically significant results are reported in the tables below, but only those of moderate strength (as per Cohen's criteria (1992)) or interest will be discussed. The results reported below include the standardised regression (beta) coefficients (β), part (semi-partial) correlations (r_{part}), which express the unique relationship between an independent variable (IV) and the dependent variable (DV), and the squared multiple correlation (r^2), which reflects the total amount of variance in the DV, accounted for by the IVs.

3.3.1. Demographics and Values ➔ Dog Beliefs

Table 12 outlines the results of stepwise regressions for each dog belief DV with demographics and values as IVs. The two variables that did not load during PCA ('dogs don't feel physical pain like humans' and 'dogs are independent animals') showed poor results, with weak correlations and only 6.2% and 2.1% of the variance explained by the IVs. This combined with their failure to load in PCA suggested that these are not robust measures and they were subsequently excluded from further analysis.

Demographics were rarely predictive of dog beliefs and when they were, only had a very weak predictive power. Values were much better predictors, accounting for 20.7% and 16.1% of the total variance in dog beliefs regarding Capacities and Status

respectively. Values also accounted for 10% of the variance in people's general feelings towards dogs.

The strongest individual predictor of all three dog belief variables was Universalism (animals). The higher an individual scored on the Universalism (animals) scale, the more positive their general feelings towards dogs (β= 0.26, p=< 0.001, r_{part}= 0.24) and the greater their belief in dog Capacities (β= 0.27, p=<0.001, r_{part}=0.24). Universalism (animals) also had an inverse relationship with Status (β= -0.22, p=<0.001, r_{part}=-0.19). That is, those with a higher score for Universalism (animals) were less likely to consider dogs as inferior to humans.

Other notable relationships were found between Benevolence (pets) and Capacities (β= 0.21, p=<0.001, r_{part}=0.20), as well as Power (pets) and Status (β= 0.20, p=<0.001, r_{part}=0.19).

Table 12 Predicting Dog Beliefs from Values- summary of stepwise multiple regression using dog beliefs as the dependent variable and values as the independent variables (n=729)

DV: Dog Beliefs	IV: Values	Beta	t	Sig.	Part Correlation	R Square Change	Sig F Change	r^2
'Dogs don't feel physical pain like humans'	Universalism (Humans)	-.160	-4.125	.000	-.148	.042	.000	
	Universalism (Animals)	-.105	-2.717	.007	-.098	.011	.005	
	Power (Humans)	.097	2.691	.007	.097	.009	.007	
	Total r^2							**0.062**
'Dogs are independent animals'	Benevolence (Pets)	-.135	-3.364	.001	-.124	.007	.020	
	Universalism (Animals)	.104	2.599	.010	.095	.008	.015	
	Age	-.075	-2.025	.043	-.074	.006	.043	
	Total r^2							**0.021**
General Feeling Towards Dogs	Universalism (Animals)	.255	6.752	.000	.235	.09	.000	
	Number of Dogs	.113	3.231	.001	.112	.01	.002	
	Benevolence (Pets)	.093	2.427	.015	.084	.01	.003	
	Number of Children	-.083	-2.381	.018	-.083	.01	.023	
	Age	-.071	-2.008	.045	-.070	.00	.045	
	Total r^2							**0.13**
Status	Universalism (Animals)	-.218	-5.654	.000	-.192	.090	.000	
	Power (Pets)	.202	5.629	.000	.192	.042	.000	
	Benevolence (Pets)	-.121	-3.203	.001	-.109	.017	.000	
	Universalism (Humans)	-.084	-2.252	.025	-.077	.006	.020	
	Power (Humans)	.078	2.179	.030	.074	.0	.030	
	Total r^2							**0.161**
Capacities	Universalism (Animals)	.270	7.203	.000	.238	.152	.000	
	Benevolence (Pets)	.214	5.898	.000	.195	.045	.000	
	Universalism (Humans)	.105	2.907	.004	.096	.009	.004	
	Total r^2							**0.207**

3.3.2. Dog Beliefs ➔ Duty Beliefs (why)

Dog beliefs accounted for only a small amount of the variance in Duty Beliefs (why) ranging from 0.7-7.8% (table 13). Two duty beliefs, "It is a give-and-take relationship- the dog provides a service (companionship, guarding, work, guide etc.) and in return we look after them" and "We have responsibilities to dogs because that's the law" had no significant predictors.

All individual predictors showed very weak predictive power, with the only exception being the inverse relationship between Property and Status (β= -0.235, p=<0.001, r_{part}=-0.23).

3.3.3. Duty Beliefs (why) ➔ Duty Beliefs (what)

Duty beliefs (why) were weak predictors of duty beliefs (what). They accounted for only 5.1% of Positive and 3.3% of Negative duty belief variance (table 14). A moderate inverse relationship (β= -0.260, p=<0.001, r_{part}=-0.174) was found between Love ("I look after my dog because I love my dog") and Positive duty beliefs. However, this relationship only accounted for 2.4% of the overall variance.

3.3.4. Dog Beliefs ➔ Duty Beliefs (what)

Dog beliefs were much better predictors of Duty Beliefs (what), accounting for 38.3% of Positive and 18.2% of Negative duty belief variance (table 15). Status beliefs were the primary predictor of Negative duty beliefs (β= 0.305, p=<0.001, r_{part}=0.29) while beliefs in dog Capacities were the main predictor of Positive duty beliefs (β= 0.406, p=<0.001, r_{part}=0.36). A moderate inverse relationship was also found between Status and Positive duty beliefs (β= -0.250, p=<0.001, r_{part}= -0.23).

3.3.5. Duty Beliefs (what) ➔ Care Beliefs

Responsibility based care beliefs were well predicted by Duty Beliefs (what) with 41.7% of the total variance explained (table 16). Positive duty beliefs were strong predictors (β=0.53, p=<0.001, r_{part}=0.50) accounting for 36.4% of the variance on their own. A moderate inverse relationship (β=-0.24, p=<0.001, r_{part}= -0.23) was also present with Negative duty beliefs, but this only accounted for an extra 5.3% of the variance.

In contrast, Duty beliefs (what) were poor predictors of Resource related care beliefs, only accounting for 3.2% of the overall variance.

Table 13 Predicting Duty Beliefs (why) from Dog Beliefs- summary of stepwise multiple regression using duty beliefs (why) as the dependent variable and dog beliefs as the independent variables (n=930)

DV: Duty Beliefs (why)	IV: Dog Beliefs	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Socially Expected	Status	.084	2.568	.010	.084	.007	.010	
	Total r^2							**0.007**
Choice	General Feelings Towards Dogs	.097	2.964	.003	.096	.008	.005	
	Pain	.094	2.879	.004	.094	.009	.004	
	Total r^2							**0.017**
Love	General Feelings Towards Dogs	-.186	-5.469	.000	-.174	.051	.000	
	Status	.078	2.300	.022	.073	.009	.003	
	Capacities	-.071	-1.990	.047	-.063	.004	.047	
	Total r^2							**0.065**
Dependent	Status	.108	3.324	.001	.108	.012	.001	
	Total r^2							**0.012**
Property	Status	-.235	-7.358	.000	-.232	.065	.000	
	Pain	-.116	-3.626	.000	-.114	.013	.000	
	Total r^2							**0.078**

Table 14 Predicting Duty Beliefs (what) from Duty Beliefs (why)- summary of stepwise multiple regression using duty beliefs (what) as the dependent variable and duty beliefs (why) as the independent variables (n=930)

DV: Duty Beliefs (what)	IV: Duty Beliefs (why)	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Positive	'Because I love my dog'	-.260	-6.074	.000	-.194	.024	.000	
	'We have bred dogs to be dependent on us and that brings with it responsibilities'	-.128	-4.841	.000	-.155	.019	.000	
	'We have responsibilities to dogs because that's the law'	-.085	-3.012	.003	-.096	.009	.003	
	Total r²							**.051**
Negative	'We have bred dogs to be dependent on us and that brings with it responsibilities'	.157	4.786	.000	.155	.020	.000	
	'Because I have chosen to bring them into my home, I am responsible for them'	.103	3.163	.002	.102	.009	.004	
	'Because I love my dog'	.074	2.241	.025	.072	.005	.025	
	Total r²							**.033**

Table 15 Predicting Duty Beliefs (what) from Dog Beliefs- summary of stepwise multiple regression using duty beliefs (what) as the dependent variable and dog beliefs as the independent variables (n=936)

DV: Duty Beliefs (what)	IV: Dog Beliefs	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Negative	Status	.305	9.608	.000	.285	.141	.000	
	Capacities	-.185	-5.790	.000	-.172	.031	.000	
	Independent	.068	2.284	.023	.068	.005	.019	
	Pain	.066	2.177	.030	.065	.004	.030	
	Total r^2							**.182**
Positive	Capacities	.406	14.123	.000	.363	.300	.000	
	Status	-.250	-9.104	.000	-.234	.062	.000	
	General Feelings Towards Dogs	.159	5.774	.000	.148	.022	.000	
	Total r^2							**.383**

Table 16 Predicting Care Beliefs from Duty Beliefs (what)- summary of stepwise multiple regression using care beliefs as the dependent variable and duty beliefs (what) as the independent variables (n=920)

DV: Care Beliefs	IV: Duty Beliefs (what)	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Resources	Negative	.140	4.083	.000	.133	.027	.000	
	Positive	-.075	-2.191	.029	-.071	.005	.029	
	Total r^2							**.032**
Responsibility	Positive	.525	19.713	.000	.497	.364	.000	
	Negative	-.244	-9.162	.000	-.231	.053	.000	
	Total r^2							**.417**

3.3.6. <u>Care Beliefs ➔ TPB elements</u>

Overall, care beliefs were found to be good predictors of the various TPB elements, though the strength of this relationship and the variance accounted for varied with the target behaviour (table 17). The highest amount of variance accounted for was for petting control beliefs (29%) and the lowest was for enrichment normative beliefs (6.7%). Care beliefs consistently accounted for less variance in normative beliefs than both behavioural and control beliefs. In other words, care beliefs were stronger predictors for behavioural beliefs and control beliefs than they were for normative beliefs. Additionally, care beliefs accounted for a much higher amount of variance in normative beliefs around the interaction behaviours [petting (11.5%), play (13.4%), and spending time (14.5%)], than in the management behaviours [walking (6.9%), enrichment (6.7%), vet check & vaccination (7.3%), and flea & worming (8.3%)].

