Testing the Theory that Pets can help to Alleviate Loneliness

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Abbreviations used in this thesis

6-CLS	The six new complementary loneliness scales
AAT	Animal Assisted Therapy
CDM	Cognitive Discrepancy Model
LDS	Loneliness Distress Scale
PANAS	The Positive Affect/Negative Affect Scale
PGWB	Psychological General Well-Being
PWA	People with AIDS
SEM	Structural Equation Modelling
SWB	Subjective Well-Being
UCLA-LS	The UCLA Loneliness Scale
Busy	The 6-CLS scale measuring a need to keep busy to avoid feeling lonely
Care	The 6-CLS scale measuring a need to care for others
Esteem	The 6-CLS scale measuring a desire to feel valued, needed, understood and loved
Image	The 6-CLS scale measuring a desire not to appear lonely
Share	The 6-CLS scale measuring a need to share
Tactile	The 6-CLS scale measuring a need for tactile affection

Acknowledgements

Declarations

The data analysed in Study I of this thesis was collected for two unpublished studies: McNicholas, Collis & Harker (1998); and Collis, McNicholas & Harker (1998).

The remainder of the work contained in this thesis is entirely that of the author and has not been previously published, or submitted for the fulfilment of another qualification.

The results of Study II were presented at the 10th International Conference on Human-Animal Interactions. Rio de Janeiro, Brazil, September, 2001.

The results of Study III were presented at the 10th International Conference on Human-Animal Interactions. Rio de Janeiro, Brazil, September, 2001.

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Thesis Summary

Loneliness is extremely common, highly unpleasant, and the health consequences have been reported to rival those of smoking and obesity (House et al., 1988). It is widely believed that pets can help to alleviate loneliness. This belief is consistent with research that suggests pets can provide companionship similar to that provided by humans.

Having first reviewed the literature on loneliness and the role of pets in providing companionship and alleviation of loneliness, a theory was articulated that pets should help to alleviate loneliness. The remainder of this thesis sought to test this theory.

Three hypotheses were derived from the theory that pets can help alleviate loneliness: pet owners will be less lonely than non-pet owners; pet separation will be associated or will lead to increased loneliness; and, pet acquisition will lead to decreased levels of loneliness.

Seven empirical studies were conducted, of which six directly tested one or more of the three hypotheses. Each hypothesis was tested at least twice. Amongst samples recruited from the general population, no quantitative evidence was found to reject any of the three null hypotheses: pet owners were no less lonely than non-pet owners; pet separation was neither associated with higher loneliness nor led to increased levels of loneliness; and pet acquisition did not lead to reduced levels of loneliness. There was some qualitative evidence that if people acquired a pet to help with loneliness they believed it was helpful.

These findings did not appear to be affected by whether or not the person-pet relationship was described as 'close' or the species of pet.

Amongst a sample of deaf people who were at high risk of loneliness, no evidence was found of that pet owners or hearing dog owners were less lonely than non-owners. Nor was there significant evidence that hearing dog acquisition led to lower levels of loneliness.

It was concluded that insofar as none of the three hypotheses were supported by the data, the theory that pets help to alleviate loneliness was not supported amongst the general population. It was proposed that the belief that pets alleviate loneliness might endure simply because it is a pleasing and agreeable belief. Alternatively, people may see what they want to see. However, it is also possible that the quantitative methods used in psychology simply fail to reflect the qualitative benefits of pet ownership, or that there are people for whom pets alleviate loneliness, but they are specific sub-groups of the population.

Loneliness

Humans and sociability

One of the defining characteristics of humans is that generally they are highly sociable. From an anthropological perspective, this single characteristic has been argued to explain much of humankind's apparent success in the world (Ridley, 1998). Humans are equally clear about the importance of being able to socialise with others. In an investigation of quality of life, when asked what was the most important part of their lives, 89% of people reported that their relationships with other people made their lives meaningful (Klinger, 1977). Consistent with this finding, people's relationships figure prominently in most forms of literature, rhetoric, films, song, dancing and art. These sources invariably portray interpersonal relationships as being fundamental to happiness.

There have been some detractors of the theory that humans are intrinsically sociable. For example, Putman (2000) suggested that Americans, once considered to be amongst the most sociable people on earth, are becoming a nation of loners who increasingly prefer solitary activities. Putman reported that thousands of clubs and fraternities have simply ceased to exist, because when the existing members die there are no longer people to take their place. Taking a more extreme view, Storr (1989) argued that isolation, rather than the company of other humans, is the source of true happiness and fulfilment.

In practice, most people choose to spend some time in the company of other people and some time alone. Whilst people report their interpersonal relationships to be important (Klinger, 1977), this does not mean that people need, or want, company every moment of the day. Such a notion would ignore the range of activities people choose for enjoyment (e.g., run marathons, read books, take long walks, swim, climb, meditate, garden).

Although generally people report that interpersonal relationships are the most important part of their lives, it does not follow that all people have the kinds of interpersonal relationships that they would like. When individuals perceive that the number, the quality or the availability of their interpersonal relationships do not reflect what they desire, it is argued they will experience a cluster of negative feelings (Fromm-Reichmann, 1959; Weiss, 1973; Zilboorg, 1938), which collectively have been labelled as loneliness (Peplau & Perlman, 1982).

The prevalence of loneliness

Evidence suggests that for a great many people loneliness is a problem. Bradburn (1969) claimed that 26% of those interviewed reported having felt very lonely or remote from other people within the last few weeks, and Rubenstein and Shaver (1982a) found that every month 35 million Americans were affected by loneliness, accounting for approximately 1 in 7 of the [1980] population. From a life-span perspective, Peplau and Perlman (1982) suggested that almost everybody would experience 'intense' loneliness at some time in their lives. Campbell (1981) found that 1 in 7 people admitted not having a friend in whom they could confide personal problems, a figure which rose to 1 in 6 when city dwellers were examined separately.

There is no indication that the high prevalence of loneliness in society is a temporary phenomenon. Weeks (1994) reported that 40% of the population have experienced some loneliness, and that this proportion has been relatively stable over the last 25 years. Similarly, Lindgren, Svardsudd and Tibblin (1994) reported that 42% of people felt lonely either sometimes or often.

Defining loneliness

Generally, there is an implicit understanding of what it means to be lonely. However, Marcoen and Goossens (1993) pointed out that non-scientific understanding tends to perceive loneliness as being virtually synonymous with being sad because one is objectively alone. This might imply that a person who visits a cinema, theatre or restaurant alone is lonely, whilst a person surrounded by their friends or family is not. In contrast, the view commonly held by social scientists improves upon this simple conceptualisation by emphasising the importance of understanding loneliness in qualitative or subjective terms. For example, Perlman and Peplau (1981) observed that "...people can be alone without being lonely, and lonely in a crowd" (p.3).

Perhaps surprisingly, there is no overall consensus amongst researchers as to how loneliness should be defined. Peplau and Perlman (1982) collated 12 different definitions of loneliness. For example, Gordon's (1976) definition that loneliness is a "...feeling of deprivation caused by the lack of certain kinds of human contact; the feeling that someone is missing" (Peplau & Perlman, 1982, p.4). This can be contrasted with Peplau and Perlman's (1982) 'Cognitive Discrepancy Model', which proposed that "...people experience loneliness when they perceive a discrepancy

between their actual and desired levels of interpersonal contact" (p.4). Whilst at face value these two definitions may appear similar, they differ fundamentally as to whether loneliness is best explained in terms of *affect*, or in terms of *attitude*. Presumably, there are so many different definitions of loneliness because they simply reflect the many different approaches there are for understanding psychology *per se*.

Theoretical approaches to loneliness

Perlman and Peplau (1982) reported eight different theoretical approaches to the study of loneliness: psychodynamic, phenomenological, existential-humanistic, sociological, interactionist, privacy, systems theory and cognitive. Each of these approaches varies to some degree as to what they state constitutes the nature of loneliness, the causes of loneliness and the type of evidence upon which each theory was formulated. More importantly, each theoretical approach also varies as to what is considered the solution to loneliness, if indeed any solutions are suggested.

Psychodynamic models of loneliness are drawn primarily from work carried out in a clinical setting and tend to view loneliness as pathological. Consistent with the way they perceive the origins of most psychological problems, psychodynamic theorists tend to attribute loneliness to childhood experiences. As such, the tendency is to focus primarily on factors within the individual as a means of resolving feelings of loneliness. Therapies attempt to make use of the transference between client and therapist to identify and resolve those conflicts which stem from childhood and make social bonding in adulthood problematic (Rook, 1984).

Phenomenological theorists, of whom Carl Rogers is a leading figure, also base their conceptualisation of loneliness upon work carried out in clinical settings and subsequently also believe loneliness to be intra-personal. In this perspective loneliness is seen as stemming from a discrepancy between one's actual and one's ideal self. Counselling is used to help clients grow through their current predicament. Rogers (1973) suggested that by encouraging a client-therapist relationship in which clients feel free and able to express themselves without fear of censure, their fear of rejection would be reduced and they would cease to be lonely.

The Existential Approach argues that loneliness is a normal human condition; an inextricable artefact of believing that no one can really understand another person's thoughts, aspirations, feelings or beliefs in exactly the way that they can themselves. Separateness, and by implication loneliness, is viewed as an essential part of our existence. In this sense, existentialists appear to view loneliness as a product neither of the person nor of the environment. To help overcome the negative thoughts associated with loneliness, existentialists suggest that those who are lonely should somehow be encouraged to overcome their fear of it (Rook, 1984).

The Sociological Approach to loneliness differs fundamentally from the psychodynamic and phenomenological approaches, and to a lesser extent the existential, by suggesting that loneliness is primarily a product of society, as opposed to being internally based. Bowman (1955) proposed three 'forces' that might lead to loneliness in members of a contemporary society: (1) a decline in primary group relations (e.g., the family); (2) an increase in family mobility; and (3) an increase in social mobility. Slater (1976) suggested that the main cause of loneliness in America is

the unrelenting societal pursuit of individualism, and that this thwarts the more basic needs of community and interdependence. There are some serious implications of the sociological view of loneliness, according to Fischer and Phillips (1982). They argued that when people are alone, they no longer benefit from social life, and that when a society has many such members, it is prone to crumble. Thus, for sociologists, the consequences of loneliness impact at both individual and societal levels. However, as plausible as these arguments are, evidence tends not to support the link between higher mobility and loneliness. Rubenstein and Shaver (1982a), for example, suggested that increased geographical mobility fails to predict loneliness, and that social mobility, in an upward direction at least, may actually predict lower levels of loneliness.

Interactionists believe that loneliness is the result of both internal and external causes, and that loneliness will occur when a person's social interactions are deficient in supplying crucial social requirements (Weiss, 1973). Weiss suggested that loneliness is a 'normal' condition that people will sometimes experience during their lives. Only when loneliness becomes a chronic problem is action necessary, and ideally this should not be allowed to occur.

The Privacy Approach, suggested by Derlega and Margulis (1982), uses the concepts of privacy and self-disclosure as a means of understanding loneliness. It is assumed that social relationships help an individual to achieve various goals and that loneliness is experienced if there is a lack of an appropriate social partner who can assist in achieving such goals. It is suggested that loneliness is most likely to occur when people lack the *privacy* necessary for honest communication. There is no evidence that this theory has inspired any further research.

The General Systems Approach views loneliness primarily as a feedback system for helping people maintain both a steady and an optimal level of human contact. In this sense loneliness might be viewed as an unpleasant, but necessary motivational force similar to physical needs, such as hunger or thirst, which drives people to seek affiliation with others. As people who co-operated in groups gain more advantages than those who strike out on their own, loneliness might be understood as the subjective manifestation of an evolved drive to affiliate (Wright, 1984). In support of this possibility, Flanders (1982) suggested that "loneliness is an adaptive feedback mechanism for bringing the individual from a current lack stress state to a more optimal range of human contact in quantity or form. Lack stress means too little of a given input, human contact in this instance" (p.170). Weiss (1973) also implied there is a motivational component to loneliness when stating that "the lonely are driven to find others" (p.15). Weiss (1973) suggested that "whilst investigating how loneliness came about may be of little applied use, it may, nevertheless, help to increase our acceptance of loneliness as a response - and as valuable - as hunger" (p.77).

The Cognitive Approach to loneliness (Peplau & Perlman, 1982) proposed that "...people experience loneliness when they perceive a discrepancy between their actual and desired levels of interpersonal contact" (p.4). Loneliness is viewed as the response to the perception that one's interpersonal relationships fall short of some internalised expectation (de Jong-Gierveld, 1978; Perlman & Peplau, 1981). Loneliness is therefore the result not only of the person's objective social relationships, but also the person's internal standard for how their relationships should be. The role of cognition, therefore, is as a mediating link between objective deficits in

a person's interpersonal relationships and their subjective experience of loneliness. Models of loneliness based upon this approach have become known as Cognitive Discrepancy Models (CDMs).

The Cognitive Approach was developed with normal populations and much of the understanding has been gained from surveys and experimental studies (Perlman & Peplau, 1982). Perlman and Peplau (1981) suggested that the CDM has been useful in helping to understand the literature and findings on loneliness that might otherwise tend to be somewhat paradoxical. For example, it can account for how a happily married person with many friends might feel lonely, but a single person with only a few friends might not feel lonely.

Peplau, Miceli and Morasch (1982) argued that a particular strength of the CDM is that it enables loneliness to be examined from the 'insider's' perspective, as attention is focused upon how the person perceives and evaluates their interpersonal relationships as opposed to how others might assess it. A further strength of this model is that it explains how, when a person's interpersonal relationships remain the same, if their desired standards are raised they might begin to feel lonely. For example, Larson, Csikszentmihalyi and Graef (1982) found that teenagers feel lonelier at weekends due to raised expectations for their social life at this time

Peplau and Perlman's (1982) CDM appears to have become the dominant theory for understanding the experience of loneliness. There are at least two reasons why this might be so. Firstly, of the eight theoretical approaches, the Cognitive Approach to loneliness is possibly the one best able to explain the contrast between objective and

subjective influences on loneliness. Secondly, the Cognitive Approach may have become widely accepted as an artefact of the means by which loneliness is commonly measured. As the most widely accepted measure of loneliness, Russell, Peplau and Cutrona's (1980) UCLA Loneliness Scale version 2 (UCLA-LS), is based upon a cognitive approach to loneliness, it follows that the CDM, if only by default, would also gain widespread acceptance.

There are, however, three potential problems with the Cognitive Approach to loneliness. Firstly, Archibald, Bartholomew and Marx (1995) contrasted the CDM with a Social Needs Model, where loneliness arises from objective deficits in social contact. They reported little support for the CDM, which appeared only marginally better than the Social Needs Model in predicting loneliness. However, supporting the CDM, Jones and Moore (1987) found that subjective evaluations of people's social relationships played an important role in determining levels of loneliness.

Secondly, it is paradoxical why psychologists utilise only cognitive evidence (e.g., the UCLA-LS) to establish loneliness, when it has been argued that for an accurate self-diagnosis of loneliness, several converging types of evidence are needed. For example, Peplau, Miceli and Morasch (1982) argued that cognitive, affective, and behavioural cues are necessary to determine a person is lonely. According to Peplau et al. (1982), if someone reported feeling unhappy, interacting with others less often than they would like, and believed that they were lonely, they could be reasonably sure that they were lonely. Similarly, Horowitz, French and Anderson (1982) reported that the major attributes of a lonely person fall into three clusters: 1) people's thoughts about being "different, isolated and separate from others" (p.16); 2) negative feelings, or affective

cues, such as sadness, anger and paranoia; and 3) actions, or behavioural cues, such as working long hours.

Thirdly, potentially the most serious problem with the CDM, relates to the axiom that loneliness can be accurately determined by measuring the discrepancy between a person's beliefs about actual and desired levels of interpersonal contact. According to the CDM of loneliness, as measured by the UCLA-LS, if two individuals believe their actual social relationships are equally short of their ideal, then the implication is that they should both be equally lonely. However, given that loneliness is actually the subjective response to a shortfall between actual and ideal levels of interpersonal relationships, then presumably the size of the discrepancy will not in practice be a perfect indicator of loneliness. Indeed, it is actually quite likely two people with the exact same discrepancy between ideal and actual levels of interpersonal relationships might experience quite different levels of loneliness. Thus, the inference that loneliness can be determined wholly by the discrepancy between ideal and actual levels of loneliness does not logically follow. This problem may be a result of the Cognitive Approach failing to take into account the phenomenological components of loneliness, beyond stating that they will occur if people believe they are lonely. Gordon (1976) warned against adopting such a narrow focus, arguing that trying to understand loneliness as the deprivation of either social contact or intimate relationships would not capture the emotions that accompany the experience of loneliness. However, in practice, this criticism does not appear to effect the ability of the UCLA-LS to discriminate between groups that might be expected to report different levels of loneliness (e.g., Russell et al., 1980)

Of the eight theoretical approaches discussed, it is apparent there are many different ways in which loneliness can be understood. Interestingly, the different approaches position loneliness anywhere on a continuum from pathological (e.g., psychodynamic) through normal (existential) to adaptive (general systems theorists) behaviour. Based upon the criteria of completeness and stimulation of research, Perlman and Peplau (1982) suggested that none of the eight approaches they report represent a true theory, although most have had some empirical support.

In an attempt to reconcile the different approaches to loneliness, Peplau and Perlman (1982) suggested that whilst frameworks for understanding loneliness might tend to differ somewhat, there are three main points upon which all tend to agree: 1) loneliness results from deficiencies in a person's social relationships; 2) the experience of loneliness is subjective – it is not necessarily synonymous with objective isolation; and 3) loneliness is unpleasant and distressing.

The phenomenology of loneliness

Although behaviours associated with loneliness have been explored in detail (e.g., Rubenstein & Shaver, 1982b), little empirical research has directly sought to explore the phenomenology of loneliness. The only exception appears to be some anecdotal observations about what it feels like to be lonely. For example, Weiss (1973) described loneliness as a gnawing distress without redeeming features, Zilboorg (1938) called loneliness an inner worm that gnaws at the heart, and Fromm-Reichmann (1959) described loneliness as painful, frightening and creating a sense of paralysing hopelessness and unalterable futility. Similarly, Peplau et al. (1982) reported that lonely people often *feel* worthless, incompetent and unlovable.

Consistent with these views, Serpell (1988) suggested that because loneliness is such a painful and unpleasant sensation, societies have used solitary confinement, exile and social ostracism as a means of punishing the most serious crimes and persistent offenders.

The structure of loneliness

When people talk about loneliness, they tend to talk about it as a unitary construct. Generally, people do not spontaneously seem to report experiencing specific sub-types of loneliness, but just state that they feel lonely. This is consistent with the view of loneliness argued by Russell et al. (1980), whose UCLA-LS was designed to provide a unidimensional rating of loneliness. However, whilst people tend to describe how they feel in unidimensional terms of being lonely or not lonely, it is plausible that at times a more specific level of analysis might be better suited to identifying differences between groups of people. For example, whilst two people might both describe feeling very lonely, it seems unlikely that the loneliness of a recently bereaved widow is qualitatively comparable to that of a teenage boy grounded for the weekend. Consistent with this possibility, a number of researchers have proposed several typologies that have attempted to divide loneliness into its component parts.

Weiss (1973) claimed that emotional and social loneliness were two distinct types of loneliness. Emotional loneliness was argued to be due to the lack of a close, intimate attachment to a particular person. Thus, someone with a fulfilling social life could nevertheless experience a crushing loneliness through the lack of a specific romantic partner. Conversely, social loneliness was argued to result from a perceived absence of friends, relatives or other form of general social network. This means that a person in a

happy relationship with a specific romantic partner might still experience unbearable levels of loneliness due to a perceived lack of friends.

Weiss's (1973) typology has received widespread support. For example, Russell, Rose, Cutrona and Yurko (1984) used two single items, each measured on a 9-point Likert scale, to measure social and emotional loneliness, which were reported as separate and orthogonal dimensions. Wittenberg and Reis (1986) also reported that loneliness comprises both emotional and social loneliness, although they found that both were moderately correlated. DiTommaso and Spinner (1997) suggested that emotional loneliness could be divided into romantic-emotional loneliness and family-emotional loneliness, each of which was moderately correlated. Schmidt and Sermat (1983) suggested that there are four components to loneliness: Romantic-Sexual loneliness, Friendship loneliness, Family loneliness and Loneliness in a larger group.

Young (1982) suggested that it is possible to distinguish between three types of loneliness based upon temporal differences. Transient loneliness, it is argued, applies to brief or occasional lonely moods. Situational loneliness can affect people who may have undergone some specific change in their life such as divorce, bereavement or moving to a new town. Chronic loneliness occurs when a person has lacked satisfactory social relationships for a long period. Perlman and Peplau (1984) suggest that the greatest attention should be invested in trying to stop situational loneliness from becoming chronic loneliness. Similarly, Shaver, Furman and Buhrmester (1985) suggested two temporally different types of loneliness, trait and state. Trait loneliness is described as a stable pattern of feeling lonely, one that changes little with the

situation. State loneliness is believed to be a temporary experience, often caused by a particular situation or event.

Russell et al. (1980) originally argued that loneliness is fundamentally a unidimensional construct. However, as it has since been argued that the UCLA_LS may have a multidimensional solution (Austin, 1983; Miller and Cleary, 1993; McWhirter, 1990), Russell (1996) tested several multidimensional solutions of the UCLA-LS (version 3) using confirmatory factor analysis, as implemented by the structural equation modelling programme LISREL VIII (Jörescog & Sörbom, 1993). The highest fitting solution (Adjusted Goodness of Fit Index = .96) was a 3-factor solution consisting of three highly correlated factors (r = .72 to .76): global loneliness; negatively worded items; and positively worded items. Russell (1996) suggested the 3 dimensional solution appears to represent differences associated with the way in which the items were worded, rather than different types of loneliness.

In an attempt to reconcile the many different types of loneliness, Cramer and Barry (1999) performed a factor analysis of 231 participants' responses to 21 derivative sub-scales from seven measures of loneliness (i.e., de Jong-Gierveld, 1987; Schmidt & Sermat, 1983; Russell et al., 1984; Wittenberg & Reis, 1986; Scalise, Ginter & Gerstein, 1984; Di Tommaso & Spinner, 1997; Russell, 1996). The results suggested the existence of four correlated factors (the eigenvalues were 10.16, 2.35, 1.56, and 1.16) that accounted for 73% of the total variance: social loneliness (48%), emotional loneliness (11%), negative affect (8%) and family loneliness (6%). The highest correlations were between social loneliness and the other three factors (r's of .46 to

.55) and the lowest ($r = .16$) was between emotional loneliness and family loneliness. Thus, it seems a lack of friends may be the key determinant of loneliness.

Although evidence supports the notion that there are different types of loneliness, research has not addressed how different types of loneliness combine to give an overall rating of loneliness. For example, if an individual reports moderate levels of two different types of loneliness (e.g., social loneliness and emotional loneliness), it is unclear whether they would be twice as lonely, in global terms, as a person reporting either social or emotional loneliness. In addition, it is unclear whether an individual suffering two types of loneliness would be twice as susceptible to health based consequences as a person experiencing only one type of loneliness.

Marcoen and Goossens (1993) argued that the overall lack of a working consensus on the structure of loneliness could strongly influence the outcome of any study. This has important implications for researchers of loneliness. For example, when attempting to compare the findings of several different studies, if each study has used a different means to conceptualise loneliness (e.g., Goldmeier, 1986 vs. Zasloff & Kidd, 1994), then comparisons between studies will need to be treated with caution.

Predicting loneliness

Peplau and Perlman (1982) reported that almost everyone is susceptible to loneliness, and that at times most people will experience intense loneliness. However, predicting who is most susceptible to loneliness can often prove to be somewhat counter intuitive. Duck (1983), for example, described how the "...ugly, arrogant, silly, diseased, greasy or foolish often have many friends" (p.141) and that, with regard to

choosing friends, "...people will tolerate a smelly extrovert, but not a beautiful social cripple" (p.142). Similarly, Gordon (1976) reported that loneliness does not show deference to intellect, wealth, class, race or righteousness. Whilst it appears that few people are immune to loneliness, research indicates there are many variables which may be useful for identifying groups of people at a greater risk of loneliness.

Age

It is popularly believed that old age and loneliness are closely associated, and there are at least three reasons why age might be expected to predict loneliness. Firstly, with increased age comes the end of full time employment when there may be less disposable-income to visit friends or family, less time spent with former colleagues, and more time in which to keep occupied. Secondly, as people get older, there is an increased likelihood of a partner or friends having died and a reduced ability to socialise due to failing health (Delisle, 1988; Roy, 1986; Rabasca, 1999). Thirdly, Gordon (1976) suggested that it is almost as if there is a policy of age segregation, whereby not only do different age groups not meet, but also they view each other with some degree of suspicion. America, it has been suggested, is dividing into component parts based upon age (Gordon, 1976), although this division may be less pronounced in collectivist cultures, or amongst emigrants from collectivist societies who live in the West and retain their original cultural ideologies. Although there have been many studies exploring the relationship of age to loneliness, it is important to be aware that age effects are notoriously difficult to investigate, as they can be susceptible to numerous sources of confounding (e.g., ability to remember, differential use of language, cohort).

Contrary to the notion that age and loneliness are synonymous, Tunstall (1967) found that only 15% of old people (over 65 years) reported that they often felt quite lonely, whilst Gubrium and Holstein (1991) found that old people tend to reject the idea that they could possibly be lonely. Comparing two different age groups, Perlman, Gerson and Spinner (1978) found that old people were less lonely than college students. In fact, it has consistently been found that loneliness peaks during adolescent years, rather than during old age (Blau, 1973; Cutrona, 1982; Dyer, 1974; Lowenthal, Thurner & Chiriboga, 1975; Rosow, 1962; Rubenstein & Shaver, 1982b; Shanas et al., 1968; Schultz & Moore, 1988; Townsend, 1957), and that adolescents, not old people, are lonelier than any other age group (Rubenstein & Shaver, 1982b; Shaver, Furman & Buhrmester 1985; Weiss, 1973).

Two explanations have been proposed to account for the failure to support the popular belief that age and loneliness are associated. Firstly, Rubenstein and Shaver (1982b) suggested that "...loneliness in old age is a result of poverty and ill health, not a characteristic of age *per se*" (p.218). Secondly, Peplau, Bikson, Rook and Goodchilds (1982) suggested the belief that old people are especially likely to be lonely may have arisen from the faulty syllogism that being old means being alone, which in turn means being lonely. Although evidence suggests that people are more likely to live alone as they grow old (Marquis, 1979), there is little evidence that this is accompanied by increased loneliness (Cantor, 1975; Fischer & Phillips, 1982). Shanas (1979) reported that older adults who live alone are typically not cut off from or rejected by their families, and that many live no more than 10 minutes from their adult children.

Larson, Csikszentmihalyi and Graef (1982) reported that on weekend evenings solitary adolescents are more likely to experience elevated levels of loneliness than solitary adults. Exploring why this might be so, they suggested that teenagers experience more loneliness at weekends, not because they have fewer contacts at that time, but because they expect to have more contacts at that time. If loneliness results from differences between the amount and the type of interpersonal contact a person receives and the amount they desire (Peplau & Perlman, 1982), then it follows that if people's expectations of interpersonal contact increase, then so too might feelings of loneliness.

Marital Status

Russell et al. (1980) found that students who were not dating at all were much lonelier than students who were dating casually, regularly or who were married. Amongst the non-married, those who had been previously married were the most likely to experience loneliness (Weiss, 1973). Similarly, Wells and Stacey (1998) reported that widows were more likely to be depressed because they were lonely more often. Stack (1998) found that in 16 out of 17 countries studied, marriage was associated with lower levels of loneliness although, overall, the effect was greater for men than it was for women. Tornstam (1992) reported the existence of gender differences in loneliness amongst married couples, with women tending to be lonelier than men. However, the effect was significant only for couples between 20 and 49 years old. This effect remained significant, even after expectations of intimacy and self-esteem had been taken into account.

Gender

Borys and Perlman (1985) suggested that there is a tendency to expect females to be lonelier than males, as females are commonly assumed to be more emotional and to manifest higher rates of certain mental illnesses. Koenig, Isaacs and Schwartz (1994) investigated this possibility starting with the observation that depression and loneliness are two characteristic problems of adolescence, and that in adolescence girls experience depression at twice the rate of boys. Since depression and loneliness are highly correlated, Koenig et al. (1994) reported surprise that it was boys, not girls, who tended to be lonelier. Two possible hypotheses for this paradox were tested. Firstly, there was a possibility of a gender-specific response bias, characterized by a denial of emotional distress for boys that differentially affected reports of depression versus loneliness. Secondly, there might be gender differences in the relationship between depression and loneliness, whereby depression has a greater association with loneliness for boys than girls. Koenig at al. (1994) found evidence to support their second hypothesis, but not the first.

In a review of 28 studies that explored loneliness and gender using the UCLA-LS, Borys and Perlman (1985) found that only 4 studies reported a significant gender effect, whereby males reported higher levels of loneliness. However, using the technique recommended by Rosenthal (1978) to combine the data of all of the studies, males were found to report higher levels of loneliness than females.

Borys and Perlman (1985) also reviewed the results of 11 studies that asked people to explicitly label themselves as either lonely or not lonely. Contrary to the findings of

the previous review, in all of the nine studies where there was a gender difference, females were more likely to label themselves as lonely. Borys and Perlman (1985) also tested whether people were more accepting of a lonely male than a lonely female and found that lonely females were more likely to be accepted than lonely males. In a replication of this study, Lau and Gruen (1992) also reported that lonely males were more stigmatized than lonely females, and that female perceivers were more critical than male perceivers toward the lonely target person. This implies that for males, the consequences of loneliness may be greater than for females.

In a longitudinal design study, Shaver et al. (1985) investigated loneliness in students who had moved from living at home to living at college, and found that the move was particularly stressful for males, for whom loneliness increased four times more than females. However, there may have been specific reasons why, as males' dating frequency was found to decline more than that of females'; a finding which was suggested to be due to a cultural norm whereby females tend to date older males. Accordingly, if males find themselves with fewer opportunities for forming intimate relationships, then they might also be at higher risk of loneliness.

Although a person's biological sex is normally fixed, Bem (1974) suggested that the degree to which people are representative of their gender can vary. The term 'androgyny' has been used to describe people who do not fit traditionally defined sex roles. Cramer and Neyedley (1998) explored whether a person's androgyny might affect the relationship between gender and loneliness. They assessed the magnitude of sex differences in loneliness, after accounting for the influence of masculinity and femininity, using the UCLA-LS and the Bem's (1974) Sex Role Inventory. Whereas

sex differences were originally non-significant, when participants' masculinity and femininity were partialled out, males were found to report higher levels of loneliness than females. Cramer and Neyedley (1998) argued that these findings support the hypothesis that traditional males appear reluctant to admit feelings of loneliness.

Social skills deficits

It is generally accepted that poor social skills are an important predictor of loneliness (Duck, 1998). It is easy to understand why this might be so, as people who talk only about themselves, invade another's personal space, disclose inappropriate levels or types of information, or who are simply perceived as rude may find making and keeping friends somewhat difficult. Consistent with this possibility, Goswick and Jones (1981) found that lonely college students reported greater self-focused attention, and may therefore have been less empathetic to others. Horowitz and French (1979) found that lonely students report problems such as inhibited sociability and difficulty making friends, introducing themselves and being friendly. They were also more likely to use coercive power to initiate friendships, a strategy unlikely to be effective in the long term (Gerson, 1978).

Salano and Koester (1989) found that lonely people reported higher levels of anxiety about their social skills irrespective of actual levels of social skill, and suggest this anxiety might be enough to actually cause loneliness. Consistent with a social skills deficit explanation of loneliness, people who are lonely believed themselves to have poorer social skills (Horowitz & French, 1979) and were perceived by others to be socially unskilled (Sloan & Salano, 1984). However, Christensen and Kashy (1998) examined the relationship between loneliness and interpersonal perception in initial

social interactions between students. They found that lonelier people viewed others more positively, themselves more negatively, and thought others viewed them more negatively. However, lonelier people were generally not viewed negatively by others, although they were viewed as friendlier. Similarly, Segrin and Kinney (1995), based on evidence linking social anxiety with social skills deficits, found that socially anxious persons did not elicit significantly more rejection from their conversational partners, but they did report being more lonely than non-anxious persons.

Jones (1982) identified three characteristics of the way that lonely people interact in conversations that were consistent with a social-skills deficit. Firstly, they make fewer references to the other person and also ask fewer questions of them. Secondly, they change the topic of conversation more often than non-lonely people. Finally, they tended to delay longer in filling gaps in the conversation than non-lonely people. Jones (1982) developed a social-skills training program to help students overcome these interpersonal deficits. This program, when compared to control and placebo groups, was found to produce the desired changes in students' interaction styles. These changes helped to reduce students' loneliness.

Segrin (1993) sought to determine whether social skills deficits are antecedents, concomitants, or consequences of psychosocial problems. In the first week of the semester, 406 students completed measures of various components of social skills, and the following psychosocial problems: depression, loneliness, substance abuse, and poor academic performance. Four months later, the same students again completed these measures. The results suggested that social skills deficits were correlates of depression and loneliness, but not poor academic performance or substance abuse, and

neither antecedents or consequences of loneliness or depression. However, Segrin (1999) found no evidence to suggest that social skills worsen over time as a function of experiencing depression, loneliness, or social anxiety, which suggests that social skill deficits are antecedents rather than consequences of loneliness.

Socio-economic status

Weiss (1982) reported that there is an inverse correlation between income level and loneliness. There are at least two reasons why this might be apparent. Firstly, people with low incomes may simply not be able to afford to go out and socialise with other people. Secondly, people on low incomes are most likely to live in high-rise flats, where affiliation is more difficult (Festinger, 1950), or to live in areas where inhabitants fear to venture outside their front door for fear of becoming a victim of crime. Using a sample of 7-11 year old school children, Asher, Hymel and Renshaw (1984) also found that low socio-economic status, a corollary of low income, was a significant predictor of loneliness ratings (measured by their 16-point scale).

Unemployment

Rubenstein, Shaver and Peplau (1979) found that loneliness was especially prevalent amongst the unemployed. Examining unemployment and loneliness in greater depth, Leeflang, Kleinhesselink and Spruit (1992) reported that a result of unemployment is a relative lack of socio-structural resources, low levels of social participation and emotional problems, which could clearly have an adverse impact upon loneliness. One important difference they reported was that among the urban unemployed, the perceived size of a person's social network was an explanatory factor, but among the rural unemployed perceived stigmatization was more important. A further possibility

is that ex-colleagues who remain employed find it difficult to keep in touch, or may feel a sense of embarrassment at still having their job, and avoid their old colleague.

Bereavement

Bereavement, like unemployment, leads to abrupt changes in the number of people that are available for social interactions. This could entail not just the loss of the loved person, but also friends and relatives who are unable to find the appropriate words and so avoid visiting. Grimby (1993) studied bereavement amongst the elderly and found that loneliness was the most persistent problem in the year following bereavement. VanBaarsen, Smit, Snijders and Knipscheer (1999), in a longitudinal study of people before and after the death of a partner, suggested that whilst bereavement leads to loneliness, differing aetiologies may predict particular types of loneliness. Specifically, being unable to anticipate their partner's death was related to higher levels of emotional loneliness. However, loneliness may not always be the outcome of bereavement. Byrne and Raphael (1997) studied conjugal bereavement in elderly Australian men over the 13-months subsequent to bereavement and found more anxiety and general distress, but not more loneliness or depression.

Modern lifestyles

It is commonly believed that 'people are not as friendly as they used to be', and that 'nowadays, people spend too much of their time working rather than socialising'. Victor et al. (2002) argued that there is a widespread assumption that loneliness and isolation have become more prevalent due to the decline of multi-generation households. If these ideas are true, it is plausible that loneliness would be more likely nowadays than when people were friendly and socialised. However, support for the

notion that loneliness is a product of modern society has proved somewhat equivocal. For example, Mijuskovic (1979) argued that "...man has always and everywhere suffered from feelings of acute loneliness" (p.9). Peplau and Perlman (1982) concurred, citing anecdotal evidence from The Bible where God, in the Book of Genesis, having created Adam, observed that man should not be alone, and that He will create him a helpmate. Similarly, using participants' self-rated reports of loneliness measured on scales from 'never' to 'always', Victor et al. (2002) found no evidence of differences in the overall prevalence of loneliness measured in 1945, 1960 and 1999.

Having interviewed Americans about various aspects of their lives in both 1957 and 1976, Veroff, Douven and Kulka (1981) suggested that "interpersonal intimacy has become a vehicle for personal fulfilment much more in 1976 than it was in 1957" (p.537). Consistent with their findings, Veroff et al. (1981), recorded an increase in the extent to which people turned to intimate relationships to deal with personal problems. Thus, if a person's expectations regarding interpersonal relationships increased, but was not mirrored by increased opportunities to socialise then increased loneliness might result.

Gordon (1976) suggested that high mobility, a corollary of modern life, is one of the causes of high levels of loneliness. Gordon (1976) reported that 40 million Americans change their residence once a year and that, on average, people move home 14 times in their life. Each move, it is claimed, tears apart the work invested in building friendships. However, Rubenstein and Shaver (1982a) found no evidence that loneliness and the number of times a person had moved were directly related.

Similarly, Fischer and Phillip (1982) suggested that after an initial adjustment period, there was little evidence to suggest that mobility led to isolation.

Whilst modern lifestyles are often blamed for many of the problems regarding interpersonal relationships, or the lack thereof, there may now be a tendency toward rebuilding relational ties. Campbell (1976) argued that America has moved from the economic goal of being well off, to the goal of a sense of well being, although not all agree with this assertion (e.g., Glassner, 1999; Moore, 2002; Putman, 2000).

Immigrant groups

Since the 1950's many workers have come to Britain from other countries. Many were in what might be perceived as less desirable occupations (e.g., cleaners and bus-drivers), although not exclusively so (e.g., the 1960's and 70's saw a large influx of medical workers, particularly from India and Pakistan). There have also been a large number of asylum seekers to the UK. When people can share their culture, language and experience with similar people, they are probably less likely to be lonely than when surrounded by people with whom they have little in common. For example, Pang (1995) investigated Korean immigrants to the USA and found that 50% reported loneliness to be an important daily problem.

Social capital

Research into interpersonal relationships consistently shows that perceived attractiveness bestows many advantages, particularly when predicting success in relationships (Walster, Aronson, Abrams & Rottman, 1966). This implies that attractiveness might be negatively associated with loneliness. Fortunately, Cacioppo et

al. (2000) explored the notion of social capital (the physical attractiveness, intelligence, height, weight, sociometric status, or scholastic achievements that a person brings to a relationship) and found that people with less social capital were no more likely to experience loneliness.

Self disclosure

Jourard (1959) suggested that the information people disclose to others is related to the level of intimacy they achieve with them. Worthy, Gary and Kahn (1969) reported that the process of disclosure is reciprocal, and that people will disclose less information to low self-disclosers, resulting in a self-perpetuating cycle of loneliness. As evidence suggests that lonely people tend not to disclose themselves to other people with whom they have contact (e.g., Berg & Peplau, 1982; Solano et al., 1982), it is easy to understand how this might adversely affect the process of friendship formation. Quite simply, for friendships to form and develop, the process of mutual self-disclosure is a prerequisite.

Physical illnesses

Evidence suggests that there are psychological components to most physical illnesses (Glaser et al., 1993; Evans, Clow & Hucklebridge, 1997). However, research also suggests that physical illnesses can affect many types of psychological functioning, such as the propensity toward loneliness. For example, Coclami and Bor (1993) found that amongst people with a physically based disease, those with diabetes are more likely to be lonely. Given the degree of stigmatisation attached to AIDS, it is probably not surprising that AIDS sufferers also report higher levels of loneliness (Carmack, 1991; Cherry & Smith, 1993). Similarly, Johnson et al. (2000) found that HIV sero-

positive men reported more loneliness than did men who tested HIV sero-negative. It has also been found that loneliness may be more common amongst those who have suffered brain injury (Harrick, Krefting, Johnston, Carlon & Minnes, 1994), who are deaf (Dugan & Kivett, 1994), or who have some sort of auditory disability (King & Stephens, 1992). Interestingly, amongst those with hearing impairment it has been found that those with a hearing dog reported lower levels of loneliness than those without a hearing dog (Hart, Zasloff & Benfatto, 1996). Higher levels of loneliness have also been reported amongst those with visual impairment, (Barron, Foxall, Vondollen, Jones & Shull, 1994), although the effect of a guide dog on loneliness has not been explored.

Clearly there are many factors associated with an increased risk of loneliness. However, the means by which multiple causes combine appears to have received little or no attention. For example, it is not known whether a young male who has recently become unemployed is at a greater risk of loneliness or at the same level of risk as any other young male.

The consequences of loneliness

The consequences of loneliness can be classified as either passive, which simply occur (such as depression and illness), or proactive, which are initiated by the person (such as drinking alcohol or excessive exercise). The two types of consequences will almost certainly not be mutually exclusive.

Passive consequences of loneliness

Lynch (1977) found that lonely people are more likely to have heart attacks, and noted that loners tend to adopt a pattern of work that may create health problems, such as infrequent meals and sleep patterns. One of the most common causes of death in the Western world is heart disease (Pitts & Phillips, 1998), and therefore the isolation of any single predictor of heart disease might benefit a substantial number of people, if help were available.

In a large-scale epidemiological study of people who had survived a myocardial infarction, Case, Moss, Case, McDermott and Eberly (1992) found that patients who lived with someone else were 79% less likely to experience another attack. However, this may not be directly attributable to reduced levels of loneliness. Companions may also be responsible for sorting out the stressful day-to-day hassles of everyday life or prompting adherence to a medication regime, rather than just reducing loneliness.

Bloom, Asher and White (1978) suggested that loneliness may be predictive of sleep disruption, anxiety, headaches and ulcers, and that people experiencing such disturbances are more likely to have more driving accidents, higher suicide rates and alcohol problems.

Amongst students, Goswick and Jones (1981) found that loneliness was associated with poor personality integration, neurosis, and general maladjustment as measured by the Tennesee Self Concept scale. Also using a student population, Diamant and Windholz (1981) found loneliness to be associated with aggressive tendencies, although it is

possible that students with aggressive tendencies may lack friends because people are simply unwilling or too frightened to associate with them.

Berkman and Syme (1979) reported that a lack of social relationships predicted mortality for a period of 9 years, after controlling for factors such as, health, smoking, alcohol, obesity, physical activity and use of preventative health services. The presence or extent of four types of social ties (marriage, contacts with family and friends, church membership and other formal or informal group affiliations) was used as an index of social relationships. People scoring low on this index were twice as likely to die as people scoring high on the index. However, House, Landis and Umberson (1988) point out that a limitation of this study was that the baseline measure of health was based on participants' self-reports.

House, Robbins and Metzner (1982) sought to replicate the findings of Berkman and Syme (1979) using a wide range of biomedically assessed risk factors of mortality (blood pressure, cholesterol, respiratory function and electrocardiograms) in addition to self-reported risk factors. They found that composite indexes of social relationships and activities were inversely associated with mortality during the succeeding 10- to 12-year period. However, although the risk factor for men was 2.0x to 3.0x, the risk factor for women was 1.5x to 2.0x. This suggested that the negative health consequences of loneliness might be greater for males than for females.

Schoenbach, Kaplan, Fredman and Kleinbaum (1986) also attempted to replicate the findings of Berkman and Syme (1979) using similar methodology. After controlling for potential confounders (principally cardiovascular disease risk factors), comparing the

lowest with the highest scores on the social network index, the age adjusted hazard ratio for white males was 1.5x. The effect for black males, black females and white females was not significant. Similar to the previous study, the implication is that white males are at greater risk of negative health consequences than are females.

Having reviewed 81 prospective studies of social relationships and health, House, Landis and Umberson (1988) suggested "...that social relationships, or the lack thereof, constitute a major risk factor for health – rivalling the effects of well-established health risk factors such as cigarette smoking, blood pressure, blood lipids, obesity, and physical activity" (p.541).

It is important to note that in each of the preceding studies the risk factors were based on measures of social relationships, as opposed to more direct measures of loneliness. However, according to Perlman and Peplau (1982), in a "...very general way, loneliness and social support can be seen as opposite concepts" (p.18), a view with which Andersson (1998) agreed. Similarly, Peplau and Perlman's (1982) cognitive discrepancy model of loneliness implies that the quality of people's relationships is a good predictor of loneliness. Likewise, Archibald, Bartholomew and Marx (1995) compared the quality and quantity of people's relationships and found that the quality of people's social relationships was a good measure of loneliness.

It is plausible that the link between loneliness and health is mediated by some third variable. One such possibility might be depression. For example, it is accepted that a lack of friends can make people depressed (Duck, 1983), which Evans, Clow and Hucklebridge (1997) suggest can lead to physically based disorders as "...there is

absolutely no doubt in scientific circles that our psychological experiences can influence the activity of our immune systems" (p.303). Consistent with this finding, Sarason, Sarason and Gurung (1999) reported that the risk of developing clinical depression is markedly higher in people who are single, separated, divorced or who fail to enjoy a satisfying relationship with their spouse. However, Russell et al. (1984) found that depression was more often related to social loneliness, whilst emotional loneliness was more related to feelings of anxiety.

Recognising the importance of social relationships in relation to people's health, The President's Commission on Mental Health (1978) argued that "...it is a societal responsibility to provide mechanisms for social integration and to provide special help for those unable to avail themselves of such opportunities" (p.144). However, there is no indication that any widespread governmental policies are in place to protect the vulnerable in this way.

Proactive responses to loneliness

Rubenstein and Shaver (1982b) explored reactions to loneliness by asking people "when you feel lonely, what do you do about it?" (p.215). This question was followed by 24 response options, to which participants answered 'yes' or 'no'. A factor analysis of people's responses indicated there were four factors, two of which might be viewed as positive and two as negative. The first of the 'positive' factors was classified as 'social contact', which accounted for 12% of the common variance. People reacting in this way attempted to deal with the problem head-on, by 'calling on a friend' or 'visiting someone'. The second positive reaction was classified as 'active solitude'. Behaviours such as work, hobbies, studying for qualifications, exercise, movies, music

and reading were argued to represent a creative and rewarding use of time and accounted for 24.4% of the common variance. People also reacted in negative ways such as crying, drug taking, alcohol, sleeping, comfort eating or aimlessly watching television, which were classified as 'sad passivity' and accounted for 46.6% of the common variance. Rubenstein and Shaver (1982b) defined 'sad passivity' as "...a state of lethargic self-pity that may well contribute to a vicious cycle of low self-esteem and social isolation" (p.215). The last factor, which accounted for 17% of the common variance, was labelled 'spending money', whereby people presumably try to distract themselves or compensate for their negative feelings of loneliness.

There was, however, a potential limitation to this study. Rubenstein and Shaver (1982b), quite possibly for ethical reasons, had not given participants the option of listing behaviours such as shop lifting, petty crime, acts of vandalism, or anti-social behaviour generally, and so these behaviours could not be reported. Evidence suggests that amongst males, anti-social or criminal activities could be one type of response to loneliness. For example, Schultz and Moore (1988) suggested that in male subjects loneliness could be linked to the prevalence of risk taking, which in turn may be associated with criminal behaviour. Check, Perlman and Malamuth (1985) reported that chronically lonely males have some beliefs about themselves, which may lead them to act in an aggressive and hostile way. They were also more punitive to female partners who made errors on a learning task they were supervising. Howells (1981) found that rapists score highly on loneliness scales and have been socially isolated well before they committed such assaults, although whether and how these factors were causally linked was not investigated.

Consistent with Rubenstein and Shaver's (1982b) concept of sad passivity, Orford and O'Riley (1981) reported that it is often poor interpersonal relationships that precede alcoholism, rather than that alcoholism leads to loneliness as is commonly believed. Consequently, part of the cure for some alcoholics is to be found in improved relationships (Duck, 1983). Rubin, Perse and Powell (1985) identified another behaviour that might also be classified as sad passivity, whereby lonely people tend to 'interact' with a favourite newsreader by commenting aloud on performance or appearance.

When exploring the so-called consequences of loneliness, it is apparent that the direction of causality has often not been addressed. For example, whilst it has been found that high internet usage is associated with loneliness (Kraut, Patterson, Lundmark, Kiesler, Mukophadhyay & Scherlis, 1998), whether it was an antecedent or a consequence of loneliness was not reported.

The implications of loneliness for society

Apart from individual consequences of loneliness, there are also serious implications at a societal level. That is, if people who experience loneliness are at high risk of health related problems, as evidence suggests they are (e.g., House et al., 1988), then loneliness will be associated with higher use of health service resources. As there are finite resources available, it follows that the financial burden that loneliness places upon the health service diverts funds from other areas. Consequently, one way or another, loneliness affects the welfare of both the lonely and the non-lonely.

Measuring loneliness

For the purpose of research, loneliness requires quantification. Because loneliness is an abstract construct that is not possible to directly observe, reliance is placed on people's responses to specially designed questionnaires.

One approach to measuring loneliness has been to ask people the single question 'are you lonely?' and to score answers on a Likert scale to measure the extent to which people feel it is true of them. This approach has been used (e.g., Bradburn & Caplovitz, 1965; Hart et al., 1996), and benefits from extremely high face validity. However, it is generally agreed that multiple item scales are likely to be both more reliable and valid as they are less susceptible to idiosyncrasies of interpretation and response (Weiss, 1982).

The most widely used measure of loneliness appears to be version 2 of the UCLA-LS (Russell et al., 1980), which is a unidimensional measure based on people's perceptions of the discrepancy between their desired and actual levels of social contact. The UCLA-LS is shown in Appendix 4a. Many of the items were based upon statements written by psychologists who were asked to describe the experience of loneliness, whilst others were based on a scale reported in Eddy's (1961) unpublished doctoral dissertation.

The UCLA-LS consists of 20-items (e.g., I feel left out; I lack companionship) to which the participants report, using a four-point Likert scale (*never – rarely – sometimes – always*), how often the statement represents them personally. Ten items measured loneliness and ten items measured the absence of loneliness. The ten items

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measuring the absence of loneliness require reverse scoring so that overall, higher scores will indicate higher levels of loneliness. Total scores will thus be in the range 20 to 80. Russell et al. (1980) quote an internal reliability coefficient of .94, convergent validity with measures of depression (r values of approximately .50) and amount of time spent alone ($r = .41$), and divergent validity whereby negative correlations were obtained with each participant's number of close friends ($r = -.44$). Cutrona et al. (1982) reported test-retest reliability of .62 over a seven-month longitudinal study of college freshmen, which might, at face value, not seem particularly high. However, as the freshmen were first measured three weeks after starting at university and then seven months later, at which time some had made friends but others were still lonely, the reliability statistic implies the UCLA-LS is sensitive to differences in loneliness.

Typical mean UCLA-LS scores reported for college students (males and females combined) were 38.6, whilst divorced adults were 47.7, and adult participants at a social skills workshop were 56.8 (Russell, 1978). Also amongst college students, Williams and Salano (1983) reported 39.9 for females and 33.8 for males (although they were not significantly different). The scale is argued to represent a unidimensional measure of loneliness (Russell, 1982), although a number of studies have argued otherwise (e.g., Austin, 1983; McWhirter, 1990, Miller & Cleary, 1993). Russell (1996) responded to arguments that there was more than a single factor underlying the UCLA-LS (version 2), suggesting that the multidimensional solutions reported by Austin (1983), Miller and Cleary (1993) and McWhirter (1990) were primarily artefacts of whether the item measured 'loneliness' or 'absence of loneliness', as opposed to differences in loneliness.

Russell (1996) reported a modified version of the UCLA-LS (version 3). In this version, the wording of some of the items was changed. For example, the word 'superficial' was changed to 'not meaningful' as the original word had not been understood by some participants. Furthermore, all of the items now had the statement "how often do you feel..." added to the beginning of each question to facilitate administering the questionnaire via personal or telephone interviews. Similar to the more commonly used version 2 of the UCLA-LS (Russell et al., 1980), alpha coefficients are reported as being in the range .89 to .94 across samples of students, nurses, teachers and the elderly. A test-retest correlation of .73 was reported for the elderly sample over a 1-year period. However, as most research published since 1981 has used version 2 of the UCLA-LS, and as this thesis will draw comparisons with these studies, version 2 of the UCLA-LS will be used in the empirical studies of this thesis.

DiTommaso and Spinner (1993) developed a multidimensional alternative to the unidimensional UCLA-LS, the Social and Emotional Loneliness Scales (SELSA). The SELSA was derived from Weiss's (1973) constructs of emotional and social loneliness, which have received widespread support (Rubenstein & Shaver, 1982; Russell et al., 1984). The final version in fact had three sub-scales: social loneliness; romantic-emotional loneliness; and family-emotional loneliness. Using a student sample, participants were asked to report on a 7-point scale (from strongly disagree to strongly agree) which answer most closely described how they thought and felt. Internal consistencies for the student sample were between .89 and .93. Although each of the scales correlated beyond the $p = .001$ level, the actual r values were between .21

and .37, which the authors argued were not so large as to preclude the usefulness of the scales individually. To measure concurrent validity, correlations with the UCLA-LS were reported as $r = .79$ for the social sub-scale, $r = .40$ for the romantic sub-scale and $r = .37$ for the family sub-scale.

Whilst adolescents more than 12 years old should be capable of answering the UCLA-LS, younger children may find it too difficult (Asher et al., 1980). To deal with this problem, Asher et al. (1984) constructed a 24-item scale designed to measure loneliness in $3^{rd} - 6^{th}$ grade children (approx. 7-11 years old). In a sample of 506 children, the internal consistency, Cronbach's α, for this scale was .90, and uncorrected item-total correlations were in the range .50 to .72. Evidence of divergent validity was demonstrated by a negative correlation between loneliness scores and classroom peer ratings of popularity. There was a significant difference in loneliness scores of those named as a friend by more than five class members ($M = 27.8$), and those not named as a friend by any class member ($M = 36.3$)

Shaver, Furman and Buhrmester (1985) created two parallel 11-item scales to measure temporal differences in loneliness (State and Trait loneliness). The scale items were in identical, although in the 'State' scale participants were instructed to refer to the past few days, and in the 'Trait' scale to the past few years. Test-retest correlations for Trait loneliness, where loneliness was expected to last for a prolonged period, were reported as between .77 and .83. However, for State loneliness, where loneliness might be expected to vary on a day to day basis, lower test-retest correlations of between .29 to .64 were reported.

Although measurement of an abstract construct such as loneliness relies on people's responses to questionnaires, there are at least three potential problems with loneliness questionnaires. Firstly, because it is invariably obvious what loneliness questionnaires are measuring, for reasons of social desirability, lonely people may be unwilling to let the experimenter know that they are lonely since there is a social stigma attached to loneliness (Gordon, 1976). Secondly, there is a lack of consensus as to whether loneliness is a global or multidimensional construct. Thirdly, people's recall is not always objective, as memories consistent with a person's present state may be more likely to be recalled than those inconsistent with the present state (Eysenck, 1992). For example, Mineka (1992) found that depressed subjects showed a bias toward recalling information consistent with their mood state, and that they tended to recall negative past events.

Reducing loneliness

Self help for lonely people

For some people who experience loneliness, it will be a transient problem, perhaps the result of a temporary situation such as illness or pressing deadlines at work. Given some time and/or personal effort they may develop or re-establish satisfying relationships and will no longer be lonely.

Cutrona (1982) investigated the behaviours of students who overcame loneliness by the end of their first year at university and contrasted them with the behaviours of students who remained lonely at the end of the year. Interestingly, the behaviours that students thought would help them to overcome loneliness were not necessarily consistent with the effectiveness of the behaviours. The most popular strategy for

students to overcome loneliness was "...finding a boyfriend or girlfriend" (p.38). Such a strategy has high face validity and is consistent with Weiss's (1973) suggestion that those who are without special romantic relationships are more likely to report being lonely. However, Cutrona (1982) reported that in fact this strategy was not a good predictor of who overcame loneliness by the end of the first academic year. One possible reason is that there might be barriers to implementing this strategy. For example, if a lonely person attempts to meet a romantic partner but have failed to achieve this already, there may be good reasons why (e.g., they are lacking in social skills).

Duck (1983) suggested that lonely people could make an effort to find more friends, or get out with their existing friends more often. However, lonely people may lack the confidence or the skills to initiate new friendships, and the people with whom they seek to interact may perceive them unfavourably (Goswick & Jones, 1981). There may also be practical constraints as to why this cannot be achieved. For example, geographical isolation may mean there are no prospective or existing friends. Nevertheless, Cutrona (1982) reported that this was a far more effective strategy as the students who overcame their loneliness did so by increasing their circle of friends.

Formal interventions for lonely people

Rook (1984) reported that loneliness can be a chronic problem lasting many years, and that very few lonely people ever seek professional help for loneliness. However, for those who do seek help, there are, in theory, a number of possible interventions available.

Rook (1984) suggested that interventions to alleviate loneliness could be based on three approaches. Firstly, lonely people could be helped to form satisfying friendships. Possible strategies might include helping lonely people to identify new opportunities for social contact (e.g., joining a health club) and helping them improve how they relate to other people (e.g., social skills training). Secondly, loneliness could be prevented from evolving into more serious problems, such as depression, suicide or drug abuse, by teaching people ways to cope with being lonely. For example, Rook (1984) suggested "...a lonely widow might be helped to identify enjoyable activities for a single person, or a lonely adolescent might be taught drug-free strategies for managing the anxiety of isolation" (p.1391). Thirdly, theoretically the most sensible but difficult to initiate, would be to prevent loneliness from occurring, rather than to help people who are already lonely. Rook suggested that "preventative interventions could focus on groups known to be at high risk or on the design of social settings, such as schools and workplaces, to facilitate friendship formation" (p.1392). A further possibility might be the inclusion of social skills training as part of the national school curriculum (e.g., how to make friends, how to keep them, how to meet the opposite sex, good citizenship).

Offering some reassurance for lonely people, Duck (1983) suggested that, as the causes of loneliness concern performance, behaviour and action, it should be possible for loneliness to be 'cured'. Consequently, loneliness might be tackled either by an individual's good sense or by formal intervention or guidance. However, Duck's (1983) optimism may not apply to people who are lonely due to geographic isolation.

A number of intervention programmes have been developed to treat chronic loneliness and prevent any consequences of loneliness from occurring. Rook (1984) summarised

the approaches as being of four different types: *Community-based approaches*, aimed at increasing people's opportunities for interaction; *Social-skills training*, aimed at improving people's ability in social situations; *Group therapy*, aimed at increasing sensitivity to other people, and *Cognitive treatment,* aimed at changing peoples expectation of future attempts to socialise.

Duck (1998) questioned the efficacy of community-based approaches, arguing that they may be little more than a chance to "...go out and get some more of the same" (p.62). Social skills training, however, has been reported as showing some success (Gallup, 1980; Jones et al., 1981). In social-skills training, lonely people have been taught skills such as paraphrasing, showing interest, appropriate levels of self-disclosure, and how to give positive evaluations to people. In both of these programmes people became more skilful conversationalists and reported subsequent reductions in loneliness. Whether these changes in behaviour remained in the long term was not clear. However, if implemented properly they might be expected to be self-maintaining, as they would be maintained by positive reinforcement.

Group therapy does not constitute a therapy in its own right, but is simply an application of social skills training amongst homogenous groups of lonely people. For example, a training course might concentrate on teaching social skills to lonely students who could practice their newly acquired techniques on fellow group members (Rook, 1984).

Cognitive treatment sets out to challenge erroneous beliefs. For example, Young's (1982) cognitive therapy encourages people to openly disclose their feelings and

emotions. Examples of other people's errors are then discussed and comparisons made of the client's reaction to them. Erroneous beliefs, such as feeling constantly ridiculed, can be challenged by the therapist and the person asked to provide evidence. For example, Duck, Pond and Leatham (1994) reported that it is often the case that lonely people can be demonstrated to be more critical of themselves, than of other people.