Resource-based care beliefs were not significant predictors of control beliefs or normative beliefs for any target behaviour. Resource-based care beliefs only ever contributed to the prediction of behavioural beliefs but even then only accounted for 1.2% or less of the overall variance.

Responsibility based care beliefs were the primary predictors for all TPB elements. This relationship was strongest for petting control beliefs (β=-0.54, p=<0.001) and spending time behavioural beliefs (β=0.53, p=<0.001) and weakest for walking (β=0.26, p=<0.001) and enrichment (β=0.26, p=<0.001) normative beliefs.

Table 17 Predicting Theory of Planned Behaviour (TPB) elements from care beliefs- summary of stepwise multiple regression using TPB elements as the dependent variable and care beliefs as the independent variables (sample sizes varied with target behaviour and are consequently listed separately in the table)

Target Behaviour	DV: TPB elements	IV: Care Beliefs	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Petting (n=790)	Behavioural Beliefs	Responsibility	.415	12.804	.000	.415	.172	.000	
		Total r^2							**.172**
	Normative Beliefs	Responsibility	.339	10.109	.000	.339	.115	.000	
		Total r^2							**.115**
	Control Beliefs	Responsibility	-.539	-17.969	.000	-.539	.290	.000	
		Total r^2							**.290**
Play (n=805)	Behavioural Beliefs	Responsibility	.478	15.551	.000	.474	.241	.000	
		Resources	-.111	-3.628	.000	-.111	.012	.000	
		Total r^2							**.253**
	Normative Beliefs	Responsibility	.366	11.144	.000	.366	.134	.000	
		Total r^2							**.134**
	Control Beliefs	Responsibility	-.455	-14.479	.000	-.455	.207	.000	
		Total r^2							**.207**
Spending Time (n=818)	Behavioural Beliefs	Responsibility	.526	17.748	.000	.523	.287	.000	
		Resources	-.075	-2.535	.011	-.075	.006	.011	
		Total r^2							**.292**
	Normative Beliefs	Responsibility	.381	11.786	.000	.381	.145	.000	
		Total r^2							**.145**
	Control Beliefs	Responsibility	-.465	-15.026	.000	-.465	.217	.000	
		Total r^2							**.217**

Walking (n=839)	Behavioural Beliefs	Responsibility	.420	13.461	.000	.417	.186	.000	
		Resources	-.096	-3.077	.002	-.095	.009	.002	
		Total r²						**.**	**.196**
	Normative Beliefs	Responsibility	.262	7.873	.000	.262	.069	.000	
		Total r²							**.069**
	Control Beliefs	Responsibility	-.350	-10.819	.000	-.350	.123	.000	
		Total r²							**.123**
Enrichment (n=853)	Behavioural Beliefs	Responsibility	.436	14.498	.000	.433	.209	.000	
		Resources	-.180	-5.999	.000	-.179	.032	.000	
		Total r²							**.241**
	Normative Beliefs	Responsibility	.259	7.823	.000	.259	.067	.000	
		Total r²							**.067**
	Control Beliefs	Responsibility	-.361	-11.285	.000	-.361	.130	.000	
		Total r²							**.130**
Vet Check & Vaccination (n=886)	Behavioural Beliefs	Responsibility	.293	9.110	.000	.293	.086	.000	
		Total r²							**.086**
	Normative Beliefs	Responsibility	.271	8.370	.000	.271	.073	.000	
		Total r²							**.073**
	Control Beliefs	Responsibility	-.344	-10.889	.000	-.344	.118	.000	
		Total r²							**.118**
Flea & Worm Prevention (n=910)	Behavioural Beliefs	Responsibility	-.303	-9.586	.000	-.303	.092	.000	
		Total r²							**.092**
	Normative Beliefs	Responsibility	.287	9.042	.000	.287	.083	.000	
		Total r²							**.083**
	Control Beliefs	Responsibility	-.350	-11.267	.000	-.350	.123	.000	
		Total r²							**.123**

3.3.7. TPB elements ➔ Reported Behaviour

Frequently, only one or two of the TPB elements made significant contributions to predicting reported behaviour (table 18). Only for flea and worm prevention did all three elements contribute in a statistically significant way. The TPB elements accounted for the most variance for veterinary check & vaccination (34.6%), walking (25.4%), worming (21.4%), and providing toys (20.6%). In contrast, the TPB elements only accounted for a relatively small amount of the total variance for petting (8.0%), spending time (weekend) (2.8%), spending time (weekday) (6.8%), enrichment (other) (6.3%), and enrichment (toy rotation) (4.6%).

Behavioural beliefs were the most consistent predictor of reported behaviour, being the primary predictor for 9 out of 11 of the behaviours. Walking and spending time (weekdays) were the only behaviours for which control beliefs surpassed behavioural beliefs as the primary predictor. Normative beliefs were the weakest predictor overall.

No significant predictors were found for 'other exercise'.

3.3.8. Reported Behaviour ➔ Animal Welfare Measures

The relationship between reported behaviour variables and individual animal welfare outcomes was weak and accounted for only a small amount of variance (table 19). Playing with your dog was a weak-moderate predictor for dog arousal, where the more a person played with their dog the more arousal related behavioural problems were reported (β=0.207, p=<0.001, r_{part}=-0.19). However, this only accounted for 6.4% of the variance. All other statistically significant relationships were weak and accounted for very low variances. There were no significant predictors for problem behaviour.

Table 18 Predicting Reported Carer Behaviour from Theory of Planned Behaviour (TPB) elements - summary of stepwise multiple regression using reported behaviour as the dependent variables and TPB elements as the independent variables (n=713)

DV: Reported Behaviour	IV: TPB elements	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Petting	Behavioural Beliefs	.220	5.477	.000	.197	.071	.000	
(n=713)	Normative Beliefs	.104	2.590	.010	.093	.009	.010	
	Total r^2							**.080**
Play	Behavioural Beliefs	.278	7.364	.000	.256	.119	.000	
(n=713)	Control Beliefs	-.169	-4.468	.000	-.155	.024	.000	
	Total r^2							**.143**
Spending Time- Weekend	Behavioural Beliefs	.100	2.373	.018	.088	.021	.000	
	Control Beliefs	-.096	-2.299	.022	-.085	.007	.022	
	Total r^2							**.028**
Spending Time- Weekday	Control Beliefs	-.203	-4.948	.000	-.179	.061	.000	
	Behavioural Beliefs	.094	2.292	.022	.083	.007	.022	
	Total r^2							**.068**
Walking	Control Beliefs	-.323	-9.083	.000	-.294	.191	.000	
	Behavioural Beliefs	.276	7.774	.000	.252	.063	.000	
	Total r^2							**.254**
Enrichment-other	Behavioural Beliefs	.251	6.923	.000	.251	.063	.000	
	Total r^2							**.063**
Enrichment- Toy Rotation	Behavioural Beliefs	.215	5.528	.000	.215	.046	.000	
	Total r^2							**.046**
Enrichment- Toys	Behavioural Beliefs	-.374	-9.862	.000	-.327	.192	.000	
	Normative Beliefs	-.133	-3.503	.000	-.116	.013	.000	
	Total r^2							**.206**

Flea Prevention	Behavioural Beliefs	-.250	-6.196	.000	-.210	.137	.000	
	Normative Beliefs	.153	3.888	.000	.132	.021	.000	
	Control Beliefs	-.128	-3.544	.000	-.120	.014	.000	
	Total r^2							**.173**
Worming	Behavioural Beliefs	-.272	-6.894	.000	-.228	.163	.000	
	Control Beliefs	-.190	-5.379	.000	-.178	.037	.000	
	Normative Beliefs	.136	3.554	.000	.117	.014	.000	
	Total r^2							**.214**
Vet Check & Vaccination	Behavioural Beliefs	.517	13.337	.000	.402	.339	.000	
	Normative Beliefs	.104	2.693	.007	.081	.007	.007	
	Total r^2							**.346**

Table 19 Predicting animal welfare outcomes from reported carer behaviours summary of stepwise multiple regression using animal welfare measures as the dependent variables and reported behaviours as the independent variables (n=704)

DV: Dog Behaviour	IV: Reported Behaviour	Beta	t	Sig.	Part Correlation	r^2 change	Sig F Change	r^2
Anxiety	Walking	-.134	-3.608	.000	-.134	.018	.000	
	Other exercise	-.117	-3.147	.002	-.117	.014	.002	
	Total r^2							**.032**
Boredom	Time Spent- Weekend	-.122	-3.263	.001	-.122	.016	.001	
	Toys	.087	2.327	.020	.087	.008	.020	
	Total r^2							**.023**
Arousal	Play	.207	5.268	.000	.191	.064	.000	
	Toys	-.121	-3.077	.002	-.112	.012	.002	
	Total r^2							**.077**
Worms	Worming	-.089	-2.368	.018	-.089	.008	.018	
	Total r^2							**.008**

3.4. Canonical Correlation Analysis (CCA)

CCA was performed between pairs of model elements to determine overall relationships between them. Table 20 provides the summarised results of all CCAs performed. CCA was not performed for demographics owing to their poor performance in the regression analyses and low zero-order correlations (appendix 2). The duty belief (why) variable 'It is a give-and-take relationship- the dog provides a service (companionship, guarding, work, guide etc.) and in return we look after them' (Why_mutual), displayed multicollinearity and was thus removed from the analysis.