People suffering from extreme social phobias or anxiety, problems thought to be closely allied to loneliness, have successfully been treated with drugs such as beta-blockers and other medications used in treatments of hypertension and depression (Garcia-Borreguero & Tockerman, 1992). Improvements with this type of intervention typically occur quickly, and they are much cheaper than either cognitive treatment or social skills training (Herbert, 1995). However, as with all current drugs of this type, there are likely to be side effects. Moreover, drugs will not work with people who simply lack social skills.

Apart from the therapeutic interventions designed by caring professionals, there is also a booming loneliness business as evidenced by the prevalence of advertisements for such services (Gordon, 1976). However, much of the loneliness business will almost certainly be based more on the idea of making money, than out of altruistic concern for lonely people. Dating services, chat lines, chat rooms and singles bars, clubs, and holidays are all commercial endeavours to cash in on loneliness. To date there do not appear to be any studies examining the effectiveness of the loneliness business, but since it is a business, success might not be encouraged too quickly.

Pet ownership and loneliness

An alternative possibility is that pet ownership can help to alleviate loneliness. It is widely believed that such a strategy can be effective (Banks & Banks, 2002; Blue, 1986; Carmack, 1991; Hart, Zasloff & Benfatto, 1996; Heath & McKenry, 1989; Hennings, 1999; Kehoe, 1990; Kiel, 1998; Levinson, 1978; Sable, 1995), although there is very little empirical evidence to support such a belief. Indeed, 98% of people questioned reported they believed pets could help to alleviate loneliness (see Appendix 1). As Chapter 2 of this thesis will articulate, the theory that pets could help to alleviate loneliness is highly plausible and, given the serious nature of loneliness, is well worth investigating.

Pets, people and loneliness

Pets: A brief definition

For the purpose of this thesis the definition of a pet will be the one provided by the Collins English Dictionary (1998), which defines a pet as "a tame animal kept in a household for companionship, amusement, etc" (p.1159). The term 'companion-animal' has also been used by some researchers and is an alternative name for pet.

The prevalence and status of pets

Pet ownership is widespread throughout much of the western world, with 56% of all homes in the USA (APPMA, 1994) and 51% of all homes in the UK (Marsh, 1994) reportedly owning at least one pet. It has been shown that the rate of pet ownership is associated with the age and composition of the family. For example, 50.4% of families with children up to 5 years old were reported to own a pet, whilst 72.3% of families with children between 6 and 15 years old were pet owners (Pedigree Petfoods, 1995). Amongst families with children aged 8 to 12 years old, Fifield and Forsyth (1999) reported that 89% owned at least one pet, whilst Bryant (1985) found that in families with children between 7 and 10 years old, 90% had pets. In single person households only 27.7% of people owned a pet, whilst in two-person households 47.2% of people owned a pet (Pedigree Petfoods, 1995).

Many different species of animals are reportedly kept as pets. For example, in a survey of UK households, the overall percentage of homes owning a pet was 51.6% (Pedigree

Petfoods, 1995). Households reported owning the following pet types: 22.9% owned dogs; 21.1% owned cats; 9.2% owned goldfish; 4.1% owned rabbits; 3.6% owned a budgerigar; 2.9% owned a hamster; 2.5% owned other caged birds; 2.5% owned tropical fish; 1.5% owned guinea pigs, and 4.4% owned 'other' species of pet.

Mason (1991) estimated that there were 117 million cats and dogs in the USA and that many of these pets were considered by their owner to be a member of the family. Beck and Katcher (1983) found that 80% of people attending a veterinary clinic viewed their pets as family members. Similarly, Voith (1985) reported that 99% of cat and dog owners entering a university veterinary clinic considered their pet to be a family member. It is possible these studies could have over estimated the number of pets viewed as family members, as people who did not view their pet as a family member may have been less likely to take it to a vet. Furthermore, when asked if their pet is a family member, particularly in a veterinary clinic, people may be likely to answer that it is, regardless of its actual status, for reasons of social desirability or demand characteristics of the experiment. However, in a telephone survey about pet ownership, 97% of females and 93% of males reported that their pet was a member of the family (The Gallup Organization, 2000).

Although pets are frequently reported as family members in companion animal research, comparable levels have not been reported in studies where human-pet relationships were not the primary subject of the investigation. For example, in a study to explore the concept of family, Hodkin (1983) asked participants the question 'who is in your family', to which only 29% stated their pets. In a similar study, to explore the conceptualisation of

'family', Trost (1990) asked participants to 'list all those that counted as family members' and found that only 10% listed their pet.

Fisher (2000) argued that whether pets are reported as family members may depend upon how the question is framed. For example, participants may respond differently to a free listing format, where participants are not prompted to mention any particular type of answer, than to a question in which the answer is ticked off a checklist in which the category *pet* is an option. As companion-animal research has tended to use the checklist format, whilst more general research has tended to use the free listing format, this might explain the differences in the rate at which pets are viewed as family members. Further research may be necessary to determine true rates at which pets are considered to be family members in the sense that a daughter or son might be described.

It is plausible that although pets are described by some people as 'family members', at least some pets may be viewed as 'property' of the family, rather than as having status comparable to human family members such as children. However, Cohen (1998) reported evidence that suggests pets are considered at least the equals of other family members. Amongst a sample of 16 participants who had completed in depth interviews about their relationship with their pet, 13 said there were circumstances when they would give a hypothetical life saving drug to their pet in preference to a person outside of their family. Moreover, 6 participants said that if their family were in a boat that tipped over, they would grab the pet first. Similarly, 87% of females and 75% of males reported that the loss of the pet would be like the loss of another family member and more than half of the sample reported they would risk their own life to save that of their pet (The Gallup Organization, 2000). Whether the attitudes that participants expressed would translate

into actual behaviour is unknown, but in principle they suggest that pets are accredited with status similar to, and sometimes higher than, other family members.

Why people acquire pets

Endenburg, Hart, and Bouw (1994) investigated people's reasons for pet acquisition using in-depth interviews and questionnaires. In a series of forty in-depth interviews about pet acquisition, it was found that "...almost the only reason given was for companionship or company" (p. 193). Participants were then asked to explain what they meant by 'companionship' and were given further prompts to elicit additional reasons for pet acquisition. The reasons elicited in the in-depth interviews formed the basis of a questionnaire that was posted to 1478 addresses sampled at random from the telephone directory. Although in their methodology section the instructions for completing the postal questionnaire were not reported, it appears that participants were simply asked whether they agreed with each of the reasons. In total, 471 pet owners (and 400 non-pet owners) returned questionnaires. Table 2.1 shows the reasons that pet owners gave for pet acquisition. Endenburg et al. reported the figures had been corrected to account for fewer single person households in their sample than were representative of the national population.

The findings of this survey suggest that when people choose to acquire a pet, they do so primarily with an expectation of some benefit to themselves, rather than for altruistic reasons such as feeling sorry for the animal. Similar to the findings of the in-depth interviews, participants reported that their primary reason for pet acquisition was to provide themselves with companionship. Overall, the reasons given were consistent with Serpell's (1988) observation that "the majority of pet owners are normal, rational people

who make use of animals in order to augment their existing social relationships, and enhance their own psychological and physical welfare" (p.49).

Table 2.1.

People's reasons for pet acquisition (from Endenburg, Hart and Bouw, 1994).

	Reason for pet acquisition (N = 459)	Percentage of participants who agree
1	Companionship	79%
2	Child-rearing considerations	14%
3	Tactile contact	12%
4	Attachment	20%
5	Taking care of an animal	20%
6	Used to it	29%
7	Usefulness	13%
8	Companionship for another animal	13%
9	Health reasons	12%
10	Feeling sorry for the animal	8%
11	Aesthetic value	8%
12	The own uniqueness of the animal	5%
13	Need for power	5%
14	Social contacts	3%
15	Other reasons	15%

(Note: percentages do not add up to 100% as respondents could give more than one reason).

Pets as providers of companionship

Given the number of pets acquired for companionship reasons, and their status as family members, it may be surprising that empirical research on interspecies

interaction and relationships is relatively scarce. Levinson (1978) questioned why, when animals such as cats and dogs have been widely used in experimental psychology, human-animal relationships have not been explored to learn about human-human relationships. Sanders (1993) suggested this might be due to the social science doctrine that relationships between different species, at anything above a simple level, are impossible without shared linguistic skills. As such, social science dismisses all but simple social exchanges between animals of different species, notably between humans and other animals, due to a lack of ability to understand and apply shared linguistic symbols.

Contrary to social science's understanding of human-animal relationships, people who live with or deal with companion animals frequently or intimately, often describe their interactions with animals as reciprocal social exchanges (Crist & Lynch, 1990; Griffin, 1984; Hearne, 1987; Ristau, 1990; Shapiro, 1990). Pet owners' definitions of their relationships with an animal suggest they regard animals as "unique individuals who are minded, empathetic, reciprocating, and well aware of basic rules and roles that govern the relationship" (Sanders, 1993, p.207). They also perceive their pets to be capable of consciously acting so as to achieve goals in social exchanges with others. In particular, dogs are regarded as possessing at least a rudimentary ability to "take the role of the other" (Sanders, 1993, p.207). Sanders notes that pet owners typically view dogs as capable of emotional experience and of an awareness and ability to respond appropriately to the experiences of others. According to Sanders, pets satisfy the basic criteria to be considered companions.

The notion that pets can provide companionship is plausible, as pets can provide many of the companionship functions that humans might provide. For example, McNicholas and Collis (2001) asked a sample of 7-8 year old children to list all of the people and animals that were important to them, and then to select their 'top 10' most special relationships from the list. Then, using a story-based methodology, the children were asked who in their 'top 10' list they would turn to in eight different scenarios. When the child selected their first choice, they were asked whom they would turn to if their previous choice were not available. This procedure was repeated until the child had named five out of their 'top 10' list. Children reported that they would turn to their pets in three of the eight scenarios: for comfort when they were ill; when scared; and as confidantes for a secret. Similarly, Melson, Schwarz, and Beck (1997) found that children believe that a pet can supply many of the provisions one might expect from another human. For example, 42% of the children in their sample mentioned turning to a pet if they were sad, angry, afraid, happy, or wanting to share a secret. For children, at least, it seems there are reasonable grounds to suggest that pets fulfil some of the functions necessary to provide companionship.

Anecdotal evidence suggests that pets can be companions for adults with AIDS and that such companionship can help to alleviate loneliness (Carmack, 1991). Kehoe (1991) also suggests that the companionship pets provide can help to alleviate loneliness amongst elderly female homosexuals. In a study of homeless people, for whom the ability to maintain relationships must be particularly difficult, Kidd and Kidd (1994) found that 74% of men and 48% of women reported that their pet was their only source of companionship and love.

Pet ownership and loneliness

That people acquire pets for companionship is particularly interesting. If people actively seek companionship from pets then this might imply that the level or type of companionship they currently have available from humans (or other pets) is less than the amount they consider ideal. As seeking companionship is virtually synonymous with seeking more interpersonal relationships then, according to Peplau and Perlman's (1982) definition of loneliness, acquiring a pet for companionship may be a euphemism for acquiring a pet to reduce feelings of loneliness.

It is widely believed that pets can help to reduce loneliness (Banks & Banks, 2002; Beck & Meyers, 1996; Blue, 1986; Carmack, 1991; Dunn, 1999; Hart, Zasloff & Benfatto, 1996; Heath & McKenry, 1989; Hennings, 1999; Kehoe, 1990; Keil, 1998; Kidd & Kidd, 1994; Sable, 1995). Amongst 103 first-year psychology students attending a lecture on questionnaire design, all except three reported believing that pets can help to alleviate loneliness (Appendix 1).

If pets do help to alleviate loneliness, in some ways they may prove a more reliable source of companionship than their human counterparts. For example, with the possible exception of cats, pets are invariably present when their companionship is required, which is often not the case with human friends. Unlike in most human-human relationships, pets do not argue, criticise, seek revenge or apply the 'silent treatment'; nor, when the going gets tough, do they leave to find a new owner. Seigel (1993) suggested that pets "...love their owner regardless of whether he or she

achieves conventional standards of success or attractiveness" (p.162). There is no evidence that a pet expects any form of social skill from their owner, certainly not the types of skills that a prospective friend might consider prerequisite. In short, pets do not care about many of the criteria that their human counterparts might use to select and reject prospective companions. Pets accept their owners with all of their foibles, nuances and shortcomings.

Prospective evidence that pets could alleviate loneliness

Although no published research has to date sought to directly explore whether pets help to alleviate loneliness, Banks and Banks (2002) conducted a prospective investigation of the benefits of animal assisted therapy (AAT) on loneliness. In AAT the time spent with the animal, which in this study was a dog, would be far less than would typically be spent with a pet, so it is plausible that any benefits directly attributable to the animal in AAT, might also be likely with an ordinary pet.

To explore the benefit of AAT on loneliness, Banks and Banks (2002) allocated forty-five residents of a long-term care centre for the elderly to one of three groups: a control group (who did not have AAT); an experimental group 1 (1 x 30 minute session of AAT per week); and an experimental group 2 (3 x 30 minute sessions of AAT per week). To ensure any effect was due to the animal rather than the handler, in both of the experimental groups, the animal's handler was instructed not to interact with participants. Before the start of the AAT sessions, a baseline level of loneliness was determined using the UCLA-LS. The study then ran for six weeks, at the end of which significant reductions of approximately 20% in loneliness were reported for both experimental

groups, when compared with the control group. Interestingly, the effects of the two experimental groups were not significantly different. Banks and Banks (2002) interpreted these results as showing that AAT can effectively reduce loneliness amongst long-term care facility residents.

There are, however, a number of problems with Banks and Banks' (2002) interpretation of their results. Firstly, if interacting with a companion animal once a week over a six-week period reduces loneliness scores by almost 20%, then, unless there was a 'ceiling effect' of a 20% reduction in loneliness attributable to AAT, it would be reasonable to expect that AAT three-times a week would have proved significantly better. As this incremental effect was not apparent, it suggests that the reported benefits in loneliness were not simply due to contact time with the animal. Secondly, at the end of the six-week period if loneliness was measured just after the participant had finished their AAT session, then there may have been some very short term effect that an hour or so later would have vanished. However, the actual time of testing, in relation to the end of the experiment, was not reported. Thirdly, to determine whether any effect was due to AAT or was simply an artefact of therapy *per se*, an additional control group could have been included (e.g., basket weaving) to explore whether the effect was as great as that reported for AAT. There are a number of alternative explanations for the changes in loneliness that were reported: *i*) participating in the AAT sessions created some sort of Hawthorne effect whereby a change occurred irrespective of any manipulation; *ii*) a programmed activity gave a little uplift in what might have otherwise been a very boring existence; and *iii*) any activity at all may have had a similar effect.

Empirical evidence that pet owners are less lonely than non-pet owners

Six studies have explored whether pet owners are less lonely than non-pet owners, of which four provided some evidence that pet owners are indeed less lonely. A further study (Keil, 1998), whilst exploring loneliness and pet ownership, used a pet owning sample to explore the relationship between attachment to the pet, stress and loneliness, but did not compare pet owners against a control group.

Goldmeier (1986) explored the effect of pet ownership and general health among a sample of 144 elderly women. Although the type of pet was not directly explored, Goldmeier reported that "almost 60% of the living-alone-with-pet sample owned dogs compared to 72% of the living-with-others-and-pet sample" (p. 205). The proportion of cats was 32% in the homes of those living-alone-with-pet and 28% for those living-with-others and pet. Amongst participants who lived alone, pet owners reported significantly less loneliness dissatisfaction than non-pet owners. However, this difference was not significant amongst participants who did not live alone. Overall, the participants who lived alone reported higher levels of 'loneliness dissatisfaction' than those who lived with others. Goldmeier (1986) interpreted this finding as suggesting that "…at best, pets only attenuate the sense of loneliness that may be felt from a lack of human companionship" (p. 203).

There were two potential problems with Goldmeier's (1986) study. Firstly, the measure of loneliness was not a widely used measure, such as the UCLA-LS, but a 3-item dichotomously scored sub-scale, out of a total of six sub-scales, from a 22-item measure of morale, the Philadelphia Geriatric Center Morale Scale (Lawton, 1972).

Secondly, Goldmeier's (1986) interpretation that "...at best, pets only attenuate the sense of loneliness that may be felt from a lack of human companionship" (p. 203) does not logically follow from the statistical comparisons that were reported. As there were two factors being investigated, living arrangements (living alone/with others) and pet ownership (pet owner/non-pet owner), the ideal statistical test would have been a two-way ANOVA. This would have allowed both main effects to be reported and would have tested whether there was an interaction between the two main factors; that is whether the differences between pet owners and non-pet owners differed between participants living alone and participants living with others. However, Goldmeier (1986) reported a main effect of living alone vs. living with others and two simple main effects (pet owner vs. non-pet owners amongst people living alone and pet owner vs. non-pet owners amongst people living with others). It is therefore unknown whether: 1) there was an overall effect of pet ownership; and 2) whether the differences between pet owners and non-pet owners amongst people living alone was statistically different from the difference between pet owners and non-pet owners amongst the people living with others.

Zasloff and Kidd (1994) reported that "a two by two analysis of variance showed that women living entirely alone were significantly more lonely than those living with pets only, with both other people and pets, and with people but without pets" (p. 747). They also reported that there were no differences between cat owners and dog owners. Whilst the mean loneliness scores are consistent with the interpretation of the two by two ANOVA, there were three problems with the method by which the authors actually arrived at their conclusions. Firstly, the reasonable analysis to determine

whether females living entirely alone were lonelier than those who live alone with a pet was a 2-way ANOVA; specifically, the interaction between 'living alone' and 'pet ownership'. Consistent with this, Zasloff and Kidd conducted a two-way ANOVA with pet ownership (yes/no) x living alone (yes/no) as between-subjects factors, and participants' UCLA-LS score as the dependent variable. However, the results of this analysis showed that participants who lived alone were significantly lonelier than the participants who lived with others, but there was no evidence of a main effect of pet ownership. Importantly, there was no evidence of an interaction between 'living alone' and 'pet ownership' which would have showed students living alone without a pet were lonelier than the other three groups. Rather than accept this finding, which is what should have been done, the authors curiously conducted a one-way between-groups analysis (Scheffé Test), where all four groups were compared. It was this *post hoc* analysis that showed that the women living entirely alone with no pet were lonelier than the three other groups, not, as the authors reported, the two-way analysis of variance.

Secondly, Zasloff and Kidd appear to have made mistakes in their calculations when they report a main effect for living alone versus living with other people, but not a main effect of pet ownership. As the authors reported participant numbers and mean UCLA-LS scores for each cell, (bold text in Table 2.2), it is possible to determine the weighted collapsed mean differences in loneliness (italic text) between participants living alone and living with others (1.79) and between pet owners and non-pet owners (2.66). This implies that, provided the homogeneity of variance assumption had not been violated, if either of the main effects were significant, it would more likely be

that of pet versus no pet, than that of living alone versus living with others. This, however, is the opposite of the main effects reported by Zasloff and Kidd (1994).

Table 2.2. *Mean UCLA loneliness scores and participant numbers reported by Zasloff and Kidd (1994)*

	Living alone		Living with others		Weighted combined mean of living alone and living with others	
Pet owner	**34.2**	*n = 24*	**34.3**	*n = 35*	*34.26*	*n = 59*
Non-pet owner	**38.9**	*n = 34*	**35.7**	*n = 55*	*36.92*	*n = 89*
Weighted combined mean of pet owning groups	*36.95*	*n = 58*	*35.16*	*n = 90*		

Note: The figures in bold are those reported by Zasloff and Kidd (1994) and the figures in italics were calculated for the purpose of this thesis

Thirdly, when Zasloff and Kidd interpret that "these findings indicate that having a pet can help to diminish feelings of loneliness, particularly for women living alone..." (p. 747), they commit the error of attributing causation on the basis of correlational data.

Although not specifically investigating the effect of pets on loneliness, Hart, Zasloff and Benfatto (1996) investigated the relationship between loneliness and acquisition of a hearing dog amongst a sample of deaf people. However, Hart et al. (1996) suggested that hearing dogs will confer many of the positive benefits of a straightforward pet dog. In this study, 38 hearing dog owners were compared with a control group of 15 prospective owners. It was found that the hearing dog owners were significantly less lonely than those awaiting hearing dogs ($p < 0.01$). In a retrospective within-subjects

comparison, the 38 participants who were already in possession of a hearing dog were asked to remember how lonely they were before they acquired their hearing dog, and how lonely they were currently. Participants reported that they felt less lonely after having acquired their hearing dog than they were before ($p < 0.01$). The authors declared these findings were 'not surprising'.

Unfortunately, there are at least five problems with this study. Firstly, rather than using a proven measure of loneliness (e.g., the UCLA-LS), loneliness was measured using a single item whereby participants were asked to indicate 'how often they felt lonely' using a 4-point Likert scale (*rarely – sometimes – often – almost always*). Secondly, in the within-subjects comparison, after having acquired their hearing dog it is debatable whether participants would accurately remember how lonely they were before acquisition had occurred. Thirdly, even if the participants did not feel less lonely after having received their hearing dog, due to the demand characteristics of the experiment they might feel compelled to report that they did. Fourthly, as there was no control group the effect that was reported by the participants who had been allocated a hearing dog could not unequivocally be attributed to the dog. Finally, there appears to have been some confusion over the degrees of freedom, number of participants or the distinction between within- and between-group analyses. In the within-subjects before-after analysis, where $N = 38$, the degrees of freedom are reported as 64 (more than the N), whereas in the between-subjects analysis, where $N = 53$, the degrees of freedom are reported as 46 (which is too small).

Mahalski, Jones and Maxwell (1988) sought to explore, amongst a number of other questions, the effect of cat ownership on loneliness amongst 40 elderly women on low

incomes recruited in two different locations in New Zealand. At the first location (Dunedin) all 20 participants were unable to own cats; 10 participants wanted to own a cat and 10 did not. At the second location (Christchurch) all 20 participants could own a cat if they wanted to, although only 10 actually owned cats. Five questions from the UCLA-LS (items 15, 20, 16, 6 and 11) were used to measure loneliness (although Mahalski et al. failed to report that they had reworded four of these items). Thus, the possible range of scores was 5 to 20, with higher scores indicating higher loneliness. Using a two (Dunedin/Christchurch) by two (do/do not want pets) ANOVA to explore participants' loneliness ratings, Mahalski et al. (1988) reported no evidence of differences for either the main effects or the interaction.

The comparison potentially of most interest in Mahalski et al.'s analysis was the interaction term, which could have indicated whether the 10 cat owners were more or less lonely than the other three groups. Interestingly, the mean loneliness scores for the 4 groups show that the cat owners actually reported marginally higher levels of loneliness (11.6) than did the two groups who wanted a cat (11.1 and 9.9) or the group that wanted a cat but were not allowed (10.5). Overall, the pet owners' mean loneliness score (11.6) was higher than the mean loneliness score of the 3 non-pet owning groups (10.5). Had a larger sample been recruited, a one-way ANOVA comparing all 4 groups may have been more informative. Although there were no quantitative differences, Mahalski et al. (1988) reported that 9 of the 10 cat owners felt less lonely on account of their cats. However, they may have simply felt an obligation to agree with the experimenter's question due to the demand characteristics of the situation.

Roberts, McBride, Rosenvinge, Stevenage and Bradshaw (1996) reported the results of a pilot study where they investigated the effect of cat or dog ownership on loneliness amongst 60 elderly participants living in their own homes. The percentage of cats and dogs were not reported, nor were differences explored. Overall, it was reported that pet owners were significantly less lonely (p = .014) than non-pet owners, and that the ratio of participants living alone and living with others was approximately equal in pet owning and non-pet owning groups. Interestingly, given this was a correlational study, this was interpreted as suggesting "...that pet ownership may be beneficial to elderly people living in their own homes with respect to reported loneliness..." (p. 64). Unfortunately, as this was just a short presentation, which has not since been published, there was not enough information (e.g., the mean loneliness scores, or the scale on which loneliness was measured) to conduct a critical review.

In an unpublished doctoral dissertation, Bekker (1986) reported that amongst 14-19 year olds, pet owners were lonelier than non-pet owners. However, as only the dissertation abstract was available, a critical review of this finding was not possible.

Overall, out of the six empirical studies, only Roberts et al. (1996) reported evidence of a main effect, whereby pet owners were less lonely than non-pet owners, although the mean loneliness scores reported by Zasloff and Kidd were in fact consistent with the possibility that pet owners were less lonely than non-pet owners. There was also some indication that amongst people who live alone pet ownership may be associated with lower levels of loneliness. As each of the studies used specific sub-sections of the population, it is uncertain whether any effects, even if they prove to be replicable, would apply to the general population.

Although not strictly exploring the effect of pet ownership on loneliness, Keil (1998) sought to "...describe the relationships of the quality of life concepts of loneliness and stress to human-animal attachment among older people who owned animals" (p. 125). Using a sample of 275 adults, loneliness and stress were measured using sub-scales from the Philadelphia Geriatric Center Morale Scale (Lawton, 1975) and attachment was measured using Keil's Human-Animal Relationship Questionnaire (Keil, 1990). If participants owned more than one type of pet, they were asked to base their answers on the pet for which they had the most feelings. Dogs accounted for 60% of responses, cats for 36% and other types of pet for the remaining 4%. Overall, significant, but low correlations were reported between attachment and loneliness ($r = .18$), which the authors reported as 'not meaningful', and attachment and stress ($r = .30$). When only participants who lacked a human confidant were considered separately ($n = 26$) the size of the correlation between attachment and loneliness increased to $r = .30$, although due to the low number of participants this was no longer statistically significant. These findings suggest that lonelier participants were more attached to their pet. This implies that higher attachment to a pet is not causally related to lower levels of loneliness, which might, perhaps, have been expected.

Theoretical arguments that pets help to alleviate loneliness

Several published articles have reported anecdotal evidence that pets can help to alleviate loneliness. Based upon personal conversations with people with AIDS (PWAs), Carmack (1991) selectively presented comments to support the argument that, amongst this group with a high risk of loneliness, pets might help to reduce feelings of loneliness. Carmack's (1991) participants made comments about their pets

such as: "...she's my companion...if I were here alone and they weren't here, I'd be really lonely" (p.26). Describing a cocker spaniel, one man commented on his dog snuggling up close, "I don't need anything else, that is all I really need" (p.26). Another PWA, looking to the time when he knew he would often be alone said that he "wanted a pet because he knew there would be lonely times ahead" (p.26). However, it was not reported whether PWAs might actually prefer the company of other humans, which might have implied that pets were merely a compromise solution.

Kehoe (1990) proposed reasons for why pet ownership may help to alleviate loneliness amongst elderly ageing female homosexuals, although not only was there a lack of evidence based research, nor was there any anecdotal evidence. However, like Carmack (1991), Kehoe ignores the possibility that other solutions could perhaps be more efficient (e.g., support groups, family or friends) in helping to alleviate loneliness.

More generally, Hennings (1999) suggested that any potential problems associated with pet ownership, such as the responsibility, are far outweighed by the advantages, "...especially in terms of reducing loneliness" (p.46). As an example of how a pet might help to reduce loneliness, Hennings reported that dogs are always pleased to greet their owners, can be talked to, and share the sorrows and joys of their owners. That is, pets appear to provide the kinds of functions that human companions might provide.

Explanatory mechanisms for how pets might alleviate loneliness

If pets are associated with lower levels of loneliness, it is important that the underlying mechanisms are fully understood. The tri-partite theory of McNicholas and Collis (1998), which originally explored the mechanisms by which the health benefits of pet ownership might accrue, has been adapted to provide a conceptual framework that could be used to explore how pets alleviate loneliness. Three mechanisms are proposed that might explain the relationship between pet ownership and reduced levels of loneliness: direct, indirect and non-causal. The three possible causal mechanisms are illustrated in Figure 2.1.

1. Direct effect of pet ownership

Pet ownership ⟶ Lower levels of loneliness

2. Indirect effect of pet ownership

Pet ownership ⟶ E.g., meet more people ⟶ Lower levels of loneliness

3. Non - causal association of pet ownership

Common factor ⟶ Pet ownership

Common factor ⟶ Lower levels of loneliness

Figure 2.1. **Three classes of explanation for the association between pet ownership and loneliness (adapted from McNicholas & Collis, 1998)**

1. Direct effect of pets on loneliness

It is possible that pet ownership directly causes lower levels of loneliness. For example, pets provide companionship in the same way that humans provide companionship, which directly helps to alleviate loneliness.

2. Indirect effect of pets on loneliness

There are three potential ways in which pet ownership might indirectly help to alleviate loneliness: a) pets may increase the number of person to person encounters that people experience; b) the presence of a pet may make the owner seem more approachable; and c) pets may help children learn social skills that reduce the chances of loneliness when they become adults.

a) Increased social encounters

The more opportunity people have to meet other people, the more friends they are likely to have (Festinger, Schacter & Back, 1950), and the lower their levels of loneliness are likely to be (Archibald, Bartholomew, & Marx, 1995). Messent (1983) was one of the first to report that pets may help to facilitate increased levels of social contact. It was suggested that the presence of the dog may have served as an 'ice breaker', enabling people to exchange the first few words essential for a conversation to start. Although pets may help people to meet more people, McNicholas and Collis (2000) found that conversations related to dog ownership tend to be at a more superficial level, consisting of exchange greetings and brief comments, but that they do not lead to longer exchanges that might lead to the formation of deep friendships. Nevertheless, even if increased levels of contact due to pets are at a superficial level,

this could still be enough to reduce feelings of loneliness. However, failing to support this possibility, Collis, McNicholas and Harker (1998) reported that pet ownership did not influence the size or composition of social networks, although they did report better psychological and physical health.