Table 20 Canonical correlations between model elements (sets of variables)

IV	DV	Wilks λ	F	Sig	R_c^2 (%)	R_c
Values	Dog Beliefs	.639	11.385	.000	36.1	.601
Dog Beliefs	Duty Beliefs (why)[a]	.836	5.616	.000	16.4	.405
Dog Beliefs	Duty Beliefs (what)	.554	63.945	.000	44.6	.668
Duty Beliefs (why)[a]	Duty Beliefs (what)	.907	7.698	.000	9.3	.305
Duty Beliefs (what)	Care Beliefs	.572	147.818	.000	42.8	.654
Care Beliefs	TPB	.480	16.197	.000	52.0	.721
TPB	Carer Behaviour	.187	4.781	.000	81.3	.902
Carer Behaviour	Animal Welfare	.782	2.322	.000	21.8	.467

a. with Why_mutual removed

Significant relationships were found between each pair of model elements. However, both canonical correlations involving duty beliefs (why), accounted for significantly less variance than the other pairs of elements (16.4 and 9.3%). All other sets of variables displayed strong canonical correlations. These pairwise relationships are summarised in figure 11, which depicts the canonical correlations between each pair of model elements that displayed strong relationships. However, it is important to note that this does not confirm a sequential relationship, only the relationship between each pair of elements.

Figure 11 Summary of Canonical Correlation Analyses showing the canonical correlations (R_c) between each pair of model elements.

4. Discussion

While the concept of Duty of Care has long been present in animal protection discourse, it has been essentially neglected in the academic literature. To my knowledge, the present study is the first to investigate DoC from a scientific perspective and as such, serves as a broad and preliminary exploration of this concept. Here, DoC was conceptualised as a psychological construct that sits within the cognitive hierarchy underpinning carer behaviour. It was theorised that the extent of an individual's sense of duty towards their dog constitutes a fundamental belief system that provides the motivation to care for their pet through its influence on behaviourally specific attitudes. Hence, this study sought to begin to characterise the nature of DoC and its role in companion dog care and management through three specific aims.

4.1. Aim 1: *To identify the values and beliefs associated with DoC in companion dog carers.*

4.1.1. Beliefs

As expected, general beliefs about dogs and feelings towards them were strong predictors of DoC overall. This was particularly the case for positive duty beliefs. The greater a person's belief in the capacities of dogs, such as that they have individual personalities, are intelligent, and have the ability to experience various affective states like love, boredom, and suffering, the greater their sense of duty towards dogs. Furthermore, the duty beliefs that loaded most strongly on the positive scale, and hence were the most correlated with capacity beliefs, could be considered as anthropomorphic: 'dogs should be treated as family members' and 'we have similar obligations to our dogs as we do to our children'. These findings are consistent with the substantial body of work that demonstrates that the more an animal is perceived to be like humans, particularly in terms of cognitive capacities, the more positive our attitudes towards them are (Amiot and Bastian, 2017, Hills, 1995, Serpell, 2004). However, how this relates to our perceived *duties* towards them has not been previously investigated. This is a novel, albeit not surprising, finding that such perceptions also are associated with a greater sense of DoC.

Beliefs that dogs have a lower status than humans, whereby they exist to serve humans, are the property of their owners, or that they aren't as important as humans were associated with a more basic sense of duty or none at all. Although this may seem intuitively obvious, there are alternative possibilities. It could have well been that despite thinking dogs are less important than humans, a person can still recognise a duty to look after them for various reasons. However, in general, this was not found to be the case. Beliefs about the status of animals are largely influenced by cultural factors including religion, history, culturally defining practices, and cultural representations (Serpell, 2004). Inter-cultural differences in attitudes towards dogs and animals more generally have been well documented (Serpell, 2004). Hence, it would be interesting to investigate how different cultural factors influence DoC through their effect on dog beliefs.

The 'general feelings towards dogs' item was included as a measure of generalised affective response to dogs. Despite the literature identifying affect as a fundamental component of general attitudes to animals (Serpell, 2004), in this study, it only displayed very weak predictive power for positive duty beliefs and none at all for negative duty beliefs. This suggests that the extent to which a person likes or dislikes dogs, does not contribute significantly to how they feel they should be treated. While this is plausible, using a single item to assess affect may not be a sufficiently reliable measure to permit strong conclusions and further investigation is required.

4.1.2. Values

In addition to the Schwartz's human-targeted values, this study incorporated separate values for animal subjects: Universalism (animals), Benevolence (pets), and Power (pets). These were designed as direct equivalents to the human-targeted Universalism, Benevolence, and Power values. The principal components analysis supported the hypothesis that values related to animals are distinct from, but correlated with, those related to humans. The human-targeted subtypes for both Universalism and Benevolence loaded together on one component, but remained separate from their associated animal-targeted subtype. That is, Universalism (tolerance) and Universalism (concern) loaded together to make Universalism (humans), and Benevolence (caring) and Benevolence (dependability) loaded together to make

Benevolence (humans), while Universalism (animals) and Benevolence (pets) remained separate. The zero-order correlations (appendix 2) also reflected this in that the correlation between animal and human-targeted subtypes of the *same* value, such as that between Benevolence (pets) and Benevolence (humans), was weaker than the correlation between the two *different* human-targeted values, Benevolence (humans) and Universalism (humans). These findings are consistent with the work of Dietz et al. (2017) as discussed in chapter 1, which found a 'concern for animals' value orientation to be distinct from human and nature-based values. As such, although individual values are described as trans-situational, they may not be trans-species.

It is important to note that this does not mean that the human and animal-targeted value subtypes are not at all related. Indeed, they displayed moderate inter-correlations (appendix 2). This reflects the central assumption of Schwartz's theory that, although basic values can be categorised for ease of evaluation, they are not discrete or independent, but form a circular motivational continuum (figure 6) (Schwartz, 1992, Schwartz et al., 2012). Indeed, a growing body of research in neuroscience and behavioural psychology has highlighted how moral concern for others, often conceptualised as empathy, can be generalised to different subjects (Bastian, 2012, Costello and Hodson, 2010, Crimston et al., 2016, Filippi et al., 2010, Mathur et al., 2010, McPhedran, 2009). One particular study demonstrated that experimentally increasing a person's empathy for animals had a positive effect on how they viewed immigrants (Costello and Hodson, 2010). Hence, human specific and animal specific values, though distinct, share common elements and are likely to have a dynamic relationship. The demonstrated existence of animal-specific values, as well as their relationship with human-specific values and position in the motivational continuum, warrants further investigation.

When all values were combined, including both human and animal targeted subtypes, they were found to be strong predictors of dog beliefs. When the values were assessed individually in the multiple regressions, Universalism (animals) was the strongest and most consistent value-based predictor of dog beliefs, having a positive relationship with Capacities and general feelings towards dogs, as well as a negative relationship with Status. Benevolence (pets) also displayed a similar positive relationship with Capacities, but only accounted for 4.5% of the variance after Universalism (animals)

was taken into account. This is likely the result of a significant amount of shared variance between Universalism (animals) and Benevolence (pets) as opposed to a substantial difference in their practical importance. This is supported by the fact that both values were similarly correlated with dog beliefs and were moderately correlated with each other (see zero-order correlations in appendix 2). As such, although they both make their own unique contribution to predicting dog beliefs, there is also a common underlying motivational dimension that underpins caring for all animals and caring for pets. This is intuitively reasonable and reflects the similar relationship between Universalism (humans) (caring for the human out-group) and Benevolence (humans) (caring for the human in-group), as underpinned by the motivational dimension 'self-transcendence' (Schwartz et al., 2012). In this way, we may consider Universalism (animals) and Benevolence (pets) to be elements of a 'species-transcendence' motivational dimension, related in part to 'self-transcendence'.

With regard to Duty of Care, the results of this study suggest that those who value and care for all animals equally, as well as their companion dog, have a greater belief in dog capacities and subsequently, a greater sense of DoC to dogs. This is somewhat supported by Blouin (2013) who observed that the relationship between people who value all animals equally (protectionists) and their dogs was characterised by a strong focus on the animal's needs. This was in contrast to those who fundamentally valued their own dog over and above other animals (humanists), who were typically more focused on what their dog provides *them* in terms of companionship and affection. As such, those who respect animals more generally for their own inherent value may be more sensitive to the animal's needs and consequently, a better dog carer. This finding has interesting implications for intervention and education programs, whereby improvements to an individual's sense of DoC would be achieved by promoting the value of *all* animals, as well as companion dogs.

Although the original human-targeted values contributed very little as predictors in the regression analyses, this does not necessarily mean that they are not important. As shown in the zero-order correlations (appendix 2), Benevolence (humans) and Universalism (humans) both displayed a positive relationship with Capacities, though this was weaker than that of the animal-specific values. Hence, in the regression analysis, any variance shared by the animal-targeted and human-targeted values,

would have been attributed to the animal-targeted values. Essentially, those factors of human-targeted values that are related to dog beliefs are encompassed by the animal-targeted values, and in their presence, the human-targeted values are rendered redundant.

4.2. Aim 2: *Evaluate the link between DoC, carer attitudes, management and interaction behaviours and dog behaviour/welfare.*

Overall, beliefs about DoC were found to be strong predictors of care beliefs, which in turn were strong predictors of the TPB attitudes, which, as a whole, were subsequently strong predictors of reported behaviour.

The relationship between DoC and attitudes about caring for one's dog (care beliefs) was strongest between positive duty beliefs and responsibility based care beliefs. In other words, the greater a person's sense of DoC the more they recognise how their actions impact on their dog's welfare and behaviour. These responsibility-based care beliefs were, in turn, the most significant predictors for all TPB elements; resource-based care beliefs contributed very little. This was surprising as it was expected that resource-based care beliefs would be linked to control beliefs, considering that they both focused on resources. This suggests that focusing intervention efforts on how our actions impact on dogs would be the best way to influence people's specific attitudes towards management behaviours.

The CCA demonstrated that the TPB elements were excellent predictors of reported behaviour when combined together across all target behaviours. This indicates that positive attitudes towards management behaviours in general are strongly related to engagement in a suite of best practice management behaviours. However, when separated out into their specific behavioural pairs (e.g. analysing the ability of walking TPB elements to predict walking behaviour), the TPB performed less well. This may be explained by Fishbein and Ajzen's concept of multiple-act criterion, whereby attitudes are found to be stronger predictors of *patterns* of behaviour than individual behaviours taken in isolation (Fishbein and Ajzen, 1974). The reduced ability of the TPB to predict specific behaviour in this instance may be the result of a number of confounding factors. Inconsistent engagement with the different behaviours, whereby some participants engaged in some behaviours while others

engaged in others, would reduce the prevalence of individual behaviours and consequently the statistical power. Factors related to the dog itself such as dog age, medical or behavioural issues are also likely to have a significant impact. For example, a person may hold the belief that walking your dog is important, but their own engagement in dog walking may be limited by their dog being old and arthritic, or having issues with aggression. The prediction of individual behaviours was particularly weak for petting, spending time, other enrichment, and toy rotation, in which the TPB accounted for less than 10% of the variance. This could be because these behaviours may be less well known for their importance in dog management and hence, a lack of knowledge may be limiting in these instances. Furthermore, the cognitive elements of the TPB assessed in this study are only able to truly predict behavioural *intention* (Ajzen, 2011). In reality, the translation of those intentions into behaviour depends on both intention and actual behavioural control, which was not measured in this study. Hence, it may be that for these dog management behaviours, actual behavioural control is a significant factor.

Attitudes towards the behaviour, as measured by behavioural beliefs, were the most consistent predictors of carer behaviour. Hemsworth (2012) also found that the performance of two routine husbandry behaviours of recreational horse owners, parasite control and hoof care, was primarily determined by behavioural beliefs. In light of this, efforts to improve owner attitudes regarding specific management behaviours should focus primarily on the outcomes of those behaviours for the dog and their importance for the dog's welfare.

Control beliefs were generally weak predictors of carer behaviour. The main exception to this was for dog walking, in which control beliefs were the primary predictor, accounting for 19.1% of the variance. Of the carer behaviours investigated, dog walking arguably requires the most commitment on the carer's behalf with regard to time and energy. Hence, it is understandable that beliefs about such resources figure more prominently than in other behaviours. Again, this aligns with the work of Hemsworth (2012) who found that dental care in recreational horses, a behaviour that is more difficult and requires greater commitment, was influenced more heavily by control beliefs than the routine husbandry behaviours.

Subjective norms, as measured by normative beliefs, were the weakest predictors of reported carer behaviour. This is also consistent with Hemsworth (2012) who found normative beliefs to be poor predictors of the husbandry behaviours of recreational horse owners. However, this is in direct contrast to Rohlf et al. (2010a), who found normative beliefs to be the *best* predictor of a range of dog management behaviours including socialisation, registration, microchipping, and desexing. This highlights, as Ajzen (1991) has suggested, how the relative importance of the different TPB elements varies with respect to the target behaviour. In the case of dog management, it may be that normative beliefs play a larger role in the more prescriptive management behaviours, whilst behavioural beliefs are more important for the more volitional behaviours examined in this study. Registration, microchipping, and desexing, are subject to strong cultural norms in Australia; they can be legislated for at both the state and local council level. Additionally, these are the behaviours most commonly targeted by responsible pet ownership campaigns run by councils, veterinarians, and animal welfare organisations. Hence, there is likely, and understandably, a stronger social pressure with regard to these behaviours than those targeted in this study. While socialisation may not be legislated for or targeted in campaigns to the same extent, the act of socialising one's dog is by nature a social process. Consequently, it makes sense that perceptions of social pressure would be more influential for this behaviour than for behaviours such as petting or playing, which are essentially private, between the carer and their dog. It would be interesting to see whether campaigns and education programs targeting the behaviours examined in this study, influence people's normative beliefs and whether that in turn would cause normative beliefs to be more influential in predicting those behaviours.

The low predictive power of normative beliefs in this study could also be attributed to a methodological oversight. Subjective norms are the product of a person's beliefs about the expectations of important others (normative beliefs) *and* their desire to comply with these expectations (Ajzen, 1985). The second part of this equation was not assessed in this study. While three different referents whose opinions were considered *likely* to matter to participants (their veterinarian, friends, and family), their importance to individual participants was not confirmed. It is very well to say that your family expects you to walk your dog, but if you are not inclined to conform to your family's expectations of you, this will not be a good predictor of behaviour.

Hence, the predictive power of normative beliefs may have been improved if, as in Ajzen and Madden (1986), the degree to which the participants were inclined to conform to the expectations of the different referents was included.

The link between reported carer behaviour and animal welfare measures showed a similar relationship to that found between the TPB variables and owner behaviour. That is, the CCA showed a good relationship between the two sets of variables overall, but the individual regressions for each animal welfare measure yielded poor results, accounting for less than 5% of the variance in the dependent variables. This suggests that individual behavioural measures are not robust reflections of carer management, but are more reliable when taken as a set of outcomes. There is a significant body of evidence supporting this relationship between human behaviour and animal welfare in agricultural, zoo, and companion animal settings. (Hemsworth and Coleman, 2011, Hemsworth et al., *in press*). With regard to dog management specifically and the behaviours assessed here, Kobelt et al. (2003) found that how often a dog was walked was negatively correlated with a range of problem behaviours including constant running around, pacing, excessive barking, and escaping. The same study also found that the amount of time spent with the dog during the week was negatively correlated with behaviours of overexcitement and arousal.

The aetiology of dog behaviour is complex and in many ways, poorly understood. As such, it is not surprising that the individual relationships between specific management behaviours and dog behaviour components were weak. There is a range of other factors, often outside the carer's control, that contribute to the development of dog behaviour. Genetics and personal experiences that may or may not have occurred during the dog's time with their present carer can have a significant impact. As such, present behaviour may not always be related to current management practices. Much like stereotypies in zoo animals, these behaviours could become habituated and persevere in circumstances where the dog is no longer subject to the same stressors that caused them to develop (Mason and Latham, 2004). Hence, caution must be taken at the *individual* level when interpreting such behaviours with regard to the animal's current environment.

It is also important to note that owner reports of dog behaviour are inherently subjective. Although these types of surveys are often used and provide valuable information, caution must be taken when interpreting owner reports of abnormal behaviour. A number of the behaviours examined such as digging, chewing, and barking are, in fact, part of the natural behavioural repertoire of the dog. For them to be considered abnormal and hence representative of a welfare issue, they must be performed in *excess*. Using owner-reported data thus requires a level of judgment and subjectivity on the owner's part. This may be influenced by a range of factors including the owner's understanding of dog behaviour, how much notice they take of their dog's behaviour, their expectations of what is appropriate, their attachment to the dog, and consequently their tendency to 'see the best' in their dog. Indeed, previous work has found apparent differences in owner perceptions of behaviour, namely that females (Howell et al., 2016) and those who are the primary carer of the dog (Bennett and Rohlf, 2007) tend to report more favourable behaviour. As noted by Bennett and Rohlf (2007) this relationship between *perceived* animal behaviour and *actual* animal behaviour requires further investigation. One way this issue can be avoided is to employ direct observations of the dog's behaviour, though this would not have been practical for a survey of this scale. However, having now identified areas for further investigation, this may be possible in the future with more specific and smaller scaled work.

Another consideration when using dog behaviour as a measure for animal welfare is that some reports of problem behaviour may not actually represent a problem for the dog. Nonetheless, if natural behaviours such as chewing and digging are being *perceived* as a problem, it is likely the animal has not been provided with the resources or opportunities to fulfill these behavioural motivations in an appropriate way. Again, akin to stereotypies in zoo animals, the behaviours themselves may be a successful strategy for the dog in adapting to a physical or social environment that is lacking (Mason and Latham, 2004). Furthermore, behaviours that are problematic for the owner pose their own risks to the animal's welfare in the long term. Problem behaviour can weaken the human-animal bond and is one of the most common reasons for relinquishment, abandonment, and euthanasia of companion dogs (Marston et al., 2004). Each year, tens of thousands of dogs are surrendered to animal shelters in Australia, with a significant proportion of them being euthanised, often for

behavioural reasons (RSPCA Australia, 2017). Hence, even those behaviours that do not reflect an immediate threat to the animal's welfare may be cause for future concern.

Despite these limitations, this study provides evidence for a generalised relationship between carer behaviour and dog welfare.