Eddy, Hart and Boltz (1988) explored the effect of service dog acquisition amongst people in wheelchairs and found that when compared to people without a service dog, they experienced more conversations and smiles from other people. Although not explicitly tested, it is possible that receiving more smiles and more conversations could help reduce feelings of loneliness, although it is conceivable that it could also appear somewhat patronizing and consequently more alienating. However, Lane, McNicholas, and Collis (1998) found that disabled subjects who had been allocated a hearing dog reported, amongst other benefits, "...an increased sense of social integration" (p.49), which was greater for the subjects who personally chose to get a service dog.

b) Improved approachability

The presence of a pet may make the owner appear more approachable, which could subsequently help to facilitate or initiate interpersonal relationships. Lockwood (1983) suggested that pets make owners appear more approachable, as society has a more positive view of people with pets than people who dislike pets. However, McNicholas (1998) pointed out that if pets enhance the perception of the owner by others, making him/her more approachable, then it needs to be demonstrated that it is not the behaviour of the dog itself in seeking attention that causes the increase in interaction, or the owner's appearance. Addressing both of these points, using a dog that was

specifically trained not to elicit attention, McNicholas and Collis (2000) showed that increased levels of social contact due to the presence of a dog were largely independent of the handler's appearance.

Rossbach and Wilson (1992) demonstrated two reasons why pets might make their owner appear more approachable. They reported that subjects rated a photograph of people with a dog as happier and more relaxed than photographs of people with a bunch of flowers, or people alone. In a second study, a person with a dog was judged as safer and easier to approach than a person who was alone. Comparing the effects of cats to dogs, Budge, Spicer, Jones and St-George (1996) asked participants to rate slides of a man or woman accompanied by a cat, a dog or alone using 36 adjectives which were subsequently clustered, using principal component analysis, into four components labelled as 'nice', 'nasty', 'style' and 'action'. The female target was rated as nicer, more stylish and more active with the dog than the cat. The male target was rated as nicer, more stylish and more active with the cat than the dog.

c) Facilitate the learning of social skills

It has been suggested that pets can help in the social development of children in ways that might 'inoculate' against the future occurrence of loneliness. Guttmann, Predovic and Zemanek (1985) reported that children brought up in the presence of pets show many benefits such as better non-verbal communication, popularity and social competence. Although it is not known whether such benefits are due to the pet or the kinds of parents or guardians that provided their children with pets, such benefits are nevertheless acknowledged to be associated with a person's overall level of social

skills (Duck, 1998). As it is widely accepted that a lack of social skills is a key determinant of loneliness (Duck, 1998; Goswick and Jones, 1981; Horowitz and French, 1979), it is plausible that improved social skills associated with pet ownership might help to reduce the chances of loneliness occurring during adulthood.

3. Non-causal association of pets and loneliness

It is possible that any relationship between pet ownership and loneliness is a non-causal one, and that loneliness and pet ownership are related to some third variable. For example, it may be that non-lonely people tend to be over-represented amongst those who choose to own pets.

Why the theory that pets could help to alleviate loneliness is plausible

Although there is no evidence that directly shows pets can help to alleviate loneliness, the theory that some types of pets may help to alleviate loneliness is supported by evidence regarding their role as providers of companionship and people's narratives about the pets that they own. Support for this theory is summarised in the following points: 1) some research has found that pet ownership (and AAT) is associated with lower levels of loneliness; 2) pets appear to fulfil many of the relational functions that humans afford, in particular the provision of companionship, and seldom withhold such functions in the ways that human friends might do; 3) pets may make people appear more approachable; 4) pets may facilitate people to meet other people; and 5) if pets help to alleviate loneliness, then this would offer a plausible explanatory mechanism for the health benefits of pet ownership.

Caveats regarding the use of pets to help alleviate loneliness

There are a number of reasons why, even if pets do help to alleviate loneliness, they may not necessarily be the ideal solution for loneliness or are even suitable for all people. Firstly, arguably the best way to alleviate loneliness is to have as many friends and romantic relationships that one would like (Peplau and Perlman, 1982), although many people may wish to augment their human relationships with animal ones (Serpell, 1988). Secondly, the cost of keeping a medium sized pet dog for 13 years might exclude some people from becoming owners. For example, expenditure might include, vaccinations once a year (£25 x 13), two additional visits to a vet (£100 x 13), two-weeks per year in boarding kennels (£100 x 13) and food bills (£300 x 13), making the lifetime cost in excess of £7000. Thirdly, pet ownership is not suitable for all people - some people intensely dislike pets and others may be precluded on personal health grounds. Finally, pet ownership in densely populated urban environments can result in environmental spoiling, increased risk of zoonotic disease (Wishon, 1989) and, in the case of dogs, an increased possibility of being bitten (Voelker, 1997).

Aim of this thesis

To test the theory that pets can help to alleviate loneliness, three hypotheses were generated: 1) pet owners are less lonely than non-pet owners; 2) pet separation leads to higher levels of loneliness; and 3) pet acquisition leads to lower levels of loneliness. Testing all three hypotheses will provide a rigorous examination of the belief that pets can help to alleviate loneliness. If there is evidence to reject the three null hypotheses, then the theory that pets can alleviate loneliness will have been supported. Thus, the outcome of this research programme may be that, where circumstances permit, pets can be recommended as an adjunctive means to help alleviate loneliness.

Pet ownership (yes/no), or type of pet ownership.

Although the generic term 'pets' has been used in this thesis, pets can of course be of many different species. The majority, however, are reported to be cats or dogs (Pedigree Petfoods, 1995). Nevertheless, this raises the possibility that the potential benefits of pets may differ according to pet type. Thus, the primary focus of this investigation could be either the effect of pet ownership (yes/no) or the type of pet that was owned (e.g., cat, dog or none).

There were 2 reasons why, on balance, the primary focus of pet ownership (yes/no) was preferred. Firstly, as approximately 50% of all homes in the UK own pets (Marsh, 1994), opportunity samples would therefore comprise roughly equal amounts of pet owners and non-pet owners. This would result in a more powerful design than if non-pet owners were compared to different types of pet owners, as the number of different types of pet owner within the overall sample of pet owners would be substantially smaller, thus reducing the statistical power. Secondly, investigating the effect of different pet types implies that the benefits of any particular type of pet are an intrinsic property of the pet, rather than attributes perceived by their owner. However, this notion does not logically follow. For example, whilst a cat may be a wonderful source of companionship to some people, others might find their aloofness precludes them from being a provider of companionship. Thus, the potential benefits of any pet type are likely to depend at least as much upon how the pet is perceived by its owner, as for any intrinsic properties of the actual pet.

Therefore, the primary focus of this thesis will be to test whether pet ownership (yes/no) helps to alleviate loneliness. However, when feasible to do so, ancillary analyses will explore whether effects differ according to the type of pet that is owned.

Study I - Investigating whether pet owners are less lonely than non-pet owners

Introduction

In this first study, the primary aim was to test the hypothesis that pet owners are less lonely than non-pet owners amongst the general population. In effect, this first study would test whether Roberts et al.'s (1996) findings amongst an elderly sample would generalise to the wider population. The secondary aim was to test whether any effect was more pronounced, or only occurred, amongst people who live alone. This explored whether Goldmeier's (1986) findings amongst elderly women and Zasloff and Kidd's (1994) findings amongst female students would generalise to the wider population.

Method

Data

The data analysed in this study had been collected for two earlier companion animal studies (Collis, McNicholas & Harker, 1998; McNicholas, Collis & Harker, 1998), and was used in the current study with the permission of the first two authors.

Participants

In total, there were 286 participants. Of these, 139 were from a study by Collis, McNicholas and Harker (1998), in which there were three groups: 52 were dog owners (none of whom owned cats); 44 were cat owners (none of whom owned

dogs); and 43 were participants who did not own a pet of any species. Participants were recruited from among customers of a large pet superstore, a public library, and local veterinary surgeries, plus a small number of university employees (not students or academic staff). There were 32 males and 107 females. Twenty participants lived alone and 119 lived with at least one other person.

The remaining 147 participants were from a study by McNicholas, Collis, and Harker (1998), in which there were three groups: 47 were dog-owners who were not members of a dog club or society; 60 were dog owners who described themselves as active members of a dog club or society; and 40 were participants who did not own a pet of any species. Participants were recruited from customers using a pet superstore and an adjacent do-it-yourself superstore, from among members of local dog clubs, and University of Warwick employees (not students or academic staff). There were 48 males and 99 females. Fifteen participants lived alone and 132 lived with at least one other person.

In both of the recruitment samples, the criteria that dog owners should own dogs and not cats, and that cat owners should own cats and not dogs was imposed. It was not regarded as feasible to exclude ownership of other species such as fish or small caged animals amongst cat or dog owners. The non-pet owners did not own a pet of any sort.

When the two data sets were combined, the participants in each age category were distributed as follows: 37 (12.9%) 17 to 25 years, 51 (17.8%) 26 to 35 years, 71 (24.8%) 36 to 45 years, 75 (26.2%) 46 to 55 years, 31 (10.8%) 56 to 65 years, and 21 (7.3%) over 65 years.

Design

A cross-sectional design was utilised for all analyses in this study. The primary aim of

this thesis was to explore the effect of pet ownership (yes/no). However, in this study

some dog owners were also members of a dog club, which may or may not have the

same effect as dogs that are kept purely as pets. In addition, there might also be

systematic differences between the two original data sets. Therefore, rather than pet

ownership (yes/no), the primary independent variable in this first study was the

participants' 'pet ownership group', of which there were 6 levels corresponding to the

3 groups from Collis, McNicholas & Harker (1998), and the 3 groups from

McNicholas, Collis, & Harker (1998). The secondary independent variable was

participant's living arrangements, of which there were 2 levels: living alone; and living

with others. The main dependent variable was the participant's score on the UCLA-LS

(Russell et al., 1980). Participants' age and gender were entered as covariates as both

variables are believed to be associated with loneliness and could have been unevenly

distributed across levels of the independent variable(s). As data had been collected for

participant's Psychological General Well-Being (Dupuy, 1984) they were explored as

an additional variable in a secondary analysis.

Measures

1) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most

widely used measure of global loneliness. The range of possible scores is 20 to 80,

with higher scores indicating higher levels of loneliness. Participants indicate how

often they felt the way described in each question using a 4-point Likert scale (*never –*

rarely – sometimes – always). Russell et al. (1980) found the internal consistency of the UCLA-LS, as measured by Cronbach's Alpha (α) was .94. Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

2) The Psychological General Well-Being Scale (PGWB) (Dupuy, 1984) was used to measure participants' overall well-being. The 22-item version of this scale was used, and each item was scored on a scale of 1 to 6. On each item, participants were asked to rate how much they believed it applied to themselves (e.g., My daily life was full of things that were interesting to me). The possible range of scores is 22 - 132, with high scores indicating greater well-being. Dupuy (1984) reported the internal consistency of the GPWS as $\alpha = .94$. The PGWB Scale is shown in Appendix 4b.

3) Demographic information was collected regarding age, gender and whether or not participants lived alone. Age was recorded as ordinal categorical data where 1 = 17-25 years, 2 = 26-35 years, 3 = 36-45 years, 4 = 46-55 years, 5 = 56-65 years, and 6 = over 65 years. Participants' living arrangements were 'live alone' or 'live with others'.

Procedure

In each of the locations that participants were recruited, a researcher stood with a display board on which there was an advertisement for participants to take part in a study investigating people's relationships with both humans and pets. Participants showing interest were given an information pack, which included a tear-off slip for them to return with details of availability if they wished to participate. Those returning the slip were interviewed in their own homes by the same interviewer.

Results

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made as recommended by Tabachnick and Fidell (2001). As there was no evidence of any serious deviation from normality, the natural data were used. Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test.

Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered. In the analysis where individual UCLA-LS items were used, it was not possible to make *pro rata* adjustments for missing data, so these participants were excluded from the analysis.

Exploratory tests of the data using Chi-square analyses indicated: no difference in the ratio of males to females between pet ownership groups, $X^2(5, n = 286) = 4.36, p = .50$, although there were fewer males (28% of the participants) than females overall; no difference in the ratio of people living alone or with others between pet ownership groups, $X^2(5, n = 286) = 4.66, p = .46$ and; no difference in the ratio of people's ages between pet ownership groups, $X^2(25, n = 286) = 27.11, p = .35$.

The internal consistency of the UCLA-LS, as measured by Cronbach's Alpha coefficient (α), was .88, which was similar to the $\alpha = .94$ obtained by Russell et al. (1980). The internal consistency of the PGWB, was $\alpha = .76$, which was lower than the $\alpha = .94$ reported by Dupuy (1984).

A two-way (pet ownership group x living arrangements) analysis of covariance (ANCOVA) was used to explore participants' loneliness. The dependent variable was the UCLA-LS. Participants' age and sex were entered as covariates[1]. Descriptive statistics showed that the UCLA-LS mean scores for each of the 12 cells in the 2-way design were similar, although amongst the participants who lived alone the mean loneliness scores suggested that pet owners might have been lonelier than non-pet owners. The UCLA-LS mean scores for each level of pet ownership group are reported

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[1] There are at least two distinct meanings of the term *covariate* in common usage. Firstly, covariate is often used to denote an independent variable (IV) that is continuous (rather than a categorical *factor*) in the context of an analysis that in other respects takes the form of an Analysis of Variance. This usage arose from early applications of Analysis of Covariance, but it has probably been encouraged by the widespread use of SPSS which utilises the distinction between factors and covariates in its user interface. In its second common usage, *covariate* is used to denote an IV that has the status of a nuisance or background variable, in contrast to substantive variables which are the primary focus of an analysis. The purpose of including in an analysis a covariate (in this sense) is to partial its influence from the observable effects of substantive IVs, and/or to remove its influence from the error term. Thus this second usage of *covariate* relates to the logical status of IVs in a particular analysis, not the kind of measurement they reflect. Clearly, there is no obstacle to a categorical IV being a covariate in this sense, and no obstacle to a continuous variable being an IV of substantive interest, which is consistent with contemporary perspectives on regression and analysis of variance as two aspects of an integrated general linear model (e.g, Cohen & Cohen, 1983). Unless otherwise stated, in this thesis *covariate* is used in the second sense. It is usual (though not mandatory) to enter only the main effects of covariates into an analysis and, unless otherwise stated, this is what is done in this thesis.

in Table 3.1. It was noted that there were uneven numbers of participants in each cell, and that there was a large variation in standard deviations between cells.

Table 3.1. *Mean UCLA-LS scores by pet ownership group*

Data set	Pet ownership group	UCLA-LS mean scores					
		Live alone			Live with others		
		Mean	*n*	*SD*	Mean	*n*	*SD*
(Collis et al., 1998)	No pet	29.14	7	(3.57)	34.48	36	(7.84)
	Pet dog	35.18	5	(9.94)	35.07	47	(8.78)
	Pet cat	34.54	8	(9.27)	36.55	36	(9.50)
	3 groups combined	32.81	20	(8.02)	35.64	119	(8.69)
(McNicholas et al., 1998)	No pet	26.22	4	(4.47)	36.91	36	(10.30)
	Pet dog	35.57	7	(11.69)	34.25	39	(10.36)
	Club dog	33.32	4	(14.20)	33.76	56	(8.60)
	3 groups combined	32.48	15	(11.05)	34.77	131	(9.68)
All six groups combined means and *SD*		32.67	35	(9.29)	35.19	250	(9.21)

The analysis provided no evidence of differences in participants' UCLA-LS scores between pet ownership groups, $F(5, 284) = .65$, $p = .662$; no evidence of differences for participants' living arrangements, $F(1, 284) = 3.22$, $p = .074$; and no evidence of interaction between the two factors, $F(5, 284) = 1.11$, $p = .354$. The test of the grouped covariates showed that neither age nor gender influenced loneliness, $F(2, 284) = .56$, $p = .574$. However, Cochran's C test suggested that the assumption of homogeneity of variance had been violated, $C(23, 12) = .187$, $p = .003$. A number of transformations

(square root, quadratic root, logarithmic) were attempted to correct this violation, but the improvement was marginal. Therefore, some caution may be necessary when interpreting the results of this particular analysis. Due to missing responses to the UCLA-LS, 1 participants' data were omitted from this analysis.

To explore whether the small cell sizes in the two-factor design had affected the overall interpretation of the previous analysis, it was rerun without the interaction term included. As the covariates age and gender clearly had no effect on UCLA-LS scores, they were not included in the following two analyses where the UCLA-LS was the dependent variable. The analysis provided no evidence of differences in participants' UCLA-LS scores between any of the pet ownership groups, $F(5, 284) = .51, p = .768$; and no evidence of differences for whether participants lived alone or with others, $F(1, 284) = 2.84, p = .093$.

Due to unequal homogeneity of variance between cells in the two-factor design, as a further check a one-way ANOVA was carried out with 'pet ownership group' as the between-subjects factor and the UCLA-LS as the dependent variable. This analysis provided no evidence of a difference between pet ownership groups, $F(5, 284) = .49, p = .781$, and no evidence of a problem with homogeneity of variance.

Although there was clearly no evidence of differences in UCLA-LS total scores attributable to pet ownership group, it was possible that differences may exist on some of the individual UCLA-LS items, which could have been obscured within the UCLA-LS total scores. The mean scores of the 20 individual UCLA-LS items for each level of pet ownership group are shown in Table 3.2.

Table 3.2. *Mean scores of individual UCLA-LS items by pet ownership group*

UCLA-LS Item No.	Pet ownership group (*SD* in parentheses)					
	3 groups from Collis et al. (1998)			3 groups from McNicholas et al. (1998)		
	Dog pet	Cat pet	No pet	Dog pet	Dog club	No pet
1	3.54 (.67)	3.55 (.66)	3.44 (.67)	3.50 (.72)	3.58 (.56)	3.60 (.63)
2	3.00 (.81)	2.55 (.95)	3.02 (.86)	3.04 (.92)	3.00 (.90)	2.88 (1.01)
3	3.48 (.80)	3.55 (.73)	3.41 (.79)	3.33 (1.01)	3.45 (.83)	3.52 (.81)
4	2.51 (1.24)	2.56 (1.18)	2.86 (1.22)	2.49 (1.23)	2.66 (1.22)	2.67 (1.23)
5	3.40 (.84)	3.25 (.84)	3.49 (.74)	3.41 (.75)	3.37 (.86)	3.32 (.66)
6	3.33 (.86)	3.23 (.72)	3.19 (.88)	3.50 (.78)	3.53 (.67)	3.32 (.66)
7	3.44 (.91)	3.65 (.65)	3.50 (.80)	3.63 (.77)	3.57 (.75)	3.47 (.90)
8	2.67 (.83)	2.81 (.90)	2.79 (.91)	2.83 (.95)	2.95 (.89)	2.87 (.91)
9	3.29 (.76)	3.20 (.93)	3.49 (.81)	3.28 (.72)	3.26 (.77)	3.10 (.84)
10	3.66 (.62)	3.86 (.35)	3.67 (.71)	3.80 (.45)	3.80 (.44)	3.65 (.53)
11	3.08 (.84)	2.83 (.93)	2.95 (.90)	3.09 (.91)	3.07 (.80)	2.93 (.86)
12	2.83 (1.02)	2.77 (.89)	2.95 (1.02)	3.02 (.84)	3.18 (.79)	2.82 (.96)
13	2.80 (1.03)	2.91 (1.01)	2.86 (1.06)	2.88 (1.00)	2.83 (.99)	2.72 (1.04)
14	3.02 (.88)	2.88 (1.06)	3.16 (.87)	3.15 (.82)	3.25 (.84)	2.97 (.94)
15	3.61 (.72)	3.59 (.58)	3.74 (.54)	3.51 (.73)	3.55 (.79)	3.37 (.93)
16	3.51 (.70)	3.55 (.66)	3.30 (.89)	3.43 (.68)	3.40 (.78)	3.36 (.77)
17	3.54 (.79)	3.32 (.98)	3.51 (.75)	3.43 (.95)	3.59 (.77)	3.26 (.97)
18	2.71 (1.00)	2.55 (1.02)	2.74 (.92)	3.04 (.95)	2.88 (.96)	3.00 (1.00)
19	3.88 (.38)	3.82 (.45)	3.93 (.26)	3.74 (.54)	3.81 (.39)	3.80 (.40)
20	3.86 (.34)	3.77 (.52)	3.81 (.50)	3.67 (.60)	3.78 (.41)	3.70 (.56)

(Note: Higher scores indicate higher loneliness).

Multivariate analysis of covariance (MANCOVA) was used to compare the effect of pet ownership group on each of the individual UCLA-LS items. As the dependent variables were now the individual UCLA-LS items, participants' age and gender were specified as covariates. It was not feasible to explore the effect of living arrangements due to missing data that could not be estimated, which resulted in some empty cells in the two-factor design. The multivariate test provided no evidence of differences between pet ownership groups, Wilks' Λ = .605; $F(100, 1082)$ = 1.17; p = .125; and no effect for the grouped covariates, Wilks' Λ = .817; $F(40, 442)$ = 1.17; p = .223. There was strong evidence that the multivariate assumption of homogeneity of covariance had been violated, Box's $\chi^2(1050, n = 248) = 1466.0$, p <.001. Therefore, as recommended by Tabachnick and Fidell (2001), Pillai's criterion was examined instead of Wilk's Λ, which only marginally affected the test of significance and did not affect the overall interpretation. In total, 38 participants were excluded from this analysis because their data were missing on one or more of the dependent variables.

Despite no evidence that pet ownership group was associated with the UCLA-LS total scores or any individual UCLA-LS item, there was a possibility that if the UCLA-LS had a multidimensional structure, then differences may be evident on one or more of the dimensions. Principal Component Analysis (PCA), using the twenty individual items of the UCLA-LS as data, revealed five eigenvalues with a score greater than one. The eigenvalues and the percentage of variance they account for are reported in Table 3.3. A scree plot of the eigenvalues is shown in Figure 3.1.

Table 3.3. *Initial solution eigenvalues for the PCA of the UCLA-LS scores*

Factor	Eigenvalue	% of Variance	Cum %
1	7.101	35.5	35.5
2	1.606	8.0	43.5
3	1.261	6.3	49.8
4	1.128	5.6	55.5
5	1.015	5.1	60.6
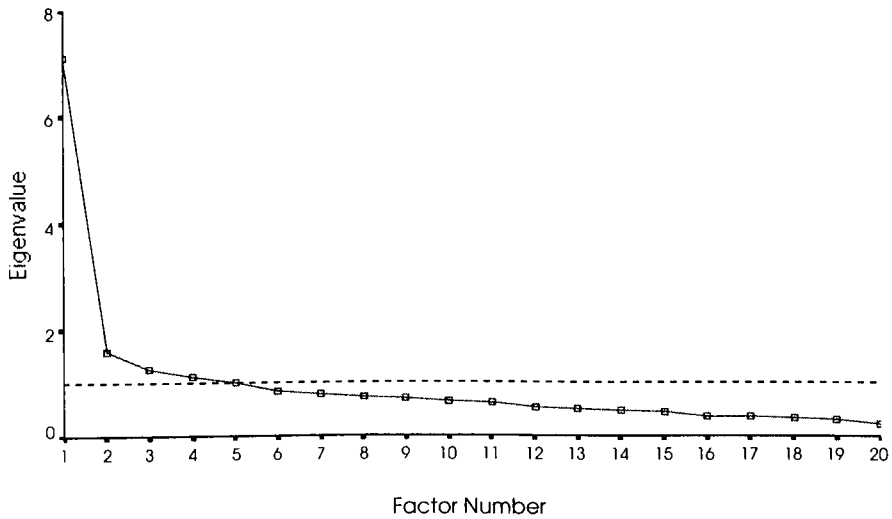
Figure 3.1. **Scree-plot of eigenvalues.**

As the fifth eigenvalue was only marginally greater than 1, a four-factor solution was examined. A varimax rotation was used to facilitate interpretation of the factors. The way in which the UCLA-LS items load onto the four factors is shown in Table 3.4. (The grouped items corresponding to each factor are shown in bold).

Table 3.4. *Factor loadings after varimax rotation*

UCLA-LS item	Factor I	Factor II	Factor III	Factor IV
2	**.58604**	.09474	.20436	.39214
8	**.55785**	.11209	.16131	-.38012
11	**.70259**	.20230	.15922	.19852
12	**.58339**	.07335	.15896	-.10921
13	**.56967**	.42979	.00970	-.00424
14	**.71321**	.21257	.25395	.10642
17	**.61362**	.17391	.31340	.17909
18	**.56608**	.18858	.31063	-.23017
3	.43016	**.58921**	-.18976	.17100
7	.52534	**.57981**	.06985	.04401
10	.15811	**.72444**	.16820	-.13306
16	.12259	**.63338**	.35608	-.21359
19	.17731	**.69600**	.31841	.14270
20	.11098	**.80474**	.23402	.04987
1	.12716	.27968	**.66557**	-.09783
5	.35432	.19256	**.58883**	.06809
6	.35629	.29535	**.56973**	-.14289
9	.22310	-.01083	**.63538**	.44932
4	.02243	.04246	.03104	**-.59223**
15	.24484	.33072	.38712	**.43214**

Table 3.5 shows how the individual UCLA-LS items correspond to each of the four factors. Inspection of the four factor solution suggested that the first factor comprised only items measuring loneliness, whilst the remaining three factors tended to comprise the absence of loneliness items (which required reverse scoring).

Table 3.5. *How the UCLA-LS items correspond to the 4 loneliness factors.*

Loneliness Factor	UCLA-LS items (item number in brackets)
I	I lack companionship (2)
	My interests and ideas are not shared by those around me (8)
	I feel left out (11)
	My social relationships are superficial (12)
	No one really knows me well (13)
	I feel isolated from others (14)
	I am unhappy being so withdrawn (17)
	People are around me but not with me (18)
II	There is no one I can turn to (3)
	I am no longer close to anyone (7)
	There are people I feel close to (10)
	There are people who really understand me (16)
	There are people I can talk to (19)
	There are people I can turn to (20)
III	I feel in tune with the way of life around me (1)
	I feel part of a group of friends (5)
	I have a lot in common with the people around me (6)
	I am an outgoing person (9)
IV	I do not feel alone (4)
	I can find companionship when I want it (15)

The individual UCLA-LS items were weighted according to the influence they had on each of the four factors using the 'regression' option in SPSS factor analysis. The resulting weights given to each component are shown in Table 3.6.

Table 3.6. *The factor score coefficient matrix.*

UCLA-LS item No.	Factor I	Factor II	Factor III	Factor IV
1	-.13578	-.00639	.39966	-.12416
2	.18551	-.08423	-.03334	.25589
3	.11721	.24615	-.34320	.14887
4	.03389	-.01739	.05681	-.46367
5	-.00610	-.07245	.29723	-.00765
6	-.00733	-.02922	.28255	-.16580
7	.11457	.17224	-.16996	.02250
8	.22867	-.10002	.00123	-.34016
9	-.06293	-.13632	.36344	.28464
10	-.09607	.28971	-.03037	-.09255
11	.24168	-.05577	-.09384	.10613
12	.23110	-.11059	-.02102	-.13226
13	.18111	.09787	-.19246	-.02044
14	.22971	-.07349	-.02400	.02656
15	-.06356	.06899	.12686	.30608
16	-.13118	.21580	.13161	-.17240
17	.17272	-.07971	.04064	.08309
18	.17481	-.08245	.07932	-.23200
19	-.13264	.25949	.05388	.10787
20	-.16031	.33589	-.00205	.05178

Multivariate analysis of covariance (MANCOVA) was used to compare the effect of pet ownership group on each of the four loneliness components (factors). As the dependent variables were now four loneliness components, participants' age and gender were specified as covariates. It was not feasible to explore the effect of living arrangements due to missing data that could not be estimated, which resulted in some empty cells. The multivariate test showed no evidence of a significant effect of pet ownership group, Wilks' $\Lambda = .920$; $F(20, 787) = 1.00$; $p = .494$. There was evidence of an effect for the grouped covariates, Wilks' $\Lambda = .920$; $F(8, 474) = 2.52$; $p = .011$. There was some evidence that the multivariate assumption of homogeneity of covariance had been violated, Box's $X^2(50, n = 248) = 83.86$, $p = .002$. However, as this was less than Tabachnick and Fidell's (2001) recommended criterion for α ($p<.001$), this was assumed not to have seriously affected the interpretation of the Wilk's test. In total, 38 participants were excluded because their data were missing on one or more of the dependent variables.

Although there was clearly no evidence of differences in loneliness as measured by the UCLA-LS, it was possible that if pet owners scored higher on General Psychological Well-Being (PGWB), then this would offer a potential explanation for why pets are widely believed to help alleviate loneliness. That is, if pet owners scored higher on General Psychological Well-Being, loneliness might feel less aversive than for non-pet owners.

Descriptive statistics showed that the PGWB mean scores for each of the 6 cells in the design were similar, although mean scores suggested that dog owners may have had marginally higher levels of Psychological General Well-Being. The mean scores and SDs are shown in Table 3.7. It was not feasible to include 'living arrangements' as a second between-subjects factor in this analysis, due to large differences in standard deviations between cells.

Table 3.7. *Mean scores of Psychological General Well-Being by pet ownership group*

Data source	Pet ownership group	Psychological General well-being		
		N	Mean	*SD*
Data set 1	No pet	43	73.33	(16.21)
(Collis et al.,	Pet dog	52	79.24	(13.07)
1998)	Pet cat	44	73.32	(14.75)
	3 groups combined	139	75.54	(14.80)
Data set 2	No pet	40	78.88	(15.33)
(McNicholas et al.,	Pet dog	43	80.75	(14.67)
1998)	Club owner dog	58	80.22	(16.02)
	3 groups combined	141	80.00	(15.33)
All six groups combined		280	77.78	(15.21)

A one-way (pet ownership group) ANCOVA was used to explore participants' Psychological General Well-Being. Controlling for participants' age and sex, the analysis provided no evidence of differences due to pet ownership group, $F(5, 272) = 2.17, p = .058$. There was evidence of an effect of the grouped covariates $F(2, 272) =$

3.98, $p = .020$. There was no evidence of violation of the assumption of homogeneity of variance.

Discussion

The current study found no evidence that pet owners are less lonely than non-pet owners, irrespective of whether or not they lived alone. In contrast, the descriptive statistics showed a tendency amongst the participants who lived alone for non-pet owners to be less lonely than pet owners. Although this was not significant, the direction was consistent with the findings reported by Bekker (1986) and the mean loneliness scores reported by Mahalski et al (1988) where pet owners were lonelier than non-pet owners, rather than the findings reported by Goldmeier (1984) or Zasloff and Kidd (1994).

The loneliness data in this study were analysed in three different forms: UCLA-LS total scores; UCLA-LS individual items; and the 4 UCLA-LS loneliness components. Thus, if there were differences between pet owners and non-pet owners, then this would improve the chance they would have become apparent[2].

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[2] Having found no differences in the first analysis using the UCLA-LS total scores as data, continuing to explore for differences due to pet ownership could incur criticism for 'data dredging'. However, having only explored the UCLA-LS total scores, if it was then concluded that pets did not effect loneliness a critical reader might ask whether additional analyses (e.g., the individual UCLA-LS items and the 4 UCLA-LS components) would have revealed differences.

That there was clearly no evidence of differences associated with the type of pet that was owned confirmed the rationale that the primary focus of this thesis should be pet ownership (yes/no), rather than pet type.

Although the role of pets on loneliness was the primary focus of this thesis, as data had been collected for Psychological General Well-Being, they were also explored as a dependent variable. It was hypothesised that if differences associated with pet ownership were evident for the additional dependent variable (PGWB), this could explain why people believe pets help to alleviate loneliness. That is, whilst pet owners and non-pet owners did not differ in loneliness, the pet owners may have experienced higher levels of well-being, which made loneliness seem somehow less unpleasant. However, no evidence of differences in well-being was found to be associated with pet ownership, although the mean scores did suggest there was a tendency for dog owners to report higher levels of well-being.

Overall, this study provided no evidence that any of the pet owning groups were less lonely than either of the two non-pet owning groups, regardless of whether participants lived alone. However, for the reasons outlined below, this does not necessarily preclude the possibility that [at least some] pet owners are less lonely than non-pet owners (reasons 1 and/or 3), or that pet ownership can help to alleviate loneliness (reasons 2 and/or 3).

1) The UCLA-LS is not sensitive to differences that occur due to pet-ownership

Whether or not pet owners are less lonely than non-pet owners, only a measure sensitive to the type of benefits associated with pet ownership would be able to detect an effect. In the context of the current study, pet owners might be less lonely than non-pet owners, but in a way not detected by the UCLA-LS. For example, if pet ownership does help reduce loneliness, it is plausible that UCLA-LS items such as 'there are people I can talk to' (item 19) or 'there are people I can turn to' (item 20), might fail to detect such an effect, due to there being worded in terms specific to the role of humans. That is, a pet might help to alleviate people's feelings of loneliness, but fail to stop them believing they have no people to talk or turn to. However, items such as 'I can find companionship whenever I want it' (item 15), are worded in more general terms, which might be more likely to detect any beneficial effects related to pet ownership. In total, at least half of the UCLA-LS items refer explicitly to humans and therefore may not reflect differences associated with pets. However, when this possibility was tested in the multivariate analysis on individual UCLA-LS items there was no evidence that any individual items detected differences associated with pet ownership. To maximise the chance of detecting an effect that truly existed, principal component analysis was carried out on the individual UCLA-LS items to explore whether there were separate groups of items that might reveal differences associated with pet ownership. However, this too failed to reveal evidence of any differences between pet owners and non-pet owners.

2) Before pet acquisition the pet-owners were lonelier than the non-pet owners, but after pet acquisition their loneliness reduced to that of the non-pet owners.

Studies with a cross-sectional design make comparisons between groups only at a particular moment in time. For example, as pet ownership was an attribute variable, it is possible that before the pet owners acquired their current pet they may have been lonelier than they are now. When they became pet owners, this 'extra' loneliness may have been alleviated, in effect reducing their loneliness to a level indistinguishable from that of the non-owners. Thus, pets may have helped to alleviate loneliness, but the use of a cross-sectional design had meant the effect was not detected. This possibility calls into doubt the rationale of testing the hypothesis pet owners are less lonely than non-pet owners as a test of the theory that pets help to alleviate loneliness

Supporting this possibility, Endenburg et al. (1994) reported that 79% of people had acquired a pet for reasons of companionship, which was consistent with the possibility that before pet acquisition people may be lonelier than is typical. If people are seeking companionship, they may be doing so because they perceive the level of companionship they have as less than ideal. As Peplau and Perlman (1982) argue that people who are dissatisfied with their current levels of interpersonal relationships (companionship) are likely to be lonely, this implies many people who seek to acquire a pet may be doing so because they feel lonely.

3) The beneficial effects of pet ownership occur only amongst specific sub-groups

Finally, it is possible that pet owners are less lonely than non-pet owners and/or that pet ownership helps to alleviate loneliness, but only amongst specific sub-sections of the population. Therefore, when attempting to detect the effect of pet ownership among the general population, any effects may be diluted to such an extent that they are too small to be detected. Consistent with this possibility, studies that have found differences associated with pet ownership have used specific, rather than general, samples of the population. For example, elderly people in long-term care facilities (Banks and Banks, 2002), elderly females (Goldmeier, 1986), female students (Zasloff & Kidd, 1994) and elderly people living in their own homes (Roberts et al., 1996).

Conclusion

It is, of course, possible that pet owners are no less lonely than non-pet owners, or that pet ownership does not help to alleviate loneliness. However, at this stage these would be premature conclusions in view of the three possible causes of a *type-II* error outlined above. Of the three reasons, it is logical that if the UCLA-LS is not sensitive to benefits associated with pet ownership, then controlling for the other two possible *type-II* errors will still not reveal an effect. Therefore, further investigation focussed on whether the UCLA-LS failed to detect differences that truly are associated with pet ownership. Subsequently, the other two reasons should be explored before concluding that pet ownership does not help to alleviate loneliness.

Study II - Developing, evaluating and using 6 complementary loneliness scales

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Aim

The primary aim of this study was to develop one or more complementary loneliness scales for use in conjunction with the UCLA-LS to provide a more sensitive means to investigate the effect of pet ownership on loneliness. As the process of validating the scales necessitated collecting a large amount of data, the validation process was used to re-examine whether pet owners are less lonely than non-pet owners. In addition, structural equation modelling was used to test whether the data collected during the validation of the new measures would fit a hypothetical model in which pet ownership predicted lower levels of loneliness.

Introduction

In Study I, no evidence was found to suggest that pet ownership was associated with loneliness measured by the UCLA-LS. Whilst the experimental hypothesis may have been correctly rejected, it was possible that a *type-II* error may have occurred due to the UCLA-LS not being sensitive to particular aspects of loneliness most likely to be influenced by pet ownership. In addition, a potential problem was identified with using the hypothesis that pet owners are less lonely than non-pet owners to test the pets and loneliness theory. That is, before they owned their pet, the pet owners may have been lonelier than the non-pet owners. Consequently, when pets were acquired they may have helped to reduce the owner's loneliness, but only to the level seen in non-pet owners. Thus, comparing pet owners with non-pet owners would not be a fair test of

the pets and loneliness theory. Finally, it was possible that pet owners are less lonely than non-pet owners, but only amongst certain sub-groups of the population.

As it would not make sense to address each of these three points simultaneously, it was logical that the issue of measuring pertinent aspects of loneliness should be dealt with first before exploring the latter issues. Therefore, this study addressed the question of whether the UCLA-LS is sensitive to the type of differences associated with pet ownership, and whether more specific measures might be more appropriate.

It has been suggested that a multidimensional approach to understanding the aetiology of loneliness may be more suitable than a unidimensional approach (Hojat & Crandall, 1987; Rook, 1988; Rubenstein & Shaver, 1982; Shaver et al., 1985). However, while a multidimensional loneliness measure may increase sensitivity to any effects, there are potential criticisms with selecting one measure in favour of another to support an experimental hypothesis. Marcoen and Goosens (1993) suggested that the results of any study of loneliness depend largely on the researcher's implicit conceptualisation of the variables under investigation and the choice of measuring instrument. Thus, deciding to use a multidimensional instrument to detect effects not apparent with the UCLA-LS may leave the experimenter open to accusations of embarking on a data-dredging exercise.

Whilst being aware of this potential criticism, the advantages of adopting a multidimensional approach to explore loneliness outweighed any potential disadvantages, as differences that were not apparent using the UCLA-LS may be found. One solution was to use an existing multidimensional measure of loneliness in place of or in conjunction with the UCLA-LS. A number of scales with multiple dimensions

have been proposed: Schmidt and Sermat's (1983) romantic-sexual loneliness, friendship loneliness, family loneliness and loneliness in a larger group; Scalise et al.'s (1984) agitation, dejection, depletion and isolation; Wittenberg's (1986) emotional and social loneliness; DeJong-Gierveld's (1987) intensity, time perspective and emotional characteristics; and DiTommaso & Spinner's (1997) romantic-emotional loneliness, family-emotional loneliness and social loneliness. However, none of these scales provide an obvious solution, as all are highly correlated with the UCLA-LS (Cramer & Barry, 1996) and worded similarly, they are therefore potentially no more likely than the UCLA-LS to detect differences in loneliness associated with pet ownership.

A second solution was preferred, whereby one or more loneliness scales should be developed to complement the UCLA-LS. The design specification was that any new scales should measure types of loneliness that were meaningful to non-psychologists and psychologists alike and, as far as possible, be worded in terms capable of detecting any effect of pet ownership. Rather than the experimenter arbitrarily choosing what the new scales should measure, a series of focus groups on the topic of loneliness would be used to provide the ideas for the complementary loneliness scales. The process of validating the new scales would test whether they were measuring complementary areas of loneliness and whether they would detect differences between pet owners and non-pet owners where the UCLA-LS had not.

This study is reported in five parts: Part 1 describes how focus groups were used to elicit ideas for the new scales; Part 2 describes how the ideas were used to construct six complementary loneliness scales and how they were evaluated; Part 3 reports how the six scales were shortened and evaluated; Part 4 uses the data collected to validate the shortened version of the complementary loneliness scales to explore whether pet

owners were less lonely than non-pet owners; and Part 5 uses structural equation modelling to explore whether the theory that pet ownership helps to alleviate loneliness was consistent with the correlational data that had been collected.

Part 1. Using focus groups to elicit ideas for a new loneliness measure

Focus groups are a research technique that collect data through group interaction on a topic determined by the researcher (moderator), and have recently been used in many fields to elicit data on how people view various issues (Weinberger et al., 1998). The data collected tends to be used to provide insights, as opposed to being used for a more formal content analysis.

For the purpose of this study, themes based upon the focus group data would be used to develop loneliness scales providing they were consistent with the following two criteria: 1) they should identify dimensions of loneliness that might reasonably be affected by pet ownership; and 2) the dimensions of loneliness should be consistent with everyday understandings of loneliness and should have received some support from previous literature.

Method

Participants

Four focus groups were used to provide the ideas for the new loneliness scales. These comprised: (1) seven 14-year old pupils from a local grammar school; (2) eight first-year psychology under-graduates (approx. 19 years old); (3) seven elderly members of an Age-Concern coffee morning in Coventry; and (4) six employed adults between 28 and 47 years old. Each group consisted of a relatively equal gender split, with the

exception of the first-year undergraduate group, which were predominantly female. Groups 1, 3, and 4 were not offered financial incentive to participate, but the psychology undergraduates were each paid £5 for participating.

Procedure

Prior to running each focus group session, participants were informed that the aim was to discuss loneliness. To encourage group discussion the moderator recounted two personal examples of loneliness (Appendix 2). The aim of this was to emphasise how high the prevalence rates for loneliness actually are and that, at some time in their lives, most people will have felt lonely. Each focus group was moderated by the same investigator and lasted for approximately 45 minutes. Both written notes and audiotapes were made of the sessions to aid identification of ideas for the complementary scales. Only when the subject matter strayed seriously from the theme of loneliness did the moderator interject. At all other times, the moderator's role remained passive.

Results and Discussion

As the focus groups were only to provide ideas for the complementary loneliness scales, a formal content analysis was not carried out. In each of the focus groups, the participants readily discussed personal thoughts about loneliness. Six ideas for loneliness scales were derived from the focus group data. These are presented in turn (abbreviated names for each of the scales are in parentheses), and the extent to which they satisfy the 2 pre-requisites of the new scales is discussed.

1) Desire to feel valued, needed, understood and loved (Esteem)

In each of the focus groups participants expressed a desire to feel valued, needed, understood and loved by other people, in the absence of which loneliness might occur. For example, one participant commented: 'You want people to want you...to want to know you...to be interested in you...to be with you...to want to talk to you'. Other participants defined loneliness as '... only being able to talk at a superficial level...not really discussing meaningful issues, feelings...' or, 'when my husband died and my neighbour just said hello it meant so much...I was so lonely'. For one man in his late 40's loneliness was '...if nobody agrees with your opinion, or is interested in your opinion, you feel alone...'

Support for the possibility that loneliness may be related to not feeling valued, needed, understood and loved was provided by Rubenstein and Shaver (1982b) who found that people reported "being misunderstood" and "not feeling needed" as reasons for feeling lonely. Weiss (1974) suggested the importance of reassurance of worth as one of six social provisions whose absence is associated with loneliness.

It is plausible that pets may help to satisfy this kind of need. For example, in a series of informal interviews with children exploring their relationship with their pet, Bryant (1985) found that of 168 children between 7 and 10 years old, 90% had pets and 75% of these reported them to be special friends who provide love and affection. Similarly, Carmack (1991) suggested that pets help people with AIDS (PWAs) to feel valued and needed. For example, the PWAs described how, since they had been diagnosed with AIDS, their pets provided the functions they required: increased self-esteem and a feeling that they were valued by another living being. Amongst a sample of 769 adults, 73% overall thought that their pet understood them (The Gallup Organization, 2000).

Vanhoutte and Jarvis (1995) compared 65 children with pets and 65 children without pets and found that the children with pets were significantly higher in self-esteem than the non-pet owning group. Although, an alternative explanation might be that parents who provided pets also provided other 'extras' that might account for increased self-esteem.

The focus group data suggested that if people perceive that they are not valued, needed, understood and loved, then they are more likely to feel lonely. Evidence suggests that pets can provide these sorts of functions. Therefore, as it is unclear from the individual UCLA-LS items that this dimension is explored, a scale to measure the lack of this kind of feeling will form the first of the scales to complement the UCLA-LS.

2) A need for tactile affection (Tactile)

On several occasions, people spoke about the wish to hold, cuddle or hug someone. For example, one of the focus group participants mentioned, 'everyone needs someone they can be close to...to touch...', and several mentioned the importance of being able to cuddle someone or to simply hold hands. Interestingly, the need for physical contact does not appear to have been explored in the context of loneliness.

Indirect evidence supports the possibility that tactile loneliness could be a specific type of loneliness. Levinson (1984), for example, claimed the human neonate has an innate need, strengthened by experience, for touch stimulation as a means of pleasure and comfort from anxiety. Touch demonstrates caring and affectionate closeness and, he claims, becomes an important component of love. Both Levinson (1984) and Katcher (1979) suggested that physical contact stimulates the brain's production of endorphins into the nervous system, which alleviates anxiety and forms the foundation for social

attachment. McNicholas (personal communication) also mentioned that in conversations with recently bereaved people, tactile loneliness was an issue that had often been mentioned.

It is easy to understand how a pet could help provide some sort of tactile comfort. For example, the image of a person stroking their pet is probably the most prototypical image of a person and their pet. Although not talking specifically about loneliness, Endenburg (1994) reported one participant talking about their reason for pet acquisition as "...nice to touch him, his fur is nice..." (p.194). Of course, a pet cannot and should not be a substitute for a person, but it is plausible that some types of pet might help to alleviate distress associated with a lack of tactile comfort from another human. Evidence suggests such a belief may be commonplace, as Fifield and Forsyth (1999) reported that parents often gave their children pets as something to cuddle and show affection to.

The content of the focus groups suggested that the notion of tactile affection might be a useful dimension to pursue with regard to loneliness. It is not clear why this area has received little attention in the loneliness literature, but a possible explanation may be because it is awkward to talk about this kind of loneliness, both for the researcher and the researched. Nevertheless, it makes sense that pets might provide the opportunity to touch or be close to another living being, and therefore the notion of tactile loneliness will be pursued as a further complementary loneliness scale.

3) A need to care for others (Care)

When talking about loneliness the focus group data suggested that if people did not have the opportunity to care or give things to other people then they might be more likely to feel loneliness. For example, one participant commented that they would feel lonely at '...special times like Christmas and there is no one to whom you can give presents, love, opinions'. Another suggested the importance of feeling you are useful to other people.

In addition to five other social provisions, Weiss (1974) reported that people might experience loneliness if they perceive that they have no opportunity to care for someone else. Although a lack of opportunity to care for others has not attracted a great deal of interest amongst mainstream loneliness researchers, it has received some attention in nursing journals, where it has been described as a 'need for nurturance' (e.g., Medcof & Wegener, 1992).

It is easy to understand how pet ownership offers children and adults a chance to care for another living being. Raina (1999) suggested that pet ownership might give older people a care-taking role, which may have subsequent health benefits for them. In a study by Allen and Blascovitch (1996), exploring the value of service dogs, one of their participants mentioned the importance of caring for others by stating, " ...with my dog I feel safe and capable, and I am no longer afraid of the future. Everyone needs someone to care for, and we care for each other..." (p1006). Bryant (1985) also reported that children frequently report animals as being special friends that offer an opportunity to nurture. Similarly, Furman (1989) found that fourth grade children provided more nurturance to their pet than to anyone else in their network. Katcher and Beck (1987) suggested that humans raise the young of other animals for both the

practical value of the animal and the "pleasure and physiological rewards" (p. 179) gained from nurturing.

It was mentioned in the focus groups that people who do not have the opportunity to care for other people might feel lonely. Not only do pets offer an opportunity to care for another living being, but dogs in particular will relish such attention. The third complementary scale will therefore measure whether people perceive that they would like more opportunity to care for other people.

4) A need to keep busy to avoid feeling lonely (Busy)

Expressing a need to keep busy was another recurrent theme in each of the focus groups. For example, one participant mentioned, 'I have television…. I'm a television addict, it's about all I can do in the winter anyway'. Another participant, talking about coping with loneliness, stated, 'I used to just pass the time of day, doing anything to just keep busy.'

Kehoe (1991) argued "…we must keep ourselves attached and occupied to escape the boredom which is often our perception of loneliness" (p.138). In this sense, then, feeling a need to keep busy could reflect behaviour motivated by a desire to avoid feeling lonely. Accordingly, Rubenstein and Shaver (1982b) reported 21 behaviours that people use to keep busy with the intention of avoiding loneliness, although many are not particularly constructive (e.g. getting drunk), and interestingly, the companionship of a pet was not mentioned. Nevertheless, it is reasonable to expect that pet ownership might at least provide a pleasant distraction from feeling lonely. Pet owners - particularly those of dogs, cats, ferrets and rabbits - would quite likely agree that owning a pet helps to keep them busy. At times when there is nothing at all to do,

there is always *someone* who will be more than happy to go for a walk, play, be fed, pampered, teased or who needs to be cleaned up after. Therefore, the fourth complementary scale will measure the degree to which people keep busy. This is based on the assumption that the degree to which people keep busy may reflect the degree to which they are lonely.

5) A need to share (Share)

Participants reported that they would feel lonely if they felt they were unable to share certain activities with other people. Particularly mentioned was the importance of sharing meal times, trips to the theatre, jokes and gossip. For example, one participant talking about Christmas reported, '...the emphasis at that time is on sharing, family, giving. So it [loneliness] is highlighted...'. Others mentioned the importance of simply being able to share gossip or a joke.

The idea that people might feel lonely if they do not have an opportunity to share with other people is consistent with commonly held anthropological views (e.g., Ridley, 1998) and general systems theory (Flanders, 1982). As all interactions with another person involve some degree of shared behaviour, it makes sense that if people feel there is too little sharing in their lives, they might feel lonelier than a person who doesn't feel in need of more sharing.

Many pets offer an opportunity to share, whether it is a mealtime, heartache or tears, laughter or a good walk. Carmack (1991), working with AIDS sufferers, reported poignant comments made by patients, which support this possibility. For example, one man, talking of his dog, said, "...when I was first diagnosed... I was able to use her as a sounding board that helped me sort out my thoughts...my puppy helped me sort it

out" (p. 27). Similarly, another AIDS sufferer talking about his dog, reports, "...by being able to confide in her and talk it out with her that's real important to me" (p. 27).

An inability to enjoy shared behaviour with another living being might therefore be an aspect of loneliness that could be offset by the ability to share behaviours with a pet. Therefore, the notion of sharing will be explored in the fifth complementary scale.

6) Desire not to appear lonely (Image)

A desire not to be perceived as a lonely person was very strongly emphasised, and for most participants appeared to be an intrinsic part of the overall negative experience of loneliness. For example, one participant stated, 'I wouldn't admit I was lonely...not to myself, even'. Another participant stated, 'I couldn't bear the thought of even eating alone in a restaurant – like I know I'm not really unpopular, but I'd seem it.... I'd feel bad, like people would think I'm lonely'. Stacey (2000), in an attempt to rationalise people's fear of being seen alone in situations that are normally shared, suggested "...there is no shame attached to being seen eating alone. It's only human..." (p.35). However, apparently not believing this advice, Stacey added, "...to do so is like wearing a sign around one's neck saying 'I have no one to be with – I have no friends. I am lonely'." (p.35). Similarly, Gordon (1976) implied that to be seen as lonely is to be seen to have failed in life.

If a person wants to reduce the chance they are perceived as lonely, then a pet might provide a solution. For example, if a person wants to take exercise, but fears doing so alone they will be perceived as lonely, they could take their pet dog for a walk and would no longer be alone. Since being perceived as lonely could be construed as part of a general negative impression, then, according to Messent (1983) and McNicholas and

Collis (2000) the presence of a pet could help to offset a perception of being lonely. Therefore, the final complementary scale will measure the extent to which people believe they are perceived to be lonely.

Summary

The data from the 4 focus groups provided ideas for six loneliness scales to complement the UCLA-LS. Each of these six new dimensions appeared to have some support in previous literature and, particularly relevant to this thesis, each might plausibly be alleviated to some degree by pet-ownership.

Part 2. Developing six complementary loneliness scales

Using the ideas elicited from the focus group data, six complementary loneliness scales were developed. The questions were worded in a similar style to the UCLA-LS items, so that they would measure loneliness in the sense defined by the cognitive discrepancy model (Peplau and Perlman, 1982). For ease of reporting the six scales are collectively called the 6-Complementary Loneliness Scales (6-CLS). However, when referred to individually the abbreviated scale name (e.g., Tactile) will be used.

Method

Participants

Two hundred and one participants were recruited from amongst daytime visitors to the Warwick Art Centre in the English Midlands. It was expected that some participants would be students, but many would be in other occupations as several private-sector conferences were running during the period questionnaires were distributed. There

were 102 females, 98 males and one participant who did not specify their gender. Participants' mean age was 25.02 years (range of ages $= 19$ to 50, $SD = 7.01$).

Design

Firstly, a pool of questions broadly related to each of the six loneliness ideas was compiled in a brainstorming session with the help of two psychologists familiar with this study. The resulting lists were then evaluated, which led to some of the items immediately being rejected as they appeared ambiguous, involved the use of double negatives or complex clause structures, or because they obviously did not appear to measure the construct in the intended way. The remaining items comprised the pilot version of the 6-CLS. The items in each of the six scales are reported in Tables 4.1 to 4.6.

Although the UCLA-LS used a four-point Likert scale, a five-point scale was preferred, as it would enable participants to give a neutral answer, which the UCLA-LS did not. Therefore, participants were asked to indicate the extent to which they agreed with each statement using a five-point Likert scale (*strongly disagree - slightly disagree - neither agree or disagree - slightly agree - strongly agree*). Similar to the UCLA-LS, some of the items were worded in the reverse direction. That is, some of the items measured loneliness, whilst others measured the absence of loneliness. The absence of loneliness items required reverse scoring. Overall scores were obtained by summing over items within a scale. Higher scores indicated greater degrees of loneliness. To ensure that the new measures were actually measuring constructs related to loneliness, the UCLA-LS (Russell et al., 1980) was also administered to obtain a measure of convergent validity.

Table 4.1. *Desire to feel valued, needed, understood and loved (Esteem)*

1	There is at least one person who understands me*
2	At least one person needs me*
3	I feel loved*
4	If I vanished I'd quickly be missed*
5	At least one person knows when I'm happy or sad*
6	I'm often misunderstood
7	People regularly come to me when they are in need*
8	I'm sure lots of people think positively about me*
9	I'm told I make a good listener*
10	At least one person thinks I'm a meaningful person*
11	No-one actually depends on me
12	I think I am well respected*
13	At least one person would call me their best friend*
14	Other people seem to value my opinions*
15	People often confide in me*
16	I feel valued, understood and needed*
17	People often tell me their secrets*
18	There are people who frequently think of me*
19	There is at least one person who frequently seems to guess what I'm thinking*

(items marked * require reverse scoring)

Table 4.2. *A need for tactile affection (Tactile)*

1	I would like more physical affection than I get.
2	I have the opportunity to show affection whenever I want *
3	People aren't as affectionate to me as I'd like.
4	I sleep alone (in a bed/in a room) more often than I would like
5	I wish someone would hug me more often
6	My physical relationship(s) are satisfying*
7	There is someone with whom I can 'cuddle-up' with whilst watching the TV when I want*
8	If I want there is someone with whom I can hold hands (e.g., when out walking) *

9   I often touch friends or acquaintances when greeting them (e.g., handshake, social kiss)*

10   I yearn for physical affection

11   I often wish there was someone to sit next to at night

12   There are times when even the sound of another person's breathing would be comforting

13   There is someone from whom I gain pleasure just looking at*

(items marked * require reverse scoring)

Table 4.3. *A need to care for others (Care)*

1   I would like to help other people more often than I do

2   I would like people to ask my advice more than they do

3   I prefer to give rather than receive and normally do so *

4   I often help people to solve their personal problems*

5   I like to feel I can be of help to others *

6   I want to relieve some of the suffering in this world

7   Caring for others gives life a special meaning*

8   Looking after other people makes me feel useful/good.

9   I go out of my way to help people I like*

10   I frequently look after my friends*

11   I would like to care for other people more than I do

12   I often help others*

13   I often give to others (gifts, help, etc.)*

14   I'm the sort of person that enjoys helping other people*

15   I often get the chance to care for other people*

16   I sometimes wish there was someone special to care for

17   I'd describe myself as a person who enjoys caring for others

18   I always give to charity

19   I am satisfied with the degree to which I care for others*

20   I wish I felt more useful

(items marked * require reverse scoring)

Table 4.4. *A need to keep busy to avoid feeling lonely (Busy)*

1	I keep myself as active as possible
2	I don't allow time to feel sorry for myself
3	There's never a moment to dwell on life's bad things.
4	I keep so busy, I seldom have time to think about things
5	I seem to make myself busy just about all of the time.
6	The times when I'm bored I find something to do.
7	If I was bored I'd probably also feel a little sad
8	I don't just sit around and wait for things to happen
9	I often get bored
10	I'm too busy to ever get bored.
11	I need to keep myself busy at all times
12	If I get bored I might dwell on parts of my life with which I am dissatisfied
13	The times things aren't going too well it's best not to dwell on them and keep busy
14	I find something to do if I'm bored.

Table 4.5. *A need to share (Share)*

1	If I have a problem I can always find someone with whom to talk it over*
2	I always share personal good fortune.*
3	I can always find someone in whom to confide*
4	I dislike going to the theatre/cinema alone
5	When I'm happy I want others to be happy too.*
6	I would enjoy a solitary hobby
7	At meal times I prefer to cook a meal for someone else as well *
8	Something enjoyable is more enjoyable when it's with someone.*
9	There is somebody with whom I can share almost everything*
10	It is important to me to share things with other people*
11	I share many aspects of my life with other people*
12	I like to tell people some of my secrets/deepest thoughts and quite often do so*
13	I am a generous person*

(items marked * require reverse scoring)

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Table 4.6. *Desire not to appear lonely (Image)*

1	I look like I'm enjoying myself most of the time*
2	I often look disagreeable
3	I think I generally look approachable*
4	I may often look sad
5	I don't normally look as if I'm lonely*
6	I can look defensive
7	I can often appear to be pre-occupied
8	I look cheerful*
9	I just look normal*
10	I look friendly*
11	I appear to be respectable*
12	I could sometimes look a little lost
13	I suppose I could sometimes look a bit sorry for myself
14	I often look bad tempered
15	I wouldn't like people to think that I am lonely*
16	I suspect that some people might think I am lonely.

(Items marked * require reverse scoring)

Procedure

The experimenter waited in an area where prospective participants were relaxing away from work or conference talks. Prospective participants were identified as any person who appeared to be over 18 years old and who sat at tables immediately adjacent to the one used by the experimenter. Prospective participants were approached and asked to fill out a questionnaire about friendships for a study run by the Psychology department.

Results

Of the prospective participants who were approached, it was estimated that less than 10% refused to participate in the study. Those who refused tended to give reasonable excuses, such as 'having a prior appointment'.

Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered.

To check whether the individual items in each scale tended to measure the same construct, a test of internal consistency, Cronbach's α coefficient was used. Table 4.7 shows the α values obtained for each of the six scales (and also the UCLA-LS).

Table 4.7. *Cronbach's alpha coefficients for the 6 new scales and the UCLA-LS*

Scale	Total number of items in each scale	N	Cronbach's α coefficient
Busy	14	195	.78
Care	20	197	.59
Esteem	19	190	.88
Share	13	197	.78
Tactile	13	192	.84
Image	16	199	.78
UCLA-LS	20	189	.89

(Busy through Image grouped as 6-CLS)

To ensure that the scales did in fact measure loneliness (convergent validity), the correlations between the six complementary loneliness scales and the UCLA-LS were explored. Table 4.8 shows the correlations (Pearson's *r*) between each of the six complementary loneliness scales and the UCLA-LS. The correlations showed that each of the scales, with the exception of the Tactile Scale (which also failed to correlate with any of the other five scales) appeared to be significantly associated with global loneliness as measured by the UCLA-LS. The size of the correlations suggested that the scales tended to measure the same overall construct (loneliness), but the correlations were not so high that all scales were effectively measuring the same dimension.