4.3. Aim 3: *Develop a proposed model of the DoC paradigm that may be used to inform intervention/educational programs.*

The hypothesised model of the DoC paradigm (figure 7) was developed from the amalgamation of four empirically tested and validated psychological models: the Schwartz Theory of Basic Human Values, the Cognitive Hierarchy Model, the Theory of Planned Behaviour, and Hemsworth & Coleman's Model of the Animal-Carer Relationship (based on their model of human-livestock interactions). This served as the basis for development of the survey and statistical analyses. Figure 12 provides a refined model incorporating the key findings of this study.
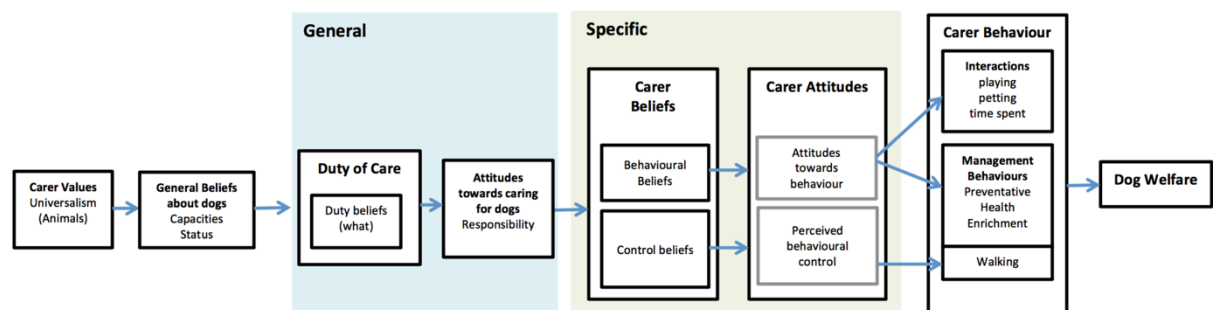
Figure 12 Model of the Duty of Care Paradigm

The results are consistent with the original hypothesis that DoC is a belief system underpinned by personal values and general beliefs that together provide the internal motivation to care for animals through a cognitive hierarchy of increasingly specific beliefs and attitudes. The findings from this study and the model above suggest that the most effective way to influence a person's sense of DoC is to a) encourage people to value *all* animals as well as their companion dogs and b) educate them about the cognitive capacities of dogs. In doing so, it is expected that a more positive sense of DoC would be fostered, which in turn would inform more positive attitudes towards

caring for dogs, behaviour specific attitudes, and ultimately carer behaviours. Furthermore, the results suggest that intervention efforts targeted at higher order attitudes would benefit from c) identifying and explaining how our actions impact on dogs and d) communicating the effects of specific management behaviours on dog welfare. An education program that included all four of these concepts (a, b, c, d) would be expected to significantly improve carer attitudes and behaviour, over and above traditional knowledge-based education. Such an education program could be incorporated into an intervention study that could be used to demonstrate the causal nature of the sequential relationships described in this thesis. This strategy has been used extensively by Hemsworth and Coleman who have developed a number of cognitive-behavioural intervention programs that specifically target stockperson attitudes (Hemsworth and Coleman, 2011). Empirical testing has found these attitude-based interventions to be highly effective in changing stockperson behaviour and improving animal welfare (Coleman et al., 2000, Hemsworth et al., 1994, Hemsworth et al., 2002). These interventions have since been developed into the ProHand® programs (ProHand® Pigs, Pork Abattoir, Dairy cows, and Red Meat Abattoir), which are available for industry training and continue to be delivered across the country. Developing and testing a similar cognitive-behaviour based training program for dog carers, targeting the key values, attitudes, and beliefs identified in this study, would be the next step in further validating the role of DoC in carer behaviour and utilising this information to improve dog welfare.

4.4. Limitations

Being a preliminary investigation of a very complex topic, the results of this study should be considered as a general exploration, highlighting areas for further investigation. The sheer number of concepts examined meant that detail, and potentially robustness, were at times sacrificed. As mentioned previously, the large sample size meant that significant results were found for very weak effect sizes, which are not likely to be of any practical significance. However, this was considered and only results of relative strength were discussed. It is also important to note that the study and its results are correlational in nature and do not indicate causal relationships. In order to claim a causal effect, experimental manipulation must be employed and this was not possible in this instance. Furthermore, in the absence of

structural equation modeling, a sequential relationship between the model elements cannot be confirmed. As such, the sequential representation of the model is purely based on psychological theory and pairwise regressions.

While this study did not attempt to make claims as to how Australian dog owners think and behave as a whole and thus, did not require a representative sample, it is nonetheless important to note that the sample obtained was significantly biased towards those owners with a relative interest in and commitment towards dogs. This is a common problem with survey-based research, as accessing disengaged owners, who are arguably the most important targets of such research, is extremely challenging (Rohlf et al., 2010a). Although this study was focused on intra-individual relationships, it is possible that there are elements of this topic, specifically related to those owners who hold more negative views, which have not been identified. This will continue to be a challenge in future research and strategies to address this should be investigated. However, it is important to note that in the present research, such bias would have led to a reduced variation in responses, which would have tended to diminish observed correlations. Hence, the fact that significant results were found despite this, adds to the strength of the findings.

With these limitations in mind, it is the intention of this research that the general findings presented here can be used as a starting point to inform more specific and in-depth individual projects in the future.

5. Conclusion

In all, the present study provides novel evidence for the role of Duty of Care in companion dog management and welfare. Underpinned by animal-specific values and beliefs about the capacities and status of dogs, a person's sense of Duty of Care is predictive of their attitudes towards caring for their dog and in turn their behaviour, and their dog's welfare. As discussed previously, these findings have useful applications for education and intervention strategies, and highlight a range of future research topics. From here, representative sampling techniques should be employed to gain a better understanding of the prevalence of different duty beliefs with regard to companion dogs within the wider community. This would aid in informing public

policy and further elucidate society's attitudes towards companion dogs as a whole. This work could then be expanded to investigate Duty of Care to other domesticated animals including other companion animal species, as well as animals kept for food, fibre, experimentation, and entertainment. This would provide valuable information on how differences in species and utility impact our perceived duties towards animals. Being such a fundamental aspect of our relations with other animals, there is truly enormous scope for Duty of Care research. While the present study has only begun to scratch the surface of this complex topic, it provides the basis for a new and exciting dimension of human-animal research.

6. Acknowledgments

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8. Appendices

8.1. Appendix 1: Questionnaire

Draft DoC Survey- Development Version

Section A. Demographics
This section contains questions about yourself and your household. Your individual responses will remain strictly confidential. The information will only be used to relate individual and household demographics to dog ownership

A1. Are you?
☐ Male
☐ Female

A2. How old are you? ____

A3a. How many adults (over 18 years) live in your household? _____

A3b. How many children?
    16-18 years? _____
    12-15 years? _____
    8-11 years? _____
    5-7 years? _____
    2-4 years? _____
    Under 2 years? ____

A4. What is your highest level of education?
☐ Primary School
☐ Secondary School
☐ TAFE college
☐ University undergraduate degree
☐ University post-graduate degree
☐ No formal schooling
☐ Other _____

A5. Would you mainly describe yourself as?
☐ Employed full time
☐ Employed part-time
☐ Casual
☐ A volunteer
☐ Between jobs
☐ A student
☐ A homemaker
☐ Retired
☐ Pensioner/unable to work
☐ Other _____

A6. Would you describe your current residential location as?
☐ Urban (inner city)
☐ Suburban (+10kms from city)
☐ Regional City (pop'n +50,000)
☐ Country Town (pop'n less than 50,000)
☐ Semi-rural (less than 20 acres)
☐ Rural (+20 acres)

A7. Would you describe your current living arrangement as a?

☐ House
☐ Unit/townhouse
☐ Apartment
☐ Studio
☐ Farm
☐ Hobby farm
☐ Other _____

A8. How many dogs live in your household? _____

If you have more than one dog, please answer the remainder of the survey with regard to <u>one particular dog only</u>.

A9. What is your dog's name? _____

Section B. Your thoughts about dogs

General Beliefs About and Attitudes Towards Dogs

B1. On this scale, rate your general feeling towards **dogs**:

Hate			Neither like nor dislike			Love	
1	2	3	4	5	6	7

B2. Please respond to each statement in terms of a five point scale defined by the labels: disagree strongly; disagree; neither agree nor disagree; agree; agree strongly.

No.	Statement about dogs	Disagree Strongly	Disagree	Neither Agree nor Disagree	Agree	Agree Strongly
1	Dogs are intelligent					
2	Dogs have individual personalities					
3	Dogs feel emotions like people					
4	Dogs can suffer					
5	Dogs ***don't*** feel physical pain like humans					
6	Dogs can feel love					
7	Dogs can get bored					
8	Dogs are simple-minded animals					
10	Dogs have complex inner lives					
11	Dogs are independent animals					
12	Dogs are vulnerable					
13	Dogs exist to serve humans					
14	All dogs are the same					
15	Dogs aren't as important as humans					
16	Dogs <u>don't</u> care what happens to them- they aren't aware					
17	Pet dogs are the property of their					

	owners					

Duty Beliefs

No.	Statement about duties to dogs	Disagree Strongly	Disagree	Neither Agree nor Disagree	Agree	Agree Strongly
1	We don't have any particular obligations or duties to our dogs					
2	We are _only_ obligated to provide for the basic physical needs of our dogs (food, water, shelter, health)					
3	We are not obligated to facilitate positive experiences for dogs					
4	We are mainly obligated to reduce negative experiences for our dogs (e.g. hunger, pain, discomfort)					
5	As long as a dog is healthy, we have fulfilled our duties to them					
6	Dogs are reliant on us for a good life					
7	Dogs deserve respect					
8	I am responsible for my dog's well-being and happiness					
9	We owe it to dogs to ensure they lead a good life					
10	Dogs should be treated as family members					
11	We have a similar obligation to our dogs as we do to our children					

B3. The following statements reflect beliefs about looking after our dogs. Please rank them in order of relevance to you and how you care for your dog from 1 (least relevant)- 7 (most relevant)

	Dogs are property and we are responsible for our property
	We have responsibilities to dogs because that's the law
	We have bred dogs to be dependent on us and that brings with it responsibilities
	Because I love my dog
	Because I have chosen to bring them into my home, I am responsible for them
	Obligations to dogs are socially expected
	It is a give-and-take relationship- the dog provides a service (companionship, guarding, work, guide etc.) and in return we look after them

General Attitudes Towards Caring

No.	Statement about looking after dogs	Disagree Strongly	Disagree	Neither Agree nor Disagree	Agree	Agree Strongly
1	Dogs are easy to look after					
2	Little knowledge is required to					

	look after dogs properly					
3	Little time is required to look after dogs appropriately					
4	Dogs are high maintenance pets					
5	What we do impacts on our dog's well-being					
6	How I manage my dog affects his/her behaviour					
7	My actions have **no** impact on my dog's behaviour					
8	I do not always have time to meet my dog's needs					
9	My dog's welfare is dependent on my actions					
10	My dog is a member of the family					