Table 4.8. *Correlations between each of the loneliness scales*

Scales		Busy	Care	Esteem	Image	Share	Tactile
Busy		-	-	-	-	-	
Care		.14	-	-	-	-	
Esteem	6-CLS	.25**	.59**	-	-	-	
Image		.24*	.37**	.41**	-	-	
Share		.34*	.53**	.61**	.34**	-	
Tactile		.03	.04	.12	.08	.11	
UCLA-LS		.35**	.62*	.70**	.53**	.62**	.08

Items marked * are significant at p<.05, and ** at p<.001.

Interim discussion

The six-complementary loneliness scales each appear to have reasonably good internal consistency and, with the exception of tactile loneliness, appear to correlate strongly with the UCLA-LS. No individual scale correlated so strongly with the UCLA-LS that,

for practical purposes, it appeared to measure global loneliness in the same way as did the UCLA-LS.

It was noted that the Tactile scale did not appear to be associated with either the UCLA-LS, or the any of the other five complementary scales. One possible reason why the Tactile scale was not correlated with the UCLA-LS is that the UCLA-LS simply did not tap the notion of tactile loneliness. Alternatively, it may be that the Tactile scale simply does not measure loneliness.

Part 3. Developing and validating a shortened versions of the 6-CLS

Although the pilot version of the scales appeared to work well, overall the 6-CLS was too long to be easily administered, particularly when used in conjunction with other measures. Therefore, to reduce the number of items in each sub-scale, corrected item-total correlations were used as the basis to reject items until eight or nine items remained in each sub-scale (and there were approximately 50 items in total). Having adopted this criterion, the items that would comprise the final six scales are shown in Table 4.9 to 4.14 (items marked * required reverse scoring). Item 6 of the pilot version of the Tactile loneliness scale (my physical relationships are satisfying) was reworded to read 'I do not need any more hugs/cuddles than I already get' as, in hindsight, it was possible that the original item could cause embarrassment. The shortened versions of the new scales were tested for internal and convergent validity.

Table 4.9. *Items in the shortened 'Esteem' scale*

1 At least one person needs me*

2 People regularly come to me when they are in need*

3 I'm sure lot of people think positively about me*

4 At least one person would call me their best friend*

5 Other people seem to value my opinions*

6 People often confide in me*

7 I feel valued, understood and needed*

8 People often tell me their secrets*

9 There are people who frequently think of me*

Table 4.10. *Items in the shortened 'Tactile' scale*

1 I would like more physical affection than I get

2 I have the opportunity to show affection whenever I want*

3 People aren't as affectionate to me as I'd like

4 I sleep alone (in a bed/in a room) more often than I would like

5 I wish someone would hug me more often

6 I do not need any more hugs/cuddles than I already get*

7 There is someone with whom I can 'cuddle-up' with (e.g., whilst watching the TV)*

8 There is someone with whom I can hold hands (e.g., when out walking) if I want to*

Table 4.11. *Items in the shortened 'Care' scale*

1 I would like to help other people more often than I do

2 I would like people to ask my advice more than they do

3 I want to relieve some of the suffering in this world

4 Looking after other people makes me feel useful/good

5 I would like to care for other people more than I do

6 I like to feel I can be of help to others

7 I wish I were more useful to mankind

8 Caring for others gives life a special meaning

Table 4.12. *Items in the shortened 'Busy' scale*

1	I keep myself as active as possible
2	I keep so busy, I seldom have time to think about things
3	I make myself busy just about all of the time
4	The times when I'm bored I find something to do
5	I don't just sit around and wait for things to happen
6	If I'm feeling low, I find something to keep me busy
7	I find something to do if I'm bored
8	I'm too busy to ever get bored
9	I need to keep busy at all times

Table 4.13. *Items in the shortened 'Share' scale*

1	If I have a problem I can always find someone with whom to talk it over*
2	I always share personal good fortune*
3	I can always find someone in whom to confide*
4	When I'm happy I want others to be happy too*
5	There is somebody with whom I can share almost everything*
6	It is important to me to share things with other people*
7	I share many good things with other people*
8	I am able to share confidences as much as I want*

Table 4.14. *Items in the shortened 'Image' scale*

1	I look like I'm enjoying myself most of the time*
2	I could often look disagreeable
3	I think I'd generally look approachable*
4	I could often look unhappy
5	I expect I look cheerful*
6	I think I look friendly*
7	I could look bad tempered
8	Some people might think I am lonely

Method

Participants

There were 115 females and 85 males, of whom 163 (81.5%) were less than 30 years, 16 (8%) were 30-40 years, 16 (8%) were 41-50 years, and 5 (2.5%) were 51-64 years. Twelve participants lived alone, and 188 lived with at least one other person. The fact that many of the participants reported being pet owners implied that they were not students, as university halls or rented accommodation typically do not allow pets. Participants were recruited at the following two locations: 1) Visitors to the Warwick Art Centre; and 2) People sitting outside the Warwick University Student's Union building. Prospective participants were approached and asked if they would complete a questionnaire about friendships. Sixty-six participants owned pets and 134 participants did not own pets. Of the pet owners, 16 owned only dogs, 22 owned only cats, 19 owned only 'other' pets, 6 owned cats and dogs, 2 owned cats and 'other' pets, and 1 owned a dog and 'other' pets. The category 'other' pets included cage birds, ferrets, hamsters, rabbits, etc.

Results

In total, 200 questionnaires were completed. Of the prospective participants approached, it was estimated that less than 10% refused to take part in the study. Of those who did refuse to participate, most gave the reasons of just coming to the end of a lunch hour or having a prior appointment. Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered.

Reliability analyses (Cronbach's α coefficient) for each of the scales showed the internal consistency of each scale was similar to those obtained for the pilot version of the scale. In fact, four of the complementary scales actually showed a higher alpha coefficient. The high levels of internal consistency showed that reducing the length of the scales had not affected their intrinsic properties. Scale mean scores and alpha coefficients are shown in Table 4.15. Closer inspection of the data showed that each of the individual items in the six scales appeared to have an adequate standard deviation (.68 to 1.59). This suggested that the participants' responses were not all the same and that each of the items was able to detect differences between participants.

Table 4.15. *Mean scores and Cronbach's alpha coefficients for the shortened new scales and the UCLA-LS*

Scale		N	Number of scale items	Mean	SD	Cronbach's α coefficient
Busy		195	9	30.72	6.99	.86
Care		197	8	30.38	4.34	.78
Esteem	6-CLS	194	9	16.71	5.16	.85
Image		199	8	19.11	5.57	.82
Share		198	8	15.10	5.49	.86
Tactile		192	8	21.74	7.21	.84
UCLA-LS		189	20	35.4	7.99	.88

The correlations between the scales are shown in Table 4.16. It can be seen that the strengths of some of the relationships have changed from those in the pilot version of the scale. However, since items with low item-total correlations had been removed,

which might be expected to increase the reliability of the scales, this might reasonably be expected.

Table 4.16. *Correlations (Pearson's r) between the new scales and the UCLA-LS*

Scales		Busy	Care	Esteem	Image	Share	Tactile
Busy		-	-	-	-	-	
Care		.01	-	-	-	-	
Esteem	6-CLS	-.13	-.06	-	-	-	
Image		-.14*	-.06	.43**	-	-	
Share		.13	-.13	.50**	.34**	-	
Tactile		.01	.05	.23**	.19**	.39**	
UCLA-LS		-.07	.18*	.54**	.44**	.57**	.39**

Items marked * are significant at $p<0.05$, and items marked ** are significant at $p<0.01$.

Interim discussion

Each of the six complementary scales was designed to measure different types of loneliness. Consistent with this specification, each of the scales, with the exception of the 'Busy' scale, appeared to correlate with the UCLA-LS, but not at so high a level that they were deemed to be measuring identical concepts. It was noted that the shortened 'Tactile' scale did now correlate with the UCLA-LS, whereas in Part 2 this had not occurred. However, in Part 2, the 'Busy' scale had correlated with the UCLA-LS but this was no longer apparent. As might be expected, the 6-CLS scales did not all correlate highly with each other as they were designed to measure different types of loneliness, that in principle may or may not co-exist.

Part 4: Using the data collected to validate the shortened version of the 6-CLS to explore differences associated with pet ownership.

As the process of validating the shortened version of the new loneliness scales necessitated the collection of a large amount of data, to make the best possible use of the data it was used to re-explore whether pet owners were less lonely than non-pet owners.

As it was possible that the new loneliness measures may still not detect differences associated with pet ownership, a health symptom checklist was included as an additional dependent variable. The Health Symptom Checklist had been developed by McNicholas and Collis (1995) to measure health symptoms that may be associated with stress. The rationale for including a health symptom checklist as an additional dependent variable was that if differences due to pet ownership were found in health, but not loneliness, this might explian why people believe pets help to alleviate loneliness. That is, even although people's beliefs about loneliness remain the same, if they enjoy better health they may feel less bad about the overall experience of being lonely.

As some personality characteristics may affect people's propensity toward loneliness and also their decision to own a pet (Collis & McNicholas, 1998), which could potentially confound the comparison between pet owners and non-pet owners, two personality measures were used as covariates. The first of these was hardiness (Kobasa, 1979), which is an intrapersonal coping resource that can moderate the impact of stress on health. As such, it is plausible that hardiness might affect people's choice to acquire a pet, loneliness and health. The second covariate was optimism, which might also

plausibly affect people's propensity toward loneliness, their health, and whether or not they choose to own pets.

The primary analysis would explore the independent variable of pet ownership (yes/no). The independent variable of pet type (e.g., only cats, only dogs, only 'other' types of pet) would be explored in an ancillary analysis. As the results of Study I provided no evidence of differences in loneliness or well-being between owners of cats, owners of dogs (pets or club dogs), and non-pet owners, combining pet types into pet ownership (yes/no) would be more likely to reveal any effects should they exist.

Method

Participants and procedure

The participants and procedure were the same as for Part 3 of the present study.

Design

A one-way (pet owner/non-pet owner) between-subjects MANCOVA was used to explore whether pet owners and non-pet owners differed on the ULCA-LS, the 6-CLS or the health symptom checklist. The ancillary analyses used eight one-way ANCOVAs to explore whether owners of cats, owners of dogs and owners of 'other' types of pets differed on any of the eight dependent variables. In each analysis, participants' age, gender, optimism and hardiness were entered as covariates.

Measures (used in addition to the 6-CLS)

1) Dispositional optimism was measured using the Life Orientation Test (Scheir & Carver, 1985), which had 12 items. The items were scored on a 5-point Likert scale (disagree-a-lot to agree-a-lot), therefore the possible range of possible scores was 12 to 60. The authors reported that internal consistency, Cronbach's' α coefficient was .76. This questionnaire is shown in Appendix 4c.

2) The construct of hardiness was measured using the shortened (30-Item) Dispositional Resilience Scale (DRS-30) as devised by Bartone, Ursano, Wright & Ingram (1989). The items were scored using a 4-point Likert scale (not-at-all-true to completely-true), therefore the range of possible scores was 30 to 120. The authors reported that internal consistency of the shortened scale was $\alpha = .82$. This questionnaire is shown in Appendix 4d.

3) Participants' health was measured using the shortened symptom checklist developed by McNicholas and Collis (1995). This checklist was designed to measure symptoms of ill health likely to exist as the result of stress and was therefore particularly suited to the purpose of this study. There were 30 items in total, 15 measure physical symptoms and 15 measure psychological symptoms, which in total provide a measure of participants overall health. Each of the 30 symptoms were scored using a 6-point Likert scale (*never* to *almost always*), and the range of possible scores was 30 to 180. Higher scores indicate higher incidence of negative health symptoms. This checklist is shown in Appendix 4e.

4) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most widely used measure of global loneliness. The range of possible scores is 20 to 80, with

higher scores indicating higher levels of loneliness. Participants indicate how often they felt the way described in each question using a 4-point Likert scale (*never* – *rarely* – *sometimes* – *always*). Russell et al. (1980) found the internal consistency of the UCLA-LS, as measured by Cronbach's Alpha (α) was .94. Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

Results

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made as recommended by Tabachnick and Fidell (2001). As there was no evidence of any serious deviation from normality, the natural data were used. Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test.

Descriptive statistics showed the internal consistency of the Hardiness and Optimism measures to be comparable to levels reported by their original authors. The health symptom checklist was also found to have high internal consistency. The descriptive statistics are reported in Table 4.17. The descriptive statistics for the 6-CLS and the UCLA-LS were reported in Table 4.15.

Table 4.17. *Alpha coefficients and mean scores for the additional 3 measures*

Scale	Number of items	Mean	SD	Cronbach's α coefficient
Dispositional Optimism	12	43.92	7.14	.81
Health Symptom Checklist	30	87.31	19.68	.92
Hardiness	30	90.06	8.33	.77

To test whether the new loneliness scales could differentiate between pet owners and non-pet owners, where the UCLA-LS had not, a one-way (pet owner/non-pet owner) MANCOVA test was conducted with the 6-CLS, the UCLA-LS and the Health Symptom Checklist as dependent variables. The mean scores for pet owners and non-pet owners for each of the dependent variables are shown in Table 4.18. It was not feasible to investigate the effect of participants' living arrangements, as only 12 participants lived alone, of whom only 3 owned pets.

Table 4.18. *Mean scores for each dependent variable by pet ownership*

Dependent variable		Number of items	Non-pet owners			Pet owners		
			n	mean	SD	n	mean	SD
Busy		9	134	29.64	6.87	66	32.89	6.76
Care		8	134	30.54	4.28	66	30.03	4.47
Esteem	6-CLS	9	133	17.30	5.08	66	15.52	5.16
Image		8	134	19.81	5.37	66	17.67	5.72
Share		8	134	16.11	5.76	66	13.06	4.25
Tactile		8	133	21.88	7.26	66	21.44	7.17
UCLA-LS		20	129	36.44	8.25	66	33.37	7.07
Health Symptom Checklist		30	131	89.19	20.39	66	83.58	17.75

A quadratic root transformation was applied to the new loneliness scale 'Share' because of evidence of a problem with the homogeneity of variance assumption. Controlling for participants' age, gender, optimism and hardiness, the multivariate test showed a significant group effect of pet ownership, Wilks' $\Lambda = .898$; $F(7, 173) = 2.72$, $p = .010$. Univariate statistics showed that the pet owners were significantly different from the non-pet owning sample on two of the six new complementary loneliness scales: pet owners believed that they were perceived as less lonely than non-pet owners

(Image), $F(1, 181) = 3.88$, $p = .029$; and felt less in need of sharing (Share), $F(1,181) = 8.12$, $p = .005$. There was also a significant effect of the grouped covariates, Wilks' $\Lambda = .898$; $F(7, 173) = 2.72$, $p = .010$. There was no evidence of violation of univariate homogeneity of variance or multivariate homogeneity of covariance. Thirteen participants' data were excluded from this analysis, due to missing data for one or more of the dependent variables, or one or more of the covariates.

In addition to the evidence of differences between pet owners and non-pet owners on the Image and Share scales, it was possible that differences on other scales had been masked by differences between types of pets that participants owned (e.g., dogs, cats or 'other' types of pet), although Study I found no evidence of this. Therefore, ancillary analyses used one-way ANCOVAs to explore whether cat owners, dog owners, owners of 'other' pet types or owners of multiple pet types differed on any of the eight dependent variables used in this study. Participants owned only cats ($n = 22$), only dogs ($n = 16$), only 'other' types of pets (rabbits, ferrets, birds, etc) ($n = 19$) or multiple pet types ($n = 9$). Participants' age, gender, hardiness and optimism were entered as covariates. Due to the increased chance of a *type-I* error occurring due to multiple comparisons, the Bonferroni correction principle was applied, which reduced the criterion for significance to $p = .006$, from the more usual level of $p = .05$. The mean scores and univariate test statistics for each type of pet owner for the eight dependent variables are reported in Table 4.19.

None of the univariate tests were significant at $p = .006$, and none would have been significant at $p = .05$, which implies that there were no systematic differences between cat owners, dog owners or 'other' pet owners. There was no evidence that any of the tests of the homogeneity of variance assumptions were violated.

Table 4.19. *Mean scores and univariate statistics by pet type for the eight dependent variables*

Dependent variable	Mean scores of cat v. dog v. other pet owners (N = 66) (SDs in parentheses)				Univariate test of pet type (cat v. dog v. other v. multiple)	Univariate test of combined covariates (age, gender, hardiness & optimism)
	Dog (n = 16)	Cat (n = 22)	'Other' pets (n = 19)	Multiple pet types (n = 9)		
Busy	33.2 (6.1)	31.1 (6.2)	33.8 (7.7)	33.33 (7.7)	$F(3, 56) = 1.14$, $p = .327$	$F(4, 56) = 4.74$, $p = .003$
Care	31.9 (4.0)	29.2 (5.45)	29.4 (3.4)	29.55 (4.42)	$F(3, 56) = 2.98$, $p = .060$	$F(4, 56) = 3.85$, $p = .008$
Esteem	15.0 (6.4)	16.6 (5.1)	15.7 (4.4)	15.33 (5.2)	$F(3, 56) = .86$, $p = .430$	$F(4, 56) = 5.93$, $p = .001$
Image	17.3 (7.0)	17.7 (6.2)	18.3 (5.0)	16.44 (3.7)	$F(3, 56) = .18$, $p = .837$	$F(4, 56) = 3.36$, $p = .016$
Share	14.7 (4.9)	12.3 (3.9)	12.9 (3.8)	13.22 (4.6)	$F(3, 56) = 1.19$, $p = .314$	$F(4, 56) = 1.54$, $p = .204$
Tactile	23.1 (7.4)	20.2 (6.3)	21.1 (6.5)	22.22 (10.3)	$F(3, 56) = .79$, $p = .457$	$F(4, 56) = 1.73$, $p = .159$
Health symptoms	79.4 (14.8)	86.9 (15.8)	84.3 (24.0)	83.89 (9.9)	$F(3, 56) = .95$, $p = .393$	$F(4, 56) = 4.87$, $p = .002$
UCLA-LS	33.3 (8.7)	33.8 (6.9)	34.0 (6.8)	31.22 (5.14)	$F(3, 56) = .02$, $p = .984$	$F(4, 56) = .95$, $p = .442$

(6-CLS brackets: Care, Esteem, Image, Share, Tactile)

Note. The *p* values reported are the true values, which have not been corrected

Interim discussion

Similar to the findings of Study I, Part 4 of this study provided no evidence of differences between pet owners and non-pet owners on the UCLA-LS. However, two of the 6-CLS showed that pet owners scored significantly lower on the 6-CLS 'Share' and 'Image' scales. This implies that whilst the UCLA-LS is not sensitive to the types of loneliness associated with pet ownership, at least 2 of the 6 new scales are. An ancillary analysis provided no evidence of differences between owners of cats, dogs or 'other' pets, which was also consistent with the findings of Study I. The result of the ancillary analysis implied that the primary analysis, which used pet ownership (yes/no) as the independent variable, was an appropriate test of the theory that pets help to alleviate loneliness. However, as this was a correlational study, it is not possible to conclude whether these differences are due to pet ownership or some third but unknown variable. As Part 5 demonstrates, there is a technique, which can be used to explore more fully the nature of the relationships between variables using correlational data.

Part 5. Exploring possible causal relationships between pet ownership and loneliness using the data collected for validation of the 6-CLS

Despite only having correlational data available at this point, the technique of structural equation modelling (SEM), as implemented by the *EQS* software (Bentler & Wu, 1995), was used to explore potential causal relationships between pet ownership and loneliness. This would constitute an improvement in the understanding of the relationship between pet ownership and loneliness over and above that gained from the correlational study, although it would need to be backed up by prospective

experimental studies. Used in this way, the technique of structural equation modelling can provide a useful bridge between correlational studies and true experimental studies.

To test whether the theory that pet ownership can help to alleviate loneliness is plausible in principle, the following rationale was proposed. Firstly, a causal model (Model 1, Figure 4.1), where loneliness predicts health, and heath and loneliness are influenced by personality characteristics would be described. Then, using the *EQS* diagnostic tests, it would be modelled to fit the data as closely as possible, assuming it did not already fit the data. The degree of fit between the improved model (Model 2, Figure 4.2) and the data would be re-examined. Finally, pet ownership data would be added to Model 2 (as shown in Model 3, Figure 4.3) to explore its relationship with loneliness.

Method

Participants and procedure

The participants and procedure were the same as for Part 3 of the present study.

Procedure

The technique of structural equation modelling requires that a 'start' model be defined, stating the causal pathways between latent variables and how the latent variables are influenced by the observed variables. The model input file was defined according to the method described by Bentler and Wu (1995). The start model, Model 1 (Figure 4.1), was based upon previously reported relationships between variables (e.g., Evans

et al. 1997; Kubosa, 1979). Table 4.20 lists the observed variables, and Table 4.21 lists the latent variables in each of the *EQS* models.

Design

The cross-sectional data were entered into *EQS* in the form of a covariance matrix, as recommended by Raykov, Tomer and Nesselroade (1991). The method of parameter estimation was the maximum likelihood procedure. Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered. There was no evidence of any serious departures from normality, and therefore the natural data were used (*N* = 200). The mean scores for each observed variable were reported in Table 4.18. Age and gender were not included in this model as preliminary exploration showed it was not possible to fit a model when these two variables were entered. For the same reason, pet ownership was entered as (yes/no) rather than as pet type (no-pet/cat owner /dog owner/ 'other' type of pet owner). As the ancillary analysis had provided no evidence of differences between the types of pets (cats, dogs, 'other'), was unlikely to alter the overall interpretation of the model.
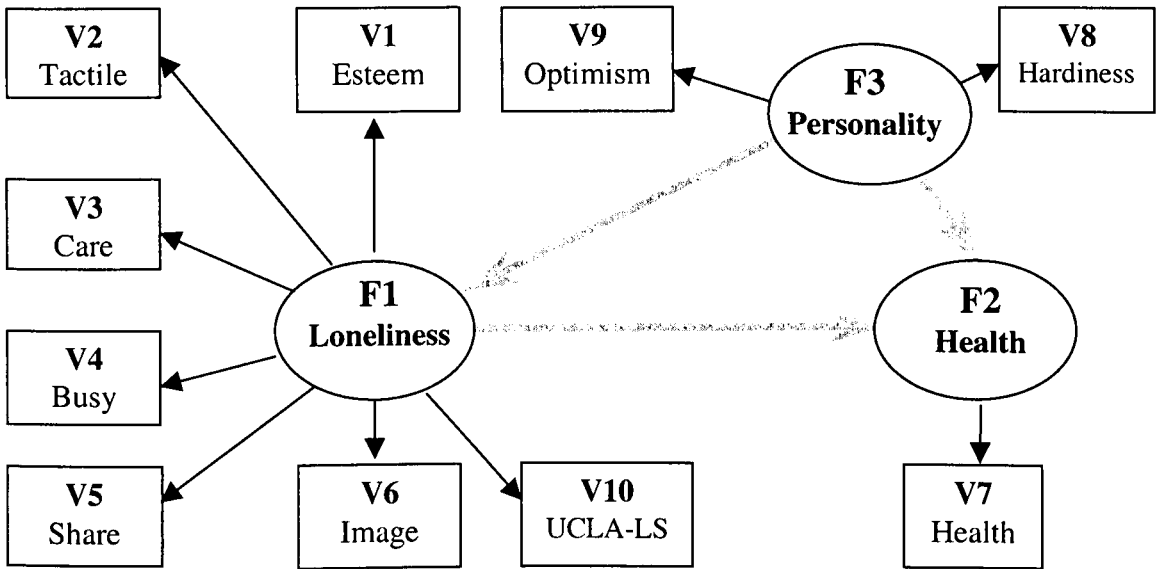
Figure 4.1. **Model 1: The ' start' model for structural equation modelling.**

Table 4.20. *Observed variables in the structural equation model*

Variables	Abbreviated variable name	Full variable name
V1	Esteem	Need to be valued, needed, loved and understood
V2	Tactile	Tactile loneliness
V3	Care	Needing to care for others
V4	Busy	Need to keep busy to avoid loneliness
V5	Share	Need to share
V6	Image	Desire not to appear lonely
V7	Health	Health Symptom Checklist
V8	Hardiness	The Dispositional Resilience Scale
V9	Opt'm	The Life Orientation Scale
V10	UCLA-LS	UCLA-LS
V11	Pets	Pet ownership (yes/no)

V1–V7 bracketed as: 6-CLS

Table 4.21. *Unobserved or latent variables in the structural equation models*

Latent variable	Latent variable name
F1	Loneliness
F2	Health
F3	Personality
F4	Pets

Results

The initial starting model (Figure 4.1.) differed significantly in fit from the data that had been collected, $\chi^2(41, n=200) = 179.6$, $p < .001$. The descriptive indexes of fit were: Bentler-Bonett's normed fit index = .717; Bentler-Bonett's nonnormed fit index = .679; and comparative fit index = .760. The parsimony ratio, $df /(.5k(k +1)$, of degrees of freedom to number of non-redundant elements of the moment matrix was 0.62 (where k denotes the maximum number of observed variables).

From the outset, it was considered unlikely that Model 1 (Figure 4.1) would fit the data without some modification, as the observed variables might influence more than one of the unobserved latent variables. When the modifications identified by *EQS* diagnostics were implemented it was expected that a substantial improvement in fit would result, and that the resultant model might then fit the correlational data that had been collected.

Modifications were made to Model 1 as suggested by the diagnostic tests in *EQS* (Wald Test for dropping parameters and Lagrange Multiplier Test for adding parameters). The result of the modelling procedure, Model 2 (Figure 4.2), still without pet ownership information included, was essentially similar to Model 1. However, the

following modifications were implemented, which enabled Model 2 to fit the correlational data that had been collected: 1) it was not possible to fit model to data until the 'Busy' scale was omitted from the model. This was probably due to the lack of a statistical relationship between the 'Busy' data and four of the five 6-CLS or the UCLA-LS (as can be seen in Table 4.6); 2) links were added between the observed variables, Care, UCLA-LS and Image to the unobserved latent variable Health; 3) a further link was added between the observed variable Esteem and the unobserved latent variable Personality; and 4) the regression coefficients were adjusted to capture the different amounts of influence each observed variable had on each of the latent variables.
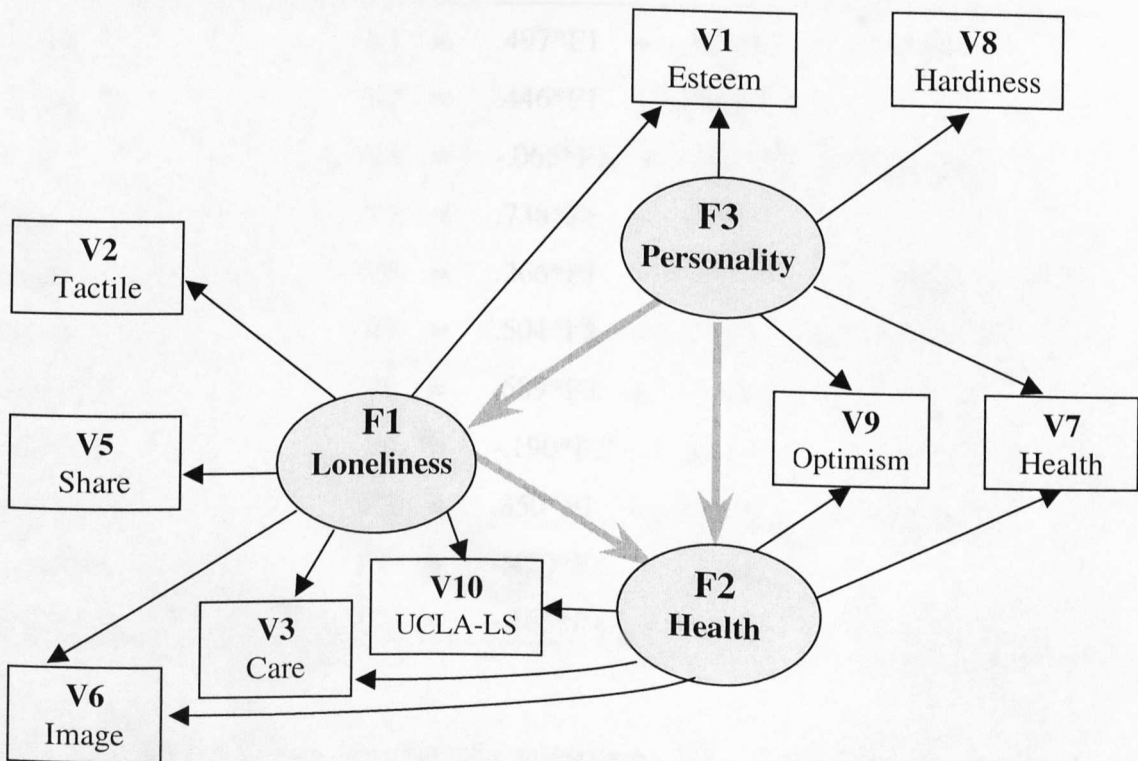
Figure 4.2. Model 2: The improved version of Model 1

In Model 2 (Figure 4.2) there was no evidence of a difference between the data that had been collected and the hypothetical model, $\chi^2(18, n=200) = 21.77, p = .242$. That is, in theory the model could describe the pattern of correlational data that had been collected. Accordingly, the descriptive indexes of fit were: Bentler-Bonett's normed fit index = .961; Bentler-Bonett's nonnormed fit index = .986; and comparative fit index = .993. The parsimony ratio, $df \div (.5k(k+1))$, of degrees of freedom to number of non-redundant elements of the moment matrix was 0.36 (where k denotes the maximum number of observed variables). The regression coefficients between each of the latent variables and between the latent and observed variables are shown in Table 4.22.

Table 4.22. *Regression coefficients of model 2 (excluding pet ownership)*

Esteem	V1	=	.497*F1	+	-.327*F3	+	.714 E1	
Tactile	V2	=	.446*F1	+	.895 E2			
Care	V3	=	-.065*F1	+	.565*F2	+	.818 E3	
Share	V5	=	.738*F1	+	.675 E5			
Image	V6	=	.266*F1	+	-.516*F3	+	.740 E6	
Health	V7	=	.504*F2	+	-.436*F3	+	.721 E7	
Hardiness	V8	=	.689*F3	+	.725 E8			
Optimism	V9	=	-.190*F2	+	.844*F3	+	.475 E9	
UCLA-LS	V10	=	.850*F1	+	.442*F2	+	.399 E10	
Loneliness	F1	=	-.420*F3	+	.907 D1			
Health	F2	=	-.165*F1	+	-.151*F3	+	.985 D2	

Model 2 (Figure 4.2) was conceptually consistent with a great deal of empirical research (e.g., Evans, Clow & Hucklebridge, 1997; Kubosa, 1979, Weiss, 1973). Pet ownership data were then added to Model 2 as a predictor of overall loneliness. The

pet ownership information (yes/no) is represented by V11 and F4, shown in the shaded area of Model 3, shown in Figure 4.3.
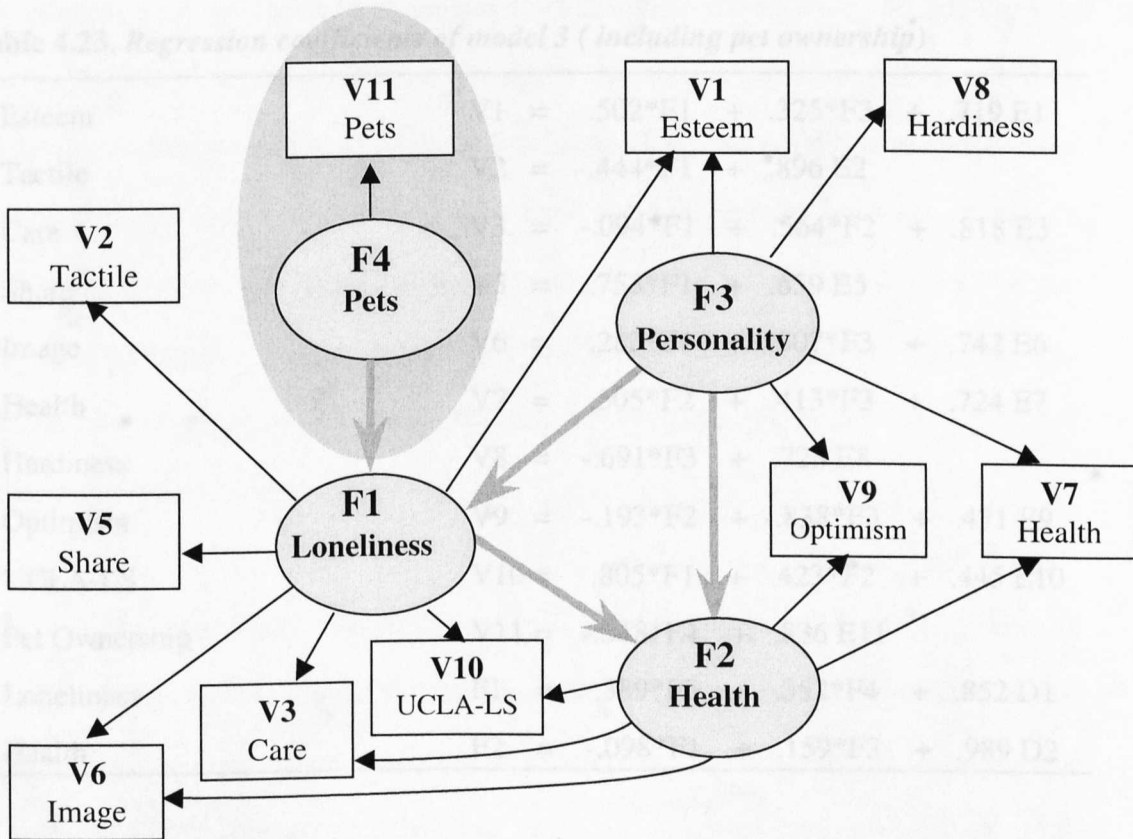
Figure 4.3. **Model 3 (Pet ownership information included)**

In the structural equation model with pet ownership information included (Model 3 Figure 4.3), although there was evidence of a difference between the data that had been collected and the hypothetical model, $\chi^2(25, n = 200) = 38.14, p = .045$, Model 3 was essentially a reasonable representation of the pattern of data that had been collected. This was indicated by the reasonably high descriptive indexes of fit were: Bentler-Bonett's normed fit index = .935; Bentler-Bonett's nonnormed fit index =

.956; and comparative fit index = .976. The parsimony ratio was .413. The regression coefficients between the latent variables and between the latent and observed variables are shown in Table 4.23.

Table 4.23. *Regression coefficients of model 3 (including pet ownership)*

Esteem	V1 =	.502*F1 + .325*F3 + .719 E1
Tactile	V2 =	.444*F1 + .896 E2
Care	V3 =	-.094*F1 + .564*F2 + .818 E3
Share	V5 =	.753*F1 + .659 E5
Image	V6 =	.283*F1 + .507*F3 + .742 E6
Health	V7 =	.505*F2 + .413*F3 + .724 E7
Hardiness	V8 =	-.691*F3 + .723 E8
Optimism	V9 =	-.193*F2 + -.838*F3 + .471 E9
UCLA-LS	V10 =	.805*F1 + .423*F2 + .445 E10
Pet Ownership	V11 =	-.548*F4 + .836 E11
Loneliness	F1 =	.389*F3 + .352*F4 + .852 D1
Health	F2 =	-.098*F1 + .159*F3 + .989 D2

The regression coefficient for the link between the latent variables pet ownership and loneliness (F4 → F3 in figure 4.3) was significant ($p < .05$). The model diagnostics (the Lagrange Multiplier Test for adding parameters) indicated that regression coefficients between the latent variable for pet ownership (F4) and the observed loneliness variables (V1, V2, V3, V5, V6 & V10) were not significant.

The regression coefficients in the final model suggested that, in theory, pet ownership information (1 = non-pet owners, 2 = pet owners) predicted lower overall experience of loneliness, as conceptualised by the latent loneliness factor F1.

Overall conclusion

Six additional loneliness scales were developed to complement the UCLA-LS. The shortened scales appeared to correlate with the UCLA-LS, which suggested they were indeed measuring loneliness (with the possible exception of the 'Busy' Scale). The fact that the correlations between the new scales were relatively low suggested that they were each measuring different types of loneliness. The data collected to validate the shortened scales were used to test whether there were differences between pet owners and non-pet owners. Evidence was found that pet owners scored lower on two of the six new complementary loneliness scales ('Image' and 'Share'). An ancillary analysis provided no evidence of differences between cat owners, dog owners, or owners of 'other' types of pet.

Although this study dealt with point 1 raised in the discussion of Study I, it remains possible that before they owned their pet, the pet owners were lonelier than the non-pet owners. Consequently, when pets were acquired they may have helped to reduce the owner's loneliness, but only to the level seen in non-pet owners. In addition, other differences may or may not be apparent amongst specific sub groups of the population; for example, people at high risk of loneliness.

The technique of structural equation modelling, as implemented by the programme *EQS*, was used to further explore the relationship between pet ownership and loneliness. The result of this suggested that, in the data set being analysed, the possibility that pet ownership lowered the overall experience of loneliness was consistent with the patterns of correlational data that had been collected.

Introduction

The aim of this study was to explore whether people who had undergone pet separation were lonelier than people who had not undergone pet separation. In practice, a number of ethical constraints determined how pet separation could be studied. These translate into the following three issues: 1) random assignment of pet separation is not feasible or ethical, therefore a quasi-experimental paradigm would need to be used; 2) it is therefore necessary to recruit groups of participants that have and have not been separated from pets; and 3) it is also necessary to control for the possibility that the groups might be systematically different for reasons other than pet separation.

To resolve the first two issues, there are several naturally occurring situations where people undergo pet separation and who could be used in this study. For example, when young adults leave home for the first time to start at university, the majority of those who had a pet at home will move to accommodation where pets are not allowed, and thus would undergo pet separation. Other possibilities might include Armed Forces' recruits and convicted criminals given custodial sentences. Of these three possibilities, the student sample was considered most appropriate, as students were both easily accessible and, in comparison to prison inmates and forces personnel, were thought to be most representative of the general population. One

further possibility was recently bereaved pet owners. However, in addition to it being very insensitive to approach people whose pets had just died, it was thought that grief might be a confounding variable.

Although psychological research could be criticised for relying too much upon student samples, this criticism seems not to apply when studying loneliness. For example, Cutrona (1982) suggested that college student samples are ideally suited to the study of loneliness as in going away to college loneliness is likely to occur as students will lose all that is familiar to them. Cutrona (1982) found that loneliness is highest amongst 'Freshmen' in the Autumn-term, and that most students recover by the end of the first year (although 20% remained lonely all year). Similarly, Shaver et al. (1985) tested students one month before the start of college then again during each academic term of the first year and found that loneliness was highest during the first term, but had reduced by the end of the third term.

The third issue was that even if pet-separation does cause higher levels of loneliness, due to the non-random allocation of pet ownership before pet separation occurred, a cross-sectional study could potentially fail to reveal evidence of such an effect. For example, if before pet separation occurred, the pet owning students had been less lonely than the non-pet owning students. Then, after pet separation had occurred those undergoing pet separation may have become lonelier, but only increasing to the level that the non-pet owners already were. A potential reason why pet owning students could be less lonely than non-pet owning students is because they received greater support from family members than did non-pet owning students. Then, when

pet separation occurred, loneliness might appear to increase, when in fact it was due to separation from their family.

There is some evidence to support the possibility that pet owners are less lonely than non-pet owners. For example, consistent with earlier research (e.g., Goldmeier 1986), Study II found pet owners may be less lonely than non-pet owners. For the hypothesis in this study to make conceptual sense, insofar as testing whether pets help to alleviate loneliness, it would need to be ascertained whether pet owners were less lonely than non-pet owners before pet separation had occurred. As the participants were not recruited until they had left home to live at university, it was not possible to test this question directly. Therefore, a number of additional questions were used to indirectly determine whether differences in loneliness were likely, and who or what provided such support. Participants were presented with 18 scenarios in which loneliness might occur, and asked who or what they might like to be with in that situation. For example, participants were asked who or what they would prefer to be with if they were feeling sad, and to indicate the degree to which the answer(s) they gave would be effective in the scenario. If the students who had owned pets reported greater levels of support (from sources other than pets) than did the non-pet owning students, it would suggest that before pet separation, they may have been less lonely than the non-pet owners.

Four further methodological issues became apparent during the detailed planning of this study. The first concerned the time-period that should be allowed between when pet separation occurred and when loneliness was measured. For example, in the first few days at university students may not have had an opportunity to be lonely because

so much was going on all around them. However, six-months after starting at university, the role of the students' families, friends and pets may have been replaced by new romantic partners, platonic friends and acquaintances. Consequently, the time-scale used by Cutrona (1982) was adopted, whereby loneliness was measured three weeks after the start of the first university term.

The second point concerned how pet separation should be defined. For example, to objectively state, 'yes, pet separation had occurred', or 'no, pet separation had not occurred' might ignore the qualitative aspects of the human-pet relationship most likely to predict increased levels of loneliness. For example, two people might both undergo pet separation, but whilst one may have had very little to do with the pet, the other may have felt very close to their pet and missed it greatly when separated. This issue could be explored in at least two ways. The participants who underwent pet separation could be divided into those who were highly attached to their pet and those who were not, using an existing measure of pet attachment (but see Collis & McNicholas (1998) for a critique of applying the attachment concept to person-pet relationships). However, in an investigation of attachment and loneliness, Kiel (1998) found little evidence of a meaningful relationship between loneliness and attachment. Alternatively, participants could be asked whether or not they felt 'close' to their pet, as this would separate the participants that had little contact with their family pet (e.g., it belonged to their sibling) from the participants who cared greatly for their pet and were likely to experience loneliness when pet separation occurred. For the purpose of this thesis, the notion of closeness seemed to be a more useful and parsimonious means to capture the subjective aspect of owners' relationships with their pets. Therefore, participants' pet separation status was assigned to one of three

categories: 1) No pet separation; 2) Separation from a 'close' pet; and 3) Separation from a 'non-close' pet.

Thirdly, it was possible that a participant self-selection bias might occur where students who were particularly close to their family pet would not leave home if it meant being separated from their pet. Consequently, the participants for whom pet separation was most likely to result in loneliness would not be recruited in the study. However, given the importance placed on having a university education, it was thought that this would effect very small numbers of students overall.

Fourthly, although Study I found no evidence of differences between cat owners and dog owners and Study II found no evidence of differences between cat owners and dog owners and owners of 'other' types of pets, it was possible that only separation from some types of pets might lead to increased levels of loneliness. Therefore, similar to Study II Part 4, an ancillary analysis explored whether there were differences between types of pet from which the participant had been separated.

Method

Participants

The participants were: 109 psychology undergraduates, of whom 104 were female, 3 were male and 2 failed to specify gender; and 113 teacher-trainee undergraduates, of whom 104 were female, 7 were male and 2 failed to specify gender. The mean age of the psychology sample was 19.1 years and the teacher-trainee sample was 19.4 years. Whilst living at home, 144 students reported that there was a family pet, whilst 78 students reported there was no pet. Before starting at university, 210 participants

lived at home with their family, 4 lived alone, 3 lived with friends, 1 lived with a boyfriend and 4 participants failed to provide this information.

Measures

1) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most widely used measure of global loneliness. The range of possible scores is 20 to 80, with higher scores indicating higher levels of loneliness. Participants indicate how often they felt the way described in each question using a 4-point Likert scale (*never – rarely – sometimes – always*). Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

2) The 6-CLS was developed to complement the UCLA-LS, and consisted of six scales: Esteem, Busy, Care, Tactile, Share and Image. The first two scales each had nine items, and the possible range of scores for each scale was 9 - 45; the remaining four scales each had eight items, and the possible range of scores for each scale was 8 - 40. Higher scores indicated a higher likelihood of loneliness. Full details of how the 6-CLS was developed and validated were reported in Study II.

3) Eighteen questions were used to explore whether pet owners were more likely to have been lonely than non-pet owners when they lived in their family homes. The 18 questions were developed to measure the extent to which participants perceived they had support available to them in a number of hypothetical scenarios where loneliness might occur. To ensure the 18 questions related to global loneliness, 2 items were designed to tap each scale of the 6-CLS, and 6 items were designed to tap the UCLA-LS. Participants were asked who (or what) they would choose to be with if they were

in each of the scenarios, (e.g., if they wanted a shoulder to cry on), and also to rate the effectiveness of who (or what) they identified in their answer using a 3-point Likert scale (*1 = a little, 2 = reasonably, 3 = a lot*). The 18 questions (both formats) are shown in Appendix 4f.

Responses to the 18 questions were totalled for each person or event that participants identified in each of the scenarios where loneliness might occur. For example, if a participant reported their 'friend' was a 'reasonably' effective solution for 14 of the 18 scenarios, then the total score for the category of 'friend' would be 28. If the same participant reported their 'family' as helping 'a lot' in all 18 of the scenarios, then the score for their 'family' would be 54. Thus, in this example the participant reported that their 'family' provided more support than their 'friends' in the scenarios where loneliness might occur. The total scores for any resource provider that participants reported could thus vary between 1 – 54. Higher scores would imply that who/what had been named provided more support in the scenarios where loneliness might otherwise occur and would be less likely to be lonely than students scoring low. Table 5.1 shows the 18 questions used to determine support available to participants.

When administering these questions, it was possible that the response options might influence participants' answers. For example, if participants were asked to report whose shoulder they used to cry on, they might omit to mention their pet because they did not think of it, or they thought the question referred only to humans. However, if the question had explicitly asked, "would you use your pet as a shoulder to cry on?" the participant might then answer 'yes'. The first style of question is

commonly described as 'open', whilst the second style is commonly defined as 'closed'.

Table 5.1. *The eighteen additional questions to determine who or what provided loneliness alleviating resources*

1) I look approachable when with ...
2) I wouldn't feel self-conscious when with ...
3) For leisure or recreation I like to be with ...
4) I feel valued, needed and loved by ...
5) I feel able to confide in ...
6) I feel close to ...
7) I receive affection from ...
8) I enjoy physical contact (e.g., hugging etc, comforting) with ...
9) I feel free to show affection to ...
10) My help is often needed by ...
11) I'm unlikely to be at a 'loose end' when with ...
12) I wish I could do more for ...
13) I'm unlikely to get bored when with ...
14) I enjoy helping ...
15) I like part of my day to be spent with ...
16) It's helpful to share my feelings with ...
17) When I'm sad I would want to be with ...
18) When I'm happy I would want to be with ...

The advantage of open style questions is that they allow people to respond as they wish without being prompted. However, this style might result in some answers not being mentioned because participants did not think of them or thought they irrelevant. Contrarily, whilst perhaps reminding participants of a possible answer, the closed format style might create an expectancy-bias, whereby participants' believe they are meant to answer in a certain way. As whichever style was used would involve some

degree of compromise, both styles were used alternately and the type of questionnaire was entered as a factor in the analysis of the 18 additional questions. Examples of both styles of questionnaire are shown in Appendix 4f.

Procedure

Approximately three weeks after leaving home and starting at university, prospective participants were approached at the end of a short lecture and asked to participate in the study. Participants were told that the aim of the study was to explore factors influencing their experience of moving from home to live at university. Those who agreed to participate completed the questionnaire in the lecture theatre. Participants were alternately given questionnaires with the 18 additional questions in either the 'closed' or 'open' format.

Results

Data screening

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made, as recommended by Tabachnick and Fidell (2001). Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test. There was evidence of serious negative kurtosis in the data collected for the 18 additional questions (for both formats) measuring whether participants' girl/boyfriends provided support in situations where loneliness might occur, which could not be corrected.

Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered. Clearly, it was not possible to estimate missing data for information such as participants' age, living arrangements or gender, and the participants not reporting this information were excluded from the analysis.

Twelve students were excluded because they had not lived in the family home immediately before coming to university, 27 because they continued to live in their family home and 10 because they had not moved into normal campus accommodation. The remaining 173 students had all left their family home to move to normal university campus accommodation. The students were assigned to the following three groups, according to their pet separation status: 57 had not left a pet; 31 had left a pet that they did not report feeling 'close to'; and 85 had left a pet that they reported feeling 'close to'. The gender ratios in each of the three levels of the independent variable were similar, χ^2 (2, N = 173) = 3.00, p = .223. Participants had been separated from the following types of pet: 47 cat only; 43 dog only; 18 'other' types of pet, and 8 from multiple types of pet. There was strong evidence of differences in the ratio of 'close' to 'not close' pets across cat owners, dog owners, or owners of 'other' types of pets, χ^2 (2, N = 108) = 14.94, p < .0005; significantly more pet owners reported feeling close to cats and dogs than to 'other' types of pet. The mean age of the 173 participants who had left their family home to live in campus based university accommodation was 18.35 years, and all participants were between 17 and 20 years old.

Exploring whether the three pet separation groups differed in loneliness before they left home.

The 18 additional questions were designed to provide an indication of whether pet owners were less likely to be lonely than non-pet owners, before they left home to live at university. There were 85 open format, and 88 closed format questionnaires. Primarily, participants reported their family, friends, girl/boyfriend and pets as who they would choose to be with in the kinds of scenarios where loneliness might occur. To make quantitative analysis possible, some sub-categories of answer were subsumed into generalised categories. For example, mother, father, sister and brother all became 'family', whilst friend, best friend, pals and mates all became 'friends'. Although in both open and closed format questions participants had the opportunity to name who/whatever they wished, there were not enough other types of responses (e.g., sports coach, ex-boy/girlfriend, teacher, television) to analyse separately. Participants' ratings for each different type of resource provider was were totalled across the answers to the 18 questions. The resulting score for each kind of answer therefore gave an indication of how much support the participant perceived was available from each type of provider. Table 5.2 shows the mean scores for the four main sources of support that the participants reported. Higher scores imply that the participant perceived more support to be available, which in turn implies the participant may be less lonely than someone reporting low levels of support.

The correlations between participants UCLA-LS scores and level of support from friends, family boy/girlfriends and pets were explored using Pearson's r. There was evidence of a small but significant negative correlation between perceived family support and loneliness ($r = -.15$, $p = .046$), a non-significant negative relationship

between perceived friends support and loneliness ($r = -.10$, $p = .220$) a non-significant

positive relationship between perceived boy/girlfriend support and loneliness ($r = .02$,

$p = .796$), and a non-significant positive relationship between support from pets and

loneliness ($r = .12$, $p = .139$).   This offered some support for the rationale of using

the 18 additional questions to explore whether pet owners were lonelier then non-pet

owners before pet separation occurred. However, only support from family predicted

lower levels of loneliness.

Table 5.2. *Mean total scores across the eighteen questions for pets, families, friends and girl/boyfriends.*

Type of Support provider	Participants' pet separation status	'Open' format questions		'Closed' format questions		Mean of combined question styles	
		Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Pet	No pet	.29	1.01	5.60	9.34	3.03	8.84
	Pet, but not close	1.62	3.25	11.47	10.51	7.47	9.61
	Close pet	7.75	10.03	24.85	14.15	15.78	14.85
	Overall total	4.35	8.19	15.40	15.27	9.97	13.47
Family	No pet	32.50	13.23	41.00	7.36	36.89	11.34
	Pet, but not close	25.07	12.80	38.32	9.92	32.94	12.81
	Close pet	29.20	14.12	39.71	8.55	34.14	12.90
	Overall total	29.66	13.71	39.85	8.43	34.84	12.40
Friends	No pet	30.25	10.46	38.06	5.83	38.43	12.51
	Pet, but not close	27.46	11.31	37.63	7.38	39.69	10.72
	Close pet	27.25	13.78	38.30	5.70	38.19	12.28
	Overall total	28.81	16.06	38.04	6.42	38.55	12.03
Girlfriend/ Boyfriend	No pet	17.43	18.49	21.77	21.14	19.67	19.85
	Pet, but not close	24.31	19.38	31.32	18.71	28.46	18.99
	Close pet	22.60	18.71	31.79	18.71	26.92	19.16
	Overall total	19.53	18.73	28.27	19.91	24.77	19.60

Visual inspection of the mean scores indicates few differences in perceived support between the two pet separation groups and the non-pet separation group. However, there was some indication that the pet owners perceived more support from their girl/boyfriends, in scenarios where loneliness might occur, than did non-pet owners. Similarly, participants who reported they felt 'close' to their pets reported more support from their pet than did participants who had pets, but had not reported feeling 'close' to them. This supported the rationale of differentiating between participants according to whether or not they reported they were 'close' to their pet. Curiously, the non-pet owners reported that pets helped them in the scenarios where loneliness might occur. A potential explanation is that they were referring to other people's pets, or this was an error due to having misunderstood the question. It was also noted that participants generally scored higher on the closed format questions than on the open format.

To test whether pet owners and non-pet owners differed in loneliness before they left home, ideally a three (pet separation status) by two (question format) MANCOVA would have been used to explore the amounts of support perceived to be available from all sources. However, the resource provider boy/girlfriends could not be explored using MANCOVA due to a very high level of negative kurtosis. The cause of this was believed to be due to participants who had a boy/girlfriend scoring them very high as resource providers, and the participants who did not have a boy/girlfriend, scoring this source of support as nil. This resulted in a concentration of scores at both the maximum and minimum of the possible range of scores. As one of the three pet separation groups consisted of non-pet owners, it did not make conceptual sense to investigate pets as resource providers in this analysis as, on *a*

priori grounds, they would have very low or nil scores for support from pets. Therefore, two-way MANCOVA was used to test for differences due to pet separation status (pet/close pet/no pet) and question format (open v. closed) for each type of resource provider (friends and family). The dependent variables were the scores for the perceived amount of support from friends and family totalled over all 18 questions. Participants' ages and gender were included as covariates.

The multivariate test provided no evidence of differences associated with pet separation status Wilks' $\Lambda = .974$; $F(4, 328) = 1.07$, $p = .371$. There was strong evidence of differences associated with the question format, Wilks' $\Lambda = .774$; $F(2, 164) = 23.87$, $p < .001$. The univariate tests for friends provided strong evidence of a difference for question format, $F(1, 165) = 36.29$, $p < .00$, the mean score for the open format questions was 28.27, and the for the closed format was 38.04. The univariate tests for friends provided strong evidence of a difference for question format, $F(1, 165) = 33.25$, $p < .001$, the mean score for the open format questions was 29.66, and the for the closed format was 39.85. The multivariate test provided no evidence of an interaction between pet separation status and question format, Wilks' $\Lambda = .991$; $F(4, 328) = .364$, $p = .831$, and no evidence that the grouped covariates influenced levels of support for either friends or family, Wilks' $\Lambda = .980$; $F(4, 328) = .817$, $p = 515$. There was strong evidence of a violation of the multivariate assumption of homogeneity of covariance, Box's $\chi^2(15, n = 173) = 62.36$, $p < .001$. Therefore, as recommended by Tabachnick and Fidell (2001), Pillai's criterion was examined instead of Wilk's Λ. This had no effect on the overall interpretation of the analysis.

One-way ANCOVA was used to explore whether there were differences in support perceived to be available from pets between the 3 pet separation groups by question format. Participants' ages and gender were included as covariates. There was strong evidence of a difference due to question format, $F(1, 165) = 37.25, p < .001$. Higher levels of support were reported to be available from pets for the closed format questions (15.40) than for the open format questions (4.35). There was strong evidence of differences between pet separation groups, $F(2, 165) = 28.72, p < .001$. *Post hoc* comparisons (LSD) indicated that participants who reported they were close to their pet perceived higher mean levels of support from their pet (15.41) than participants who were pet owners, but not close to their pet, (7.70) or who were non-pet owners (3.08). There was no evidence of an interaction between pet separation status and question format, $F(2, 165) = 1.817, p = 515$. There was no evidence that the assumption of homogeneity of variance had been violated.

To explore whether there were differences in the level of support provided by girl/boyfriends attributable to either pet ownership status or question format, the non-normally distributed continuous data were first re-coded into discrete categories. Scores less than 20 were classified as low providers of support, and scores greater than 20 were classified as high providers of support. Using Log-Linear analysis, a complete independence model (support from boy/girlfriend, pet separation status, question format) was tested for goodness of fit. Pearson Chi-Square analysis showed there was no relationship between any variable in the model, $\chi^2 (7, N = 151) = 9.29, p = .236$, which suggested pet owners did not receive different levels of support from boy/girlfriends than non-pet owners and that this did not depend upon question format.

Exploring whether pet separation causes loneliness

There was clearly no evidence of differences in levels of support received from friends, boy/girlfriends or family between the 3 pet separation groups prior to pet separation occurring. Therefore, it was assumed that if differences in loneliness were apparent after participants had left home, they would be due to pet separation, rather than systematic differences between the groups before pet separation occurred. The mean scores for each level of participants' pet separation status for the psychology students and teacher trainees are reported in Table 5.3.

To test for differences attributable to pet separation status, a two-way between-subjects MANCOVA was used. The first factor, students' pet-separation status, had three levels: no pet separation; separation from a 'close' pet; and separation from a 'non-close' pet. The second factor, participants' course of study, had two levels, psychology or teacher-trainee. The dependent variables were the UCLA-LS and the six scales of the 6-CLS. Participants' gender (male or female) and age were entered as covariates. A further 15 participants were excluded from the analysis as their data were missing for one or more of the dependent variable, or one or more of the covariates. The multivariate test provided strong evidence of a significant group difference associated with the participants' course, Wilks' $\Lambda = .857$; $F(7, 145) = 3.44$, $p = .002$. Univariate statistics showed that participants' course of study was associated with their score on the 'Busy' scale; $F(1, 151) = 14.13$, $p < .001$. The mean score for the teacher trainees was 29.18, indicating that they had a higher need to keep busy than the psychology undergraduates, whose mean score was 25.07. The multivariate test provided no evidence of group differences associated with pet separation status, Wilks' $\Lambda = .951$; $F(7, 290) = .918$, $p = .539$; and, no evidence of a

group effect for interaction between the factors, Wilks' $\Lambda = .877$; $F(14, 290) = 1.40$, $p = .153$. There was no evidence of an effect of the combined covariates, Wilks' $\Lambda = .934$; $F(14, 290) = 1.47$, $p = .182$. There was no evidence of any violations of multivariate assumption of homogeneity of covariance.

Although the main analysis explored the effect of separation from pets (close/not close), it was possible that differences may be been apparent for different types of pets. Therefore, ancillary analyses used one-way ANCOVAs to test whether there were differences associated with whether participants were separated from only cats, only dogs or only 'other' types of pets (rabbits, hamsters, birds, etc) for each of the 7 dependent variables. Participants' age, and gender were entered as covariates. Due to the increased chance of a *type-I* error occurring, the Bonferroni correction principle was applied, which reduced the criterion for significance to $p = .007$, from the more usual level of $p = .05$. The mean scores for each type of pet owner and the univariate test statistics for each of the 7 dependent variables are shown in Table 5.4.

None of the univariate tests were significant at $p = .007$, and none would have been significant at $p = .05$. This implies that there were no systematic differences associated with whether participants were separated from cats, dogs or 'other' types of pets. None of the combined covariate univariate tests were significant at $p = .007$, and none would have been significant at $p = .05$. There was no evidence that any of the tests of the homogeneity of variance assumption were violated.