Behaviour Specific Attitudes

	Target Behaviour	A,C,N	Statement
1.	**Preventative health measures**		
	Worming & Flea	A	Dogs should receive preventative treatment for fleas and intestinal worms regularly
		A	Flea and worming treatment isn't important
		A	Getting fleas or worms isn't that bad for a dog
		C	Flea and worming treatments are too expensive
		C	It is too hard to give my dog flea and worming treatments
		C	It is hard to remember to give my dog regular flea and worming treatments
		N	My vet would expect me to treat my dogs for fleas and worms regularly
		N	My friends would think it unnecessary to treat my dog for fleas and worms regularly
		N	My family would disapprove if I didn't treat my dog for fleas and worms regularly
	Vet check ups & Vaccination	A	Dogs only need to go to the vet when there is something wrong
		A	Vaccinations and regular (yearly) vet check ups are important to keep my dog healthy
		A	Vaccinations and regular (yearly) vet check ups protect my dog from disease
		C	Vaccinations and vet check ups (no apparent illness) are too expensive
		C	I don't have the time to take my dog to the vet for check ups and vaccinations
		C	Its too much trouble to take my dog to the vet when there's nothing wrong
		N	My family would expect me to take my dog for annual check ups
		N	My vet would expect to see my dog once a year
		N	My friends would disapprove if I didn't take my dog for vaccinations and check ups

3.	**Enrichment**	A	Dogs need mental stimulation to be happy and healthy
		A	Toys and enrichment items (puzzles, food dispensing items) are a good source of mental stimulation
		A	My dog doesn't need toys or enrichment items
		C	Dog toys and enrichment items are too expensive
		C	I don't have time to prepare enrichment items for my dog
		C	Preparing enrichment items for my dog requires too much effort
		N	My vet would think toys and enrichment items are unnecessary
		N	My friends would expect me to provide my dog with toys and enrichment items
		N	My family would disapprove if I didn't provide my dog with enrichment
4.	**Exercise** Walking	A	Walking exercise is important for dogs to be happy and healthy
		A	It is important to walk my dog regularly
		A	Walking my dog is good for them
		C	I don't have the time to walk my dog as often as I should
		C	Walking my dog requires too much effort
		C	I can't control my dog well enough to take them for a walk
		N	My vet would disapprove if I didn't walk my dog
		N	My friends would think it unnecessary for me to walk my dog regularly
		N	My family would expect me to walk my dog regularly
5.	**Interaction** Spending time	A	Dogs are happiest when they are with their human companions
		A	Spending time with my dog is important for his/her wellbeing
		A	My dog doesn't care if I spend time with them
		C	I don't have enough time to spend with my dog
		C	Spending time with my dog requires too much effort
		C	I have more important things to do than spend time with my dog
		N	My vet would think spending time with my dog is important
		N	My friends would expect me to spend time with my dog
		N	My family would approve of me spending time with my dog
	Playing	A	Playing with my dog makes them happy
		A	It is important to play with your dog
		A	Playing with my dog is not necessary for their wellbeing
		C	I don't have the time to play with my dog
		C	Playing with my dog requires too much energy
		C	I am too busy to play with my dog
		N	My vet would not expect me to play with my dog
		N	My friends would approve of me playing with my dog
		N	My family would think I should play with my dog
	Petting	A	Petting dogs (patting, stroking, cuddling etc.) is unnecessary for their wellbeing
		A	My dog enjoys being petted (patting, stroking, cuddling etc.)
		A	Petting (patting, stroking, cuddling etc.) my dog is good for them
		C	I don't have time to pet my dog
		C	Petting my dog requires too much effort
		C	I can't control my dog when I'm petting them
		N	My vet would not think petting is important for dogs
		N	My friends would expect me to pet my dog

N	My family would disapprove if I didn't pet my dog

Section C. Values – *Universal Values*

Below are statements that describe different people. For each statement please indicate on the scale how much each person described is or is not similar to you.

1	2	3	4	5	6
Not at all like me	Not like me	A little like me	Somewhat like me	Like me	Very much like me

Power- Dominance
C1a. She wants people to do what she says.
C1b. It is important to her to be the most influential person in any group.
C1c. It is important to her to be the one who tells others what to do.

Power- Pets
C2a. She wants her companion animal to obey her commands
C2b. Having control over her companion animal is important to her
C2c. It is important to her to be 'the boss' of her companion animal

Benevolence- dependability
C3a. It is important to her to be loyal to those who are close to her.
C3b. She goes out of her way to be a dependable and trustworthy friend.
C3c. She wants those she spends time with to be able to rely on her completely.

Benevolence-caring
C4a. It's very important to her to help the people dear to her.
C4b. Caring for the well-being of people she is close to is important to her.
C4c. She tries always to be responsive to the needs of her family and friends.

Benevolence- Pets (in-group)
C5a. It is important to her to care for her companion animal.
C5b. She cares strongly about the welfare of her companion animal.
C5c. She tries hard to understand and respond to her companion animal's needs.

Universalism- concern
C6a. Protecting society's weak and vulnerable members is important to her.
C6b. She thinks it is important that every person in the world have equal opportunities in life.
C6c. She wants everyone to be treated justly, even people she doesn't know.

Universalism- tolerance
C7a. She works to promote harmony and peace among diverse groups.
C7b. It is important to her to listen to people who are different from her.
C7c. Even when she disagrees with people, it is important to her to understand them.

Universalism- Animals (out-group)
C8a. She appreciates and respects all animals equally.
C8b. She cares about the welfare of all animals.
C8c. Protecting the welfare of all animals is important to her.

Section D. Dog Ownership- *Management Behaviours*

This section contains questions relating to the ownership of dogs.

D1. How often does [dog's name] receive the following husbandry practices?

D1a. Worming (Intestinal)

Every 3 months	☐
Every 6 months	☐
Yearly	☐
When I remember (sporadic)	☐
When I think they might have worms	☐
Never	☐

D1b. Flea Control

Monthly	☐
Every 3 months	☐
Every 6 months	☐
Yearly	☐
When I remember (sporadic)	☐
When I think they have fleas	☐
Never	☐

D1c. Veterinary check-up and vaccination (no apparent illness)

Yearly	☐
Every 3 years	☐
Never- only when there's a problem	☐
Never- dog has never been to vet	☐

D2a. Do you regularly provide [dog's name] with any toys, playthings or puzzles?

| Yes | ☐ |
| No | ☐ |

D2b. If yes, please indicate what types of toys [dog's name] has access to on a regular basis (you may select more than one)

Food dispensing toys (e.g. Kong, food puzzles, milk cartons)	☐
Plush/soft toys (e.g. stuffed animals)	☐
Ball	☐
Rope	☐
Squeaky/noise making toys	☐
Other interactive toys e.g. automatic ball throwers, lasers	☐
Other	☐
Please specify_____	

D2c. How often do you rotate toys or purchase new ones?

Yearly	☐
Every few months	☐
Monthly	☐
Weekly	☐
Daily	☐

D3. Do you provide any other forms of environmental enrichment for [dog's name] e.g. wading pool, digging pit, radio, TV?

No	☐
Yes	☐
Please specify_____	

D4. On average how often is [dog's name] taken for a walk?

Frequency of walking
More than once a day ☐
Once a day ☐
Several times per week ☐
Once a week ☐
Less than once a week ☐
Never ☐
If never, is there a behavioural or medical reason [dog's name] cannot be walked?
_____

D5. Does [dog's name] get any other form of exercise, and if so what type?

No ☐
Yes ☐
Please specify_____

D6a. How many hours are you at home (and awake) on an average **weekday**?
_____

D6b. How much time do you or other members of your household **usually** spend with [dog's name] on a **weekday**?

Time spent interacting (weekday)
None ☐
Less than 1hr per day ☐
1-2hrs per day ☐
More than 3hrs per day   ` ☐

D7a. How many hours are you at home (and awake) on an average **weekend** day?
_____

D7b. How much time do you or other members of your household **usually** spend with [dog's name] on a **weekend** day?

Time spent interacting (weekend)
None ☐
Less than 1hr per day ☐
1-2hrs per day ☐
More than 3hrs per day   ` ☐

D8. How often do you actively play with [dog's name] e.g. fetch, tug of war, wrestling, chase-y etc.?

Frequency of Play
More than once a day ☐
Once a day ☐
Several times per week ☐
Once a week ☐
Less than once a week ☐
Never ☐

D9. How often do you pet [dog's name] (e.g. pat, stroke, cuddle etc.)?

Frequency of petting
Many times a day ☐
A few times a day ☐
Once a day ☐
Several times per week ☐
Once a week ☐
Less than once a week ☐

Never ☐

Section E. About your dog – *Inferring dog welfare*

E1. How often does [dog's name] get fleas?
Always ☐   Often ☐   Occasionally ☐ Rarely ☐   Never ☐

E2. How often does [dog's name] get worms?
Always ☐   Often ☐   Occasionally ☐ Rarely ☐   Never ☐

E3. Please indicate which image below best illustrates [dog's name]'s shape
1 ☐   2 ☐   3 ☐   4 ☐   5☐

1.   2.

3.   4.

5.
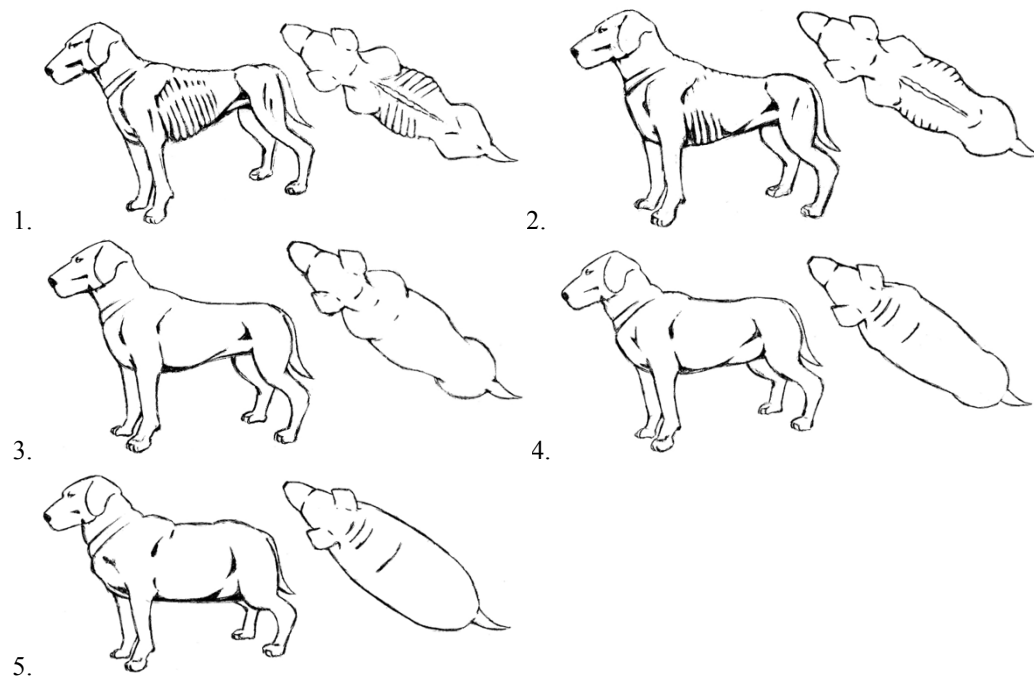
E4. Does [dog's name] show any behaviour that you consider a problem? (If YES, please specify)

Yes   ☐ _____
No   ☐

E5. Does [dog's name] display any of the following behaviours?

		1	2	3	4	5
1.	Excessive barking	always	often	sometimes	rarely	never
2.	Howling	always	often	sometimes	rarely	never
3.	Whining	always	often	sometimes	rarely	never
4.	Excessive digging, chewing or destructive behaviour	always	often	sometimes	rarely	never
5.	Urinating or defecating in inappropriate places	always	often	sometimes	rarely	never
6.	Escapes property/Roams	always	often	sometimes	rarely	never
7.	Pacing, tail chasing or spinning (spinning around in a circle	always	often	sometimes	rarely	never

	repetitively)					
8.	Nervousness	always	often	sometimes	rarely	never
9.	Overexcitement	always	often	sometimes	rarely	never
10.	Constant running around	always	often	sometimes	rarely	never
11.	Obsessive licking of self, others or objects	always	often	sometimes	rarely	never
12.	Obsessive chewing or biting of self	always	often	sometimes	rarely	never
13.	Hiding	always	often	sometimes	rarely	never
14.	Listlessness/depression	always	often	sometimes	rarely	never
15.	Play (with toys, people or other dogs)	always	often	sometimes	rarely	Never

Zero-order correlations between Values and Dog Belief variables (n=730)

		Values						Dog Beliefs			
		Benevolence (Humans)	Universalism (Humans)	Power (Humans)	Benevolence (Pets)	Universalism (Animals)	Power (Pets)	Capacities	Status	General Feelings Towards Dogs	Pain
Values	Benevolence (Humans)	-									
	Universalism (Humans)	.460**									
	Power (Humans)	.038	-.060								
	Benevolence (Pets)	.377**	.280**	-.100**							
	Universalism (Animals)	.357**	.369**	-.068	.383**						
	Power (Pets)	.111**	.057	.271**	.112**	.007					
Dog Beliefs	Capacities	.278**	.264**	-.017	.346**	.390**	.020				
	Status	-.129**	-.192**	.164**	-.213**	-.299**	.203**	-.343**			
	General Feelings Towards Dogs	.116**	.098**	-.013	.212**	.303**	.012	.350**	-.198**		
	Pain	-.077*	.098**	.114**	-.143**	-.171**	.006	-.181**	.172**	-.047	
	Independent	.003	.044	.069	-.086*	.050	.026	.094**	-.060	.068*	.011

****. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).**

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero Order correlations between demographics and dog belief variables (n= 937 except for correlations with dog age where n=726)

		Demographics									Dog Beliefs			
		Gender	Age	Number of adults in house	Number of children in house	Education	Employm-ent	Location	Number of dogs	Dog's age	Capacities	Status	General Feelings Towards Dogs	Pain
Demographics	Gender	-												
	Age	-.065*												
	Number of adults in house	.031	-.209**											
	Number of children in house	-.057	-.043	.066*										
	Education	.056	-.010	-.037	-.036									
	Employment	.120**	.115**	.032	.135**	-.115**								
	Location	-.003	.200**	-.070*	.064	-.060	.053							
	Number of dogs	.021	.089**	.076*	-.011	-.098**	.031	.298**						
	Dog's Age	.055	.257**	.001	-.014	-.001	.039	.022	.048					
Dog Beliefs	Capacities	.120**	-.001	-.019	-.053	-.089**	.009	.000	.086**	.038				
	Status	-.062	.041	.057	.089**	.035	-.046	-.019	-.065*	.007	-.343**			
	General Feelings Towards Dogs	.099**	-.063	.016	-.104**	-.119**	-.034	-.051	.132**	.073*	.350**	-.198**		
	Pain	-.063	.035	-.007	.021	-.025	.012	.030	.006	-.029	-.181**	.172**	-.047	
	Independent	.051	-.055	.074*	.043	-.015	.032	.019	.030	-.046	.094**	-.060	.068*	.011

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between dog beliefs and duty beliefs (why) (n=931)

		Dog Beliefs/Attitudes					Duty Beliefs (Why)						
		Capacities	Status	General Feeling	Pain	Independent	Property	Law	Dependent	Love	Choice	Social	Mutual
Dog Beliefs/Attitudes	Capacities												
	Status	-.343**											
	General Feelings Towards Dogs	.350**	-.198**										
	Pain	-.181**	.172**	-.047									
	Independent	.094**	-.060	.068*	.011								
Duty Beliefs (Why)	Property	.079*	-.255**	.053	-.157**	-.028							
	Law	.006	-.010	-.027	.001	-.059	.078*						
	Dependent	-.070*	.108**	.016	.045	.039	-.224**	-.184**					
	Love	-.163**	.139**	-.226**	.041	-.039	-.269**	-.227**	-.173**				
	Choice	.074*	-.014	.092**	.089**	.030	-.229**	-.225**	-.040	-.136**			
	Social	-.018	.084*	-.023	.069*	.030	-.335**	-.139**	-.146**	.061	.024		
	Mutual	.035	.043	.042	-.003	.026	-.364**	-.385**	-.256**	.096**	-.031	-.204**	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between dog beliefs and duty beliefs (what) (n=937)

		Dog Beliefs					Duty Beliefs (What)	
		Capacities	Status	General Feeling	Pain	Independent	Positive	Negative
Dog Beliefs	Capacities	-						
	Status	-.343**						
	General Feelings Towards Dogs	.350**	-.198**					
	Pain	-.181**	.172**	-.047				
	Independent	.094**	-.060	.068*	.011			
Duty Beliefs (What)	Positive	.548**	-.421**	.351**	-.158**	.046		
	Negative	-.295**	.376**	-.152**	.153**	.033	-.323**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .02 | highlighted in orange
Correlations between variables of *different* model elements > | .02 | highlighted in red

Zero-order correlations for Duty beliefs (Why) and Duty Beliefs (What) (n=931)

		Duty Beliefs (why)							Duty Beliefs (What)	
		Property	Law	Dependent	Love	Choice	Social	Mutual	Positive	Negative
Duty Beliefs (Why)	Property	-								
	Law	.078*								
	Dependent	-.224**	-.184**							
	Love	-.269**	-.227**	-.173**						
	Choice	-.229**	-.225**	-.040	-.136**					
	Social	-.335**	-.139**	-.146**	.061	.024				
	Mutual	-.364**	-.385**	-.256**	.096**	-.031	-.204**			
Duty Beliefs (What)	Positive	.134**	-.026	-.108**	-.154**	.106**	-.011	.011		
	Negative	-.117**	-.066*	.140**	.033	.087**	-.047	.022	-.323**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between Duty beliefs (what) and Care Beliefs (duty belief n= 937 care beliefs n=921)

		Duty Beliefs (What)		Care Beliefs	
		Positive	Negative	Responsibility	Resources
Duty Beliefs (What)	Positive	-			
	Negative	-.323**			
Care Beliefs	Responsibility	.603**	-.413**		
	Resources	-.120**	.164**	-.120**	-

** Correlation is significant at the 0.01 level (2-tailed)
Correlations between variables within the *same* model element > | .02 | highlighted in orange
Correlations between variables of *different* model elements > | .02 | highlighted in red

Zero-order correlations for Care beliefs and health related Theory of Planned Behaviour elements (n=887)

		Care Beliefs		Flea & Worm TPB			Vet Check & Vaccination TPB		
		Responsibility	Resources	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs
Care Beliefs	Responsibility	-							
	Resources	-.120**							
Flea & Worm TPB	Behavioural Beliefs	-.303**	.055						
	Control Beliefs	-.350**	-.002	.338**					
	Normative Beliefs	.287**	.021	-.501**	-.261**				
Vet Check & Vaccination TPB	Behavioural Beliefs	.293**	-.074*	-.505**	-.315**	.376**			
	Control Beliefs	-.344**	.066*	.326**	.530**	-.238**	-.539**		
	Normative Beliefs	.271**	-.035	-.338**	-.262**	.448**	.629**	-.397**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between care beliefs and enrichment related Theory of Planned Behaviour elements (n=840)

		Care Beliefs		Enrichment TPB			Walking TPB		
		Responsibility	Resources	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs
Care Beliefs	Responsibility	-							
	Resources	-.120**							
Enrichment TPB	Behavioural Beliefs	.458**	-.233**						
	Control Beliefs	-.361**	.055	-.512**					
	Normative Beliefs	.259**	-.090**	.486**	-.449**				
Walking TPB	Behavioural Beliefs	.432**	-.146**	.367**	-.276**	.230**			
	Control Beliefs	-.350**	.004	-.242**	.417**	-.171**	-.412**		
	Normative Beliefs	.262**	-.078*	.292**	-.250**	.450**	.513**	-.259**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between care beliefs and interaction related Theory of Planned Behaviour elements (n=791)