Table 5.3. *Mean scores for each level of pet separation for the teacher trainees and the psychology students.*

Dependent variable	Mean scores for each level of pet separation (Teacher Trainees)			Mean scores for each level of pet separation (Psychology Students)		
	No pet	Separated from pet, but not close	Separated from close pet	No pet	Separated from pet, but not close	Separated from close pet
Busy	29.09 (5.51)	30.54 (5.20)	28.93 (6.72)	25.50 (6.77)	24.20 (7.97)	25.26 (6.75)
Care	26.75 (2.70)	26.27 (2.15)	27.15 (2.87)	25.65 (2.56)	27.85 (3.11)	26.84 (2.48)
Esteem	15.66 (3.35)	15.09 (4.25)	15.25 (3.29)	33.02 (5.59)	38.66 (7.07)	35.64 (5.89)
Image	19.50 (3.46)	16.55 (4.90)	18.18 (2.91)	16.09 (4.89)	18.94 (4.94)	18.55 (4.84)
Share	15.66 (5.33)	16.00 (6.34)	13.56 (3.75)	12.00 (4.89)	15.80 (6.99)	14.79 (5.62)
Tactile	23.23 (6.41)	22.65 (6.74)	24.06 (6.34)	22.13 (7.02)	23.29 (6.75)	23.95 (6.50)
UCLA-LS	36.47 (6.45)	34.54 (8.65)	35.41 (7.07)	13.60 (3.66)	16.11 (4.72)	15.30 (3.73)

(SD in parentheses)

6-CLS (grouping: Esteem, Image, Share, Tactile)

Table 5.4. Mean scores and univariate statistics by type of pet separation for each dependent variable

Dependent variable		Mean scores of cat v. dog v. other pet owners (N =108) (SDs in parentheses)			Univariate test of pet type (cat v. dog v. other)	Univariate test of combined covariates (age, and gender)
		Cat (n = 47)	Dog (n = 43)	Other (n = 18)		
Busy		26.2 (7.3)	26.8 (7.1)	28 (5.3)	$F(2, 103) = .35$, $p = .704$	$F(2, 103) = 1.43$, $p = .244$
Esteem		15.0 (6.4)	16.6 (5.1)	15.7 (4.4)	$F(2, 103) = .44$, $p = .647$	$F(2, 103) = 1.94$, $p = .148$
Care	6-CLS	26.71 (2.8)	26.91 (2.6)	28.5 (2.1)	$F(2, 103) = 2.94$, $p = .059$	$F(2, 103) = .33$, $p = .719$
Image		18.7 (3.9)	18.4 (3.7)	18.1 (4.2)	$F(2, 103) = .17$, $p = .843$	$F(2, 103) = .62$, $p = .538$
Share		14.7 (5.0)	12.3 (4.0)	12.9 (5.1)	$F(2, 103) = .14$, $p = .869$	$F(2, 103) = 2.37$, $p = .098$
Tactile		24.9 (6.0)	24.2 (6.7)	22.3 (5.8)	$F(2, 103) = 1.11$, $p = .333$	$F(2, 103) = 1.30$, $p = .278$
UCLA -LS		37.0 (6.3)	35.2 (6.7)	34.1 (7.7)	$F(2, 103) = 1.17$, $p = .338$	$F(2, 103) = 1.11$, $p = .334$

Note. The p values reported are the true values, which have not been corrected

Discussion

At face value this study suggested that pet-separation, irrespective of whether the participant reported feeling close to the pet, was not associated with increased levels of loneliness. Ancillary analyses provided no evidence that differences between cat owners, dog owners, or owners of 'other' types of pets had masked an overall effect of pet separation.

It was possible that before leaving home to live at university pet owning students were less lonely than non-pet owning students, which may have concealed any effects due to pet separation. To investigate whether pet owners were less likely to be lonely than non-pet owners, whilst they lived at home, 18 additional questions explored whether pet owners and non-pet owners reported different amounts of support in scenarios where loneliness might occur. There was no evidence that this was the case for families, boy/girlfriends or friends.

There was strong evidence that the style in which the 18 additional questions were asked, 'open' or 'closed', was associated with differences in support that was reported. Overall, the closed format questions were significantly more likely to record responses than the open format questions.

Although worth studying in its own right, pet separation was actually studied as a hypothesis derived from the theory that pets can help to alleviate loneliness. It was argued that if pet ownership helps to alleviate loneliness, then pet separation should lead to higher levels of loneliness. However, whilst confirmation of an association

between pet separation and loneliness would have offered support for the pets and loneliness theory, ultimately, the lack of support does not logically falsify the theory. Rather, it might be that pet acquisition helps to alleviate loneliness, but subsequent pet separation does not increase loneliness. It is possible to hypothesise why this might be so. For example, when people become pet-owners, particularly of dogs, they may get out of their house more often, meet more people, and subsequently increase their social skills, social networks and self-esteem. Then, if for whatever reason pet-separation were to occur, it might not necessarily mean the end of any advantages originally facilitated by pet ownership.

Athough pet separation does not appear to affect people's beliefs about loneliness, as measured by the UCLA-LS and the 6-CLS, this does not preclude the possibility that pet separation might affect some other indicator of loneliness, such as people's phenomenological experience of loneliness. For example, although students report an increase in their beliefs about loneliness (Cutrona 1982), students who also undergo pet separation may experience higher levels of subjective stress in relation to the level of loneliness beliefs that they report. This possibility will be pursued in subsequent studies using a questionnaire especially designed to measure loneliness distress (reported in Study IV) and a number of measures to quantify subjective well-being.

Conclusion

The overall conclusion of Study III is that pet separation, at least amongst a sample of students, is not associated with increased levels of loneliness. A provisional interpretation of this finding is that this study did not support the pets and loneliness theory.

Aim

The aim of this study was to design and validate a questionnaire to measure phenomenological differences in loneliness.

Introduction

In Studies I - III, loneliness was measured using the UCLA-LS and the 6-CLS. These measures are based on the Cognitive Discrepancy Model of loneliness (Peplau & Perlman, 1982) and are designed to measure people's beliefs about shortfalls in interpersonal relationships that cause or predict loneliness.

A potential problem with the UCLA-LS and the 6-CLS is that although they measure people's beliefs about the type and the amount of interpersonal relationships they have, this is not necessarily a perfect indication of how lonely people feel. For example, item-16 of the UCLA-LS measures the extent to which participants feel, 'there are people who really understand you'. However, it seems reasonable that whilst two people could have no one that understands them, one person might feel very lonely, but the other might feel no loneliness whatsoever.

One solution to this criticism is to develop a more direct means by which feelings of loneliness are measured. The simplest method by which this could be achieved is to modify some of the questions in the UCLA-LS and the 6-CLS. For example, instead of measuring perceived shortfalls in interpersonal relationships that might cause people to feel lonely, they are reworded to directly measure whether people feel lonely because of perceived shortfalls in their interpersonal relationships. For

example, whereas UCLA-LS item 10 asks whether participants feel 'there are people they are close to', it could be reworded to ask, 'do you ever get upset because you lack close friends'.

Method

Design

The design specification was that the Loneliness Distress Scale (LDS) would be a global measure of loneliness *feelings* (distress). The items comprising the questionnaire would be designed to relate to the areas measured by 6-CLS and the UCLA-LS, but instead of measuring beliefs about objective shortfalls in interpersonal relationships they would measure distress associated with perceived shortfalls. A brainstorming session with two psychologists familiar with this study was used to generate the initial list of items for the questionnaire. This resulted in 4 items relating to each of the 6-CLS, and 9 items relating to the UCLA-LS. The items for the pilot version of the scale are shown in Table 6.1.

All of the items were worded in the same direction. That is, agreement with each of the items would indicate higher levels of loneliness distress. A potential criticism of this response format is that a response set may occur whereby respondents tend to automatically answer each question the same way. Although reverse scoring some items can help to reduce the likelihood of a response set occurring, by making participants concentrate on each question, it can also lead to problems whereby the participants' have trouble interpreting double-negative questions (Russell, 1996). Overall, it was decided that reversing some of the items would lose more in the intelligibility of the questionnaire than would be gained by reducing the likelihood of a response set occurring.

Table 6.1. *Items in the pilot version of the Loneliness Distress Scale*

Item	Question
1	Do you ever get upset because you feel dissatisfied with things?
2	Are you ever upset because you feel that you don't do enough for others?
3	Do you ever feel upset because you think you're missing out on romance?
4	Do you ever feel upset because you feel you don't look your best?
5	Are you ever upset by other people's attitudes toward you?
6	Do you ever feel upset because of a lack of acquaintances?
7	Do you ever get upset because you don't see your family/relatives as much as you'd like?
8	Do you ever get upset because you feel lonely?
9	Does what other people think ever upset you?
10	Do you ever get upset because you think nobody cares about you?
11	Do you ever get upset because you think that you lack close friends?
12	Do you ever feel unhappy because you think nobody would miss you?
13	Do you ever feel unhappy because you don't socialise enough?
14	Do you feel unhappy because you feel you should be more socially active?
15	Do you ever get upset because there's no one around?
16	Are you ever upset because you wish you could look better?
17	Do you ever feel unhappy for no particular reason?
18	Does it ever distress you because you feel you're not enjoying yourself?
19	Do you ever get upset because you feel dissatisfied with your relationships?
20	Do you ever get upset because you feel you're selfish?
21	Do you ever get distressed because you feel isolated?
22	Do you ever feel upset because you don't meet enough new people?
23	Do you ever feel upset because you lack someone to love?
24	Are you ever upset by your general quality of life?
25	Do you get distressed if you feel you're not seeing enough of your friends?
26	Do you ever feel upset because your friends don't keep in touch as much as you'd like?
27	Do you ever get upset because you feel you have little in common with those around you?
28	Do you ever feel upset because you think nobody loves you?
29	Do you ever feel unhappy because you feel your social life is not active enough?
30	Do you ever feel upset because you miss someone you like?
31	Do you ever get upset because you think nobody needs you?
32	Are you ever unhappy about the amount of time you spend alone?
33	Do relationships with your work colleagues/fellow students ever upset you?

The 33 items in Table 6.1 were used as the basis for the LDS. Participants were given instructions to mark on a 6-point Likert scale (*Doesn't apply to me at all – hardly at all – rarely – sometimes – often – almost always*) how often they felt the way each item described. The total score would indicate the degree to which the participants experienced loneliness distress, with higher scores indicating higher loneliness distress. Total scores could range from 33 to 198, with higher scores indicating higher levels of loneliness distress.

Participants

The participants were 107 first-year psychology undergraduates attending university in the English Midlands and 67 further education students attending college in the English Midlands. No other demographic data were collected. The undergraduates were recruited at the end of a short lecture and the further education students were recruited in a waiting area outside a college lecture hall.

Procedure

Participants were asked to take part in a study about interpersonal relationships. The university students were recruited during a break in a social psychology lecture. The further education students were recruited in a common area outside a lecture theatre at their college. The task took approximately 5 minutes to complete. No participants who were approached refused to participate.

Results

The 33-item scale yielded a total Cronbach's alpha coefficient (internal consistency) of .9433 for the two combined groups. Each individual item had a standard deviation in the range .95 to 1.52, which implied that each item was capable of differentiating between subjects.

As two different samples had been recruited, between-group comparisons were explored. Table 6.2 illustrates the mean LDS scores, standard deviations and internal consistencies of the two samples separately and the overall combined data set. The LDS scores were found to differ significantly by group, with the psychology students reporting higher levels of loneliness distress; $F(1, 182) = 13.241$, $p<.001$. This is consistent with the fact that the majority of the undergraduate students had left home to come to university, whereas the college students were more likely to live at home.

Table 6.2. *Mean scores and Cronbach's alpha coefficient for the college, university and combined samples*

Sample	*n*	Mean score	*SD*	Cronbach's alpha coefficient
College	68	96.85	21.60	.9371
University	115	108.29	19.89	.9438
Combined total	183	104.04	21.22	.9433

Although the first version of the LDS appeared to work well, it was considered longer than necessary. As the intention was that the scale would eventually be administered with several other measures, parsimony was considered important.

Developing a short version of the Loneliness Distress Scale

The LDS was shortened by selecting only items that had a corrected item-total correlation greater than .60. Thirteen items met this criterion, and therefore all 13 items were chosen for inclusion in the short measure. The 13 items that made up the shortened version of the LDS are shown in Table 6.3.

Table 6.3. *Items selected for the modified Loneliness Distress Scale.*

1	Do you ever feel upset because of a lack of acquaintances?
2	Do you ever get upset because you feel lonely?
3	Do you ever get upset because you think nobody cares about you?
4	Do you ever get upset because you think that you lack close friends?
5	Do you ever feel unhappy because you think nobody would miss you?
6	Does it ever distress you because you feel you're not enjoying yourself?
7	Do you ever get upset because you feel dissatisfied with your relationships?
8	Do you ever get distressed because you feel isolated?
9	Are you ever upset by your general quality of life?
10	Do you ever feel upset because you think nobody loves you?
11	Do you ever feel unhappy because you feel your social life is not active enough?
12	Do you ever get upset because you think nobody needs you?
13	Are you ever unhappy about the amount of time you spend alone?

To ensure that the shortened scale retained high internal consistency, it was administered to a convenience sample of 52 participants who were visiting conferences and other events at the Warwick Arts Centre. Inspection of the item standard deviations revealed that they were all between .83 and 1.18, which implied that they were all useful for differentiating between participants. Cronbach's alpha

coefficient was .91, which suggested that the scale tended to measure the same construct. The scale mean total score was 34.73 ($SD = 9.28$).

Discussion

The LDS was designed to be a global scale, rather than a multidimensional scale, and initial item generation was guided by the six-loneliness scales and the UCLA-LS. However, after the scale had been reduced in length it was found that the remaining items no longer specifically related to each of the six scales. As the inter-item correlations in the long scale were high, it was not thought that this was of great concern. As such, it was believed that the resulting scale still reflected all of the subscales of the 6-CLS and the UCLA-LS.

At face value, the LDS appeared to fulfil the design specification of measuring differences in people's loneliness distress. It was therefore expected that the LDS would complement the UCLA-LS and the 6-CLS by providing a phenomenological measure of loneliness distress. As tests of concurrent and divergent validity were not administered, they would need to be explored in further studies to ensure that the LDS was indeed measuring loneliness.

Study V – Re-examining pet separation and loneliness

Aim

In this study, the effect of pet separation on loneliness was re-examined using an improved experimental design so that participants' loneliness was measured before and after pet separation occurred. In addition to measuring loneliness using the UCLA-LS and the 6-CLS, the Loneliness Distress Scale (LDS) and measures of health symptoms, subjective well-being and positive/negative affect were also administered.

Introduction

In Study III, there was no evidence that participants who had undergone pet separation were lonelier than were participants who had not undergone pet separation. However, there were two potential problems with this interpretation. Firstly, it was plausible that pet separation had led to increased levels of loneliness, but that they were not detected by the measures that had been used (the UCLA-LS and the 6-CLS). To explore this possibility the current study utilised a wider battery of measures, with an emphasis upon detecting phenomenological differences that might reflect differences in loneliness, such as, subjective well-being, positive and negative affect, health symptoms, and loneliness distress.

Secondly, it was possible that before pet separation occurred, the pet owners were less lonely than non-pet owners. Then, after pet separation had occurred, the ex-

owners may have become lonelier, but their loneliness increased only to the levels of participants who did not own pets. Thus, a cross-sectional comparison of people who had undergone pet separation with those who had not, would indicate no difference, although an effect had in fact occurred. This possibility was believed to be unlikely, as Studies I and II found no differences between pet owners and non-pet owners who lived at home. Moreover, Study III found no differences in the kinds of support perceived to be available to pet owners and non-pet owners. To control for this possibility, the current study used a longitudinal design to measure loneliness before and after pet separation occurred.

The same practical constraints that applied to Study III also determined how this study could be run. It was initially proposed to the Psychology Department ethics board that pet separation would be investigated amongst first-year students at Warwick University by approaching them before they left home (where some would live with pets) and then again after they had started at university (when pet separation had occurred). However, the ethics board did not consider it ethical to contact psychology students before they left home to start at university using departmental records to find their addresses, although they recommended that a different department or institution could be approached.

Fortunately, during August a local grammar school offered to send questionnaires to their ex-pupils who had recently left the school upper-sixth year. This was designated as Time 1. These participants would all have left school during July, and the school head-teacher expected that many would leave home to start at university the following October. The participants who left home to move into

university accommodation and who had pets when they lived at home would presumably undergo pet separation when they started at university (as typically university campus regulations do not allow pets). Therefore, three weeks after the start of university term time (designated as Time 2) all of the participants who responded to the first questionnaire were contacted again, by which time it was expected that many would have left home and moved to university accommodation. If there was an increase in loneliness, between Time 1 and Time 2, and it was greater for participants who underwent pet separation than for participants who had not undergone pet separation, then this would be interpretable as direct support for the hypothesis that pet separation leads to higher levels of loneliness.

The maximum possible number of participants available from the school was known to be approximately 120. This led to concern that the number of respondents participating in both phases of the study, and who fulfilled the necessary criteria of leaving home to university accommodation by Time 2, could be very small. To pre-empt this possibility, a between-groups (pseudo-) longitudinal study was run concurrently. This compared the difference between pet owners and non-pet owners living at home (the school sample at Time 1), with the difference between participants who had undergone pet separation and those who had not in a separate sample of participants that lived in university accommodation (the university sample recruited at Time 2). If the differences between pet owners and non-pet owners was larger for the university sample (where pet owners had undergone pet separation) than the school sample, then this would suggest pet separation led to loneliness.

Method

Participants and procedure

Approximately six weeks before the start of university term questionnaires were sent by the school secretary to 122 pupils who had recently left school (designated as the school sample). It was expected that the majority of the sample were still living in their family home. This was designated as Time 1. Completed questionnaires were returned by 56 of the participants, all of whom were living in their family home, representing an overall return rate of 45.9%. There were 21 males and 35 females. Fifty-one participants were 18 years old, and five were 19 years old. Eighteen participants were not pet owners, 11 lived with a pet to which they did not feel close (4 cat owners, 4 'other' types of pet, 3 owners of multiple pet types), and 27 lived with a pet to which they reported feeling close (12 cat owners, 6 dog owners, 9 owners of multiple pet types). The category 'other' types of pet included animals such as rabbit, hamster, guinea pig and caged bird.

Two weeks after the start of the first university term, a follow-up questionnaire was sent to the 56 participants who returned the first questionnaire. This was designated as Time 2. Questionnaires were returned by 19 participants, which represented a return rate of 35.7%. There were 6 males and 13 females. All of these participants were 18 years old. Since Time 1, 13 of these participants had left home and 6 had not left home. Only the 13 who had left home were relevant to the analysis. Of these, 7 participants had owned a pet and 6 had not. All 7 of the participants who had been pet owners described the pet as one to which they felt close before they left their family home to start at university.

For the pseudo-longitudinal analysis, 115 first-year psychology undergraduates were also recruited at Time 2 (designated as the university sample). There were 24 males and 91 females. The students' mean age was 19.68 years old ($SD = 4.94$, range = 17-49). Prior to starting at university, 12 participants did not live in their family home, and after starting at university, 10 participants did not live in campus accommodation. The 22 students who did not satisfy the recruitment criteria of leaving their family home to live in campus accommodation were excluded from the analysis. Of the 93 participants entered into the analysis, 18 were male and 75 were female and the average age had reduced to 18.59 years old ($SD = 1.45$, range = 17 – 31). Of these, 31 had not left a pet; 15 had left a pet they reported not feeling 'close' to (4 dogs, 2 cats, 9 'other' types of pet); and 47 had left a pet to which they reported feeling 'close' (28 cats, 11 dogs, 5 'other' types of pet, 3 multiple categories of pet).

Design

Participants completed the following measures: UCLA-LS, 6-CLS, LDS, Positive and Negative Affect, Subjective Well-Being and a Health Symptom Checklist. The Time 1 and Time 2 questionnaires were identical except for the wording of the questions about pet ownership/separation. For example, the Time 1 questionnaire asked where participants currently lived, and the Time 2 questionnaire asked whether participants had recently moved, and if so, whether had involved separation from a pet. Similar to Study III, participants' pet separation status was assigned to one of the following categories: 1) no pet separation; 2) separation from a 'close' pet; and 3) separation from a pet.

There were four parts to this study. Part 1 used a between-subjects design to compare participants who had undergone pet separation with those who had not. This used only the 'university sample'. Part 2 investigated whether pet owners were less lonely than non-pet owners amongst young people living at home, of whom many were expected to soon start at university. This used only the 'school sample'. Part 3 used a longitudinal design to explore the effect of pet separation using the school sample. The change in loneliness between Time 1 and Time 2 for participants who had undergone pet separation was compared with the change in loneliness between Time 1 and Time 2 of the participants who had not undergone pet separation. Part 4 was a pseudo-longitudinal design, which compared the difference between pet owners and non-pet owners whilst they lived at home (the school sample) with the difference between participants who had or had not undergone pet separation who lived in university accommodation (the university sample).

Measures

1) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most widely used measure of global loneliness. The range of possible scores is 20 to 80, with higher scores indicating higher levels of loneliness. Participants indicate how often they felt the way described in each question using a 4-point Likert scale (*never – rarely – sometimes – always*). Russell et al. (1980) found the internal consistency of the UCLA-LS, as measured by Cronbach's Alpha (α) was .94. Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

2) The 6-CLS. This consisted of 6 scales measuring: a need to feel valued, loved understood and wanted (Esteem); a need to keep busy to avoid feeling lonely (Busy); a need to care for others (Care); a need for tactile affection (Tactile); a need to share (Share); and peoples belief that they are perceived as lonely (Image). There were nine items in each of the first two scales and the possible range of scores in each scale was 9 - 45, and in each of the latter four scales there were eight items, and the possible range of scores in each scale was 8 - 40. In each case, higher scores indicate a higher likelihood of loneliness. In Study II, the internal consistencies (Cronbach's Alpha) were in the range .78 to .88. Full details of this scale were reported in Study II.

3) The Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) was used to measure participants' mood. There are two separate scales, one measuring positive affect and the other measuring negative affect, each with ten adjectives. The frequency that each adjective describes how the participant has felt in the 'last few weeks' is scored using a 5-point Likert scale (very slightly - extremely). The possible range of scores is therefore 10 – 50. Higher scores indicate higher levels of negative or positive affect. Watson et al. (1988) reported internal consistencies of .87 for both scales when exploring participants mood during the past few weeks. The PANAS is shown in Appendix 4g.

4) Participants' health was measured using the shortened symptom checklist developed by McNicholas and Collis (1995). This checklist was designed to measure symptoms of ill health likely to exist as the result of stress and was therefore particularly suited to the purpose of this study. There were 30 items in total, 15 measure physical symptoms and 15 measure psychological symptoms,

which in total provide a measure of participants overall health. Each of the 30 symptoms were scored using a 6-point Likert scale (*never* to *almost always*), and the range of possible scores was 30 to 180. Higher scores indicate higher incidence of negative health symptoms. In Study II the internal consistency of the checklist, measured using Cronbach's α, was found to be .92, and a Pearson's correlation of $r = .36$ was found between the checklist and the UCLA-LS. The checklist is shown in Appendix 4e.

5) Loneliness Distress (LDS). This scale measured the affective component of loneliness and consisted of 13 items each measuring loneliness distress (e.g., are you ever unhappy about the amount of time you spend alone?). To each of the 13 items, participants' stated the extent to which they agree, using a 6-point Likert scale ('doesn't apply' to 'almost always applies'). Higher scores indicate higher levels of loneliness distress (possible range scores 13 – 78). In Study IV, the internal consistency of this scale was .91. Full details of this measure were reported in Study IV.

6) The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffen, 1985). This scale measures subjective well-being using 5 items (e.g., The conditions of my life are excellent) to which participants report the extent to which they agree using a 7-point Likert-type scale (range of possible scores is 5 – 35). Higher scores indicate higher subjective well-being. Diener et al. (1985) report internal consistency of .85. This measure was used instead of Dupuy's (1984) GPWB primarily because of the shorter length. The Satisfaction with Life Scale is shown in Appendix 4h.

7) Participants were also asked to report their age, gender, pet ownership status when they lived at home (pet / close pet / pet, but not close), where they currently lived and, in the Time 2 questionnaire, whether they had recently undergone pet separation.

Results

Data screening

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made as recommended by Tabachnick and Fidell (2001). As there was no evidence of any serious deviation from normality, the natural data were used. Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test.

Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered.

Part 1. Re-examining whether pet separation is associated with loneliness

In effect, this analysis was a replication of Study III, although several additional dependent variables were also administered to tap phenomenological aspects of loneliness. The participants were the 'university' sample, who only completed questionnaires at Time 2 when pet separation had occurred. A one-way MANCOVA was used to explore whether there were differences associated with

the students' pet separation status (left a *close* pet; left a pet; or not left a pet). Participants' gender and age were entered as covariates. Only the 93 participants who had left a family home to live in normal university accommodation were included in this analysis.

Thirty-one participants had not left pets, 15 had left pets that they did not feel 'close to', and 47 had left pets that they reported feeling 'close to'. The gender ratio in the three levels of independent variable were similar, $\chi^2 (2, n = 93) = 1.32$, $p = .515$. The mean scores for each level of pet separation status for the 12 dependent variables are shown in Table 7.1.

Table 7.1. *Mean scores for each level of pet separation status for the 12 dependent variables*

Dependent variable	No pet	Separated from pet, but not close	Separated from close pet
	($n = 31$)	($n = 15$)	($n = 47$)
		(*SD* in parentheses)	
Busy	27.56 (4.77)	26.78 (5.88)	26.23 (5.22)
Care	32.32 (4.72)	31.06 (4.75)	31.21 (4.72)
Image	20.27 (4.30)	19.49 (3.79)	18.52 (4.12)
Share	13.45 (4.42)	16.73 (5.88)	15.58 (5.73)
Tactile	26.64 (6.71)	24.33 (6.92)	23.70 (7.32)
Esteem	16.61 (4.11)	16.40 (1.80)	16.66 (5.32)
UCLA-LS	37.96 (6.51)	38.20 (7.03)	36.01 (7.43)
Loneliness Distress	37.38 (8.64)	36.86 (7.37)	37.93 (11.19)
Negative affect (PANAS)	19.06 (5.31)	20.66 (5.19)	21.31 (5.84)
Positive affect (PANAS)	34.12 (5.66)	35.00 (5.89)	34.00 (5.93)
Subjective Well-Being	23.64 (5.79)	23.60 (6.08)	23.87 (6.24)
Health Symptom Checklist	93.26 (16.37)	87.31 (13.03)	91.75 (18.69)

(Note: The first six dependent variables — Busy, Care, Image, Share, Tactile, Esteem — are bracketed together and labelled "6-CLS".)

Controlling for participant's gender and age, a multivariate test provided no evidence of a significant group difference between the pet separation groups, Wilks' Λ = .670; $F(22, 134)$ = 1.36, p =.143. There was evidence of an effect of the grouped covariates, Wilks' Λ = .607; $F(22, 134)$ = 1.72, p =.034. There was no evidence of a violation of univariate homogeneity of variance, or multivariate homogeneity of covariance. Twelve participants were excluded from the analysis as their data were missing for one or more dependent variables, or one or more covariates.

As the previous analysis only explored pet separation (yes/no), as opposed to type of pet, it was possible that differences may have been apparent according to the kind of pet that the participant had been separated from. Therefore, 12 one-way ANOVAs explored whether there were differences associated with whether participants were separated from only cats (n = 32), only dogs (n = 13) or only 'other' types of pets (rabbits, hamsters, birds, etc) (n = 14) for each of the 12 dependent variables. Participants' age and gender were entered as covariates. Due to the increased chance of a *type-I* error occurring, the Bonferroni correction principle was applied, which reduced the criterion for significance to p = .004, from the more usual level of p =.05. The mean scores and univariate test statistics for each of the 12 dependent variables are shown in Table 7.2.

None of the main effect univariate tests were significant at p = .004, and none would have been significant at p = .05, which implies that there were no systematic differences associated with whether participants were separated from cats, dogs or 'other' types of pets. There was no evidence that any of the tests of the homogeneity of variance assumption were violated.

Table 7.2. Mean scores and univariate statistics by type of pet separation for the twelve dependent variables

Dependent variable	Mean scores of cat v. dog v. other pet owners (N=59) (SDs in parentheses)			Univariate test of pet type (cat v. dog v. other)	Univariate test of combined covariates (age, and gender)
	Cat (n = 32)	Dog (n = 13)	Other (n = 14)		
Busy	26.1 (4.5)	25.5 (4.0)	26.8 (6.5)	$F(2, 53) = .35, p = .704$	$F(2, 53) = 1.43, p = .244$
Care	30.4 (4.2)	30.5 (5.0)	33.0 (4.2)	$F(2, 53) = 1.21, p = .308$	$F(2, 53) = 1.40, p = .256$
Esteem	17.3 (3.3)	16.2 (3.4)	15.6 (3.3)	$F(2, 54) = .61, p = .549$	$F(2, 54) = 1.97, p = .151$
Image	19.7 (3.1)	18.5 (4.1)	17.7 (4.5)	$F(2, 53) = 1.38, p = .261$	$F(2, 53) = 1.04, p = .361$
Share	14.7 (4.7)	15.6 (5.0)	18.8 (6.1)	$F(2, 53) = 1.59, p = .213$	$F(2, 53) = 1.82, p = .447$
Tactile	23.1 (6.1)	25.2 (9.4)	25.1 (7.0)	$F(2, 53) = .47, p = .626$	$F(2, 53) = .72, p = .491$
UCLA -LS	36.8 (5.8)	36.3 (7.0)	35.8 (6.9)	$F(2, 52) = .08, p = .925$	$F(2, 52) = 2.09, p = .135$
Loneliness Distress (LDS)	38.8 (9.8)	40.7 (8.5)	34.4 (9.9)	$F(2, 54) = 1.13, p = .331$	$F(2, 54) = .15, p = .859$
Negative affect (PANAS)	22.0 (5.3)	21.6 (6.9)	18.2 (3.9)	$F(2, 51) = 1.94, p = .155$	$F(2, 51) = 2.65, p = 081$
Positive affect (PANAS)	33.7 (5.8)	35.9 (3.8)	32.1 (5.1)	$F(2, 54) = 1.11, p = .339$	$F(2, 54) = 1.64, p = .205$
Subjective well being	23.7 (4.3)	24.6 (6.1)	22.7 (5.3)	$F(2, 54) = .25, p = .778$	$F(2, 54) = 2.26, p = .