		Care Beliefs		Spending Time			Play			Petting		
		Responsibility	Resources	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs
Care Beliefs	Responsibility	-										
	Resources	-.120**										
Spending Time	Behavioural Beliefs	.535**	-.138**									
	Control Beliefs	-.465**	.042	-.472**								
	Normative Beliefs	.381**	-.090*	.427**	-.278**							
Play	Behavioural Beliefs	.491**	-.169**	.575**	-.399**	.407**						
	Control Beliefs	-.455**	.029	-.378**	.722**	-.283**	-.393**					
	Normative Beliefs	.366**	-.107**	.368**	-.255**	.772**	.440**	-.293**				
Petting	Behavioural Beliefs	.415**	-.027	.512**	-.339**	.340**	.462**	-.348**	.323**			
	Control Beliefs	-.539**	.105**	-.500**	.563**	-.382**	-.497**	.527**	-.359**	-.500**		
	Normative Beliefs	.339**	-.077*	.374**	-.247**	.684**	.394**	-.252**	.735**	.447**	-.388**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations for health related Theory of Planned Behaviour elements and associated reported carer behaviours (n=)

		Flea and Worm prevention (TPB)			Vet Check and Vaccination (TPB)			Reported Behaviour		
		Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Flea treatment	Worming	Vet Check and Vaccination
Flea and Worm prevention (TPB)	Behavioural Beliefs	-								
	Control Beliefs	.338**								
	Normative Beliefs	-.501**	-.261**							
Vet Check and Vaccination (TPB)	Behavioural Beliefs	-.505**	-.315**	.376**						
	Control Beliefs	.326**	.530**	-.238**	-.539**					
	Normative Beliefs	-.338**	-.262**	.448**	.629**	-.397**				
Reported Behaviour	Flea treatment	.370**	.253**	-.312**	-.373**	.204**	-.259**			
	Worming	.404**	.317**	-.322**	-.387**	.246**	-.259**	.528**		
	Vet Check and Vaccination	.267**	.185**	-.209**	-.582**	.363**	-.429**	.297**	.400**	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations for enrichment related Theory of Planned Behaviour elements and associated reported carer behaviours. Sample size (N) for each correlation listed separately in table.

			Enrichment (TPB)			Walking (TPB)			Reported Behaviour				
			Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Toys	Toy rotation	Other enrichment	Walking	Other exercise
Enrichment (TPB)	Behavioural Beliefs	r	-										
		N											
	Control Beliefs	r	-.512**										
		N	854										
	Normative Beliefs	r	.486**	-.449**									
		N	854	854									
Walking (TPB)	Behavioural Beliefs	r	.367**	-.276**	.230**								
		N	840	840	840								
	Control Beliefs	r	-.242**	.417**	-.171**	-.412**							
		N	840	840	840	840							
	Normative Beliefs	r	.292**	-.250**	.450**	.513**	-.259**						
		N	840	840	840	840	840						
Reported Behaviour	Toys	r	.439**	-.293**	.315**	.087*	-.122**	.129**					
		N	725	725	725	725	725	725					
	Toy rotation	r	-.215**	.158**	-.154**	-.030	.096*	-.074	.ᶜ				
		N	634	634	634	634	634	634	634				
	Other enrichment	r	-.251**	.168**	-.154**	-.033	.077*	-.015	-.235**	.183**			
		N	714	714	714	714	714	714	714	634			
	Walking	r	-.115**	.155**	-.034	-.409**	.437**	-.253**	-.117**	.061	.043		
		N	714	714	714	714	714	714	714	634	714		
	Other exercise	r	-.114**	.097**	-.028	.065	-.001	.047	-.123**	.056	.119**	-.002	
		N	714	714	714	714	714	714	714	634	714	714	-

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
c. Cannot be computed because at least one of the variables is constant.

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations for interaction related Theory of Planned Behaviour elements and associated reported carer behaviours. Sample size (N) for each correlation listed separately in table.

			Spending time			Play			Petting			Reported Behaviour			
			Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Behavioural Beliefs	Control Beliefs	Normative Beliefs	Time Spent Weekday	Time Spent Weekend	Play	Petting
Spending time (TPB)	Behavioural Beliefs	r													
		N													
	Control Beliefs	r	-.472**												
		N	819												
	Normative Beliefs	r	.427**	-.278**											
		N	819	819											
Play (TPB)	Behavioural Beliefs	r	.575**	-.399**	.407**										
		N	806	806	806										
	Control Beliefs	r	-.378**	.722**	-.283**	-.393**									
		N	806	806	806	806									
	Normative Beliefs	r	.368**	-.255**	.772**	.440**	-.293**								
		N	806	806	806	806	806								
Petting (TPB)	Behavioural Beliefs	r	.512**	-.339**	.340**	.462**	-.348**	.323**							
		N	791	791	791	791	791	791							
	Control Beliefs	r	-.500**	.563**	-.382**	-.497**	.527**	-.359**	-.500**						
		N	791	791	791	791	791	791	791						
	Normative Beliefs	r	.374**	-.247**	.684**	.394**	-.252**	.735**	.447**	-.388**					
		N	791	791	791	791	791	791	791	791					
Reported Behaviour	Time Spent Weekday	r	-.190**	.248**	-.095*	-.130**	.224**	-.110**	-.144**	.183**	-.076*				
		N	714	714	714	714	714	714	714	714	714				
	Time spent Weekend	r	-.145**	.143**	-.077*	-.129**	.131**	-.074*	-.070	.154**	-.044	.625**			
		N	714	714	714	714	714	714	714	714	714	714			

96

Play	r	-.143**	.186**	-.151**	-.345**	.278**	-.225**	-.129**	.179**	-.184**	.128**	.091*	
	N	714	714	714	714	714	714	714	714	714	714	714	
Petting	r	-.220**	.176**	-.148**	-.221**	.151**	-.137**	-.267**	.173**	-.203**	.192**	.203**	.197**
	N	714	714	714	714	714	714	714	714	714	714	714	714

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red

Zero-order correlations between reported carer behaviour and animal welfare measures. Sample size (N) for each correlation listed separately in table.

			Carer Behaviour												Animal Welfare Measures						
			Worming	Flea treatment	Vet Check & Vaccination	Toys	Toy rotation	Other enrichment	Walking	Other exercise	Time spent (weekday)	Time spent (weekend)	Play	Petting	Flea frequency	Worm frequency	Body Condition	Problem behaviour	Inappropriate elimination	Arousal	Anxiety
Carer Behaviour	Worming	r																			
		N																			
	Flea treatment	r	.528**																		
		N	725																		
	Vet Check & Vaccination	r	.400**	.297**																	
		N	725	725																	
	Toys	r	-.121**	-.123**	-.120**																
		N	725	725	725																
	Toy rotation	r	.080*	.149**	.088*	.c															
		N	634	634	634	634															
	Other enrichment	r	.118**	.107**	.097**	-.235**	.183**														
		N	714	714	714	714	634														
	Walking	r	.141**	.113**	.102**	-.117**	.061	.043													
		N	714	714	714	714	634	714													
	Other exercise	r	.053	.019	-.001	-.123**	.056	.119**	-.002												
		N	714	714	714	714	634	714	714												
	Time spent (Weekday)	r	.067	.050	.093*	-.049	.120**	.092*	.108**	.066											
		N	714	714	714	714	634	714	714	714											
	Time spent (Weekend)	r	.019	-.001	.100**	-.049	.126**	.093*	.097**	.082*	.625**										
		N	714	714	714	714	634	714	714	714	714										

Play	r	.059	.107**	.084*	-.384**	.213**	.159**	.097**	.181**	.128**	.091*									
	N	714	714	714	714	634	714	714	714	714	714									
Petting	r	.136**	.138**	.120**	-.096*	.134**	.118**	.090*	.005	.192**	.203**	.197**								
	N	714	714	714	714	634	714	714	714	714	714	714								

Animal Welfare measures																						
Flea frequency	r	.086*	-.003	.112**	-.086*	.146**	.081*	-.007	.053	.161**	.156**	.074*	.110**							
	N	705	705	705	705	625	705	705	705	705	705	705	705							
Worm frequency	r	.089*	.080*	.150**	-.084*	.105**	.060	-.067	.034	.080*	.138**	.042	.115**	.439**						
	N	705	705	705	705	625	705	705	705	705	705	705	705	705						
Body Condition	r	-.025	-.021	.000	-.010	.011	-.001	.011	.008	.035	.019	.046	.048	.023	.172**					
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705					
Problem behaviour	r	-.023	-.029	-.055	.081*	-.033	-.053	-.022	-.037	-.049	-.018	-.038	-.004	-.033	-.059	-.012				
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705	705				
Inappropriate elimination	r	.062	.042	.091*	-.019	-.026	.039	.118**	.063	-.005	.037	.014	-.019	-.020	-.014	.033	.104**			
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705	705	705			
Arousal	r	-.035	-.085*	-.031	.200**	-.096*	-.013	.023	-.107**	.010	-.004	-.253**	-.031	-.041	-.144**	-.045	.191**	.136**		
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705	705	705	705		
Anxiety	r	.058	.016	.044	-.011	.050	.034	.134**	.117**	.023	.017	.093*	.019	.095*	.043	.002	.210**	.057	.000	
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705	705	705	705	705	
Boredom	r	.079*	-.005	.058	-.093*	.039	.029	.072	.005	.119**	.126**	.079*	.072	.070	.010	-.007	.230**	.080*	.000	.000
	N	705	705	705	705	625	705	705	705	705	705	705	705	705	705	705	705	705	705	705

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Correlations between variables within the *same* model element > | .2 | highlighted in orange
Correlations between variables of *different* model elements > | .2 | highlighted in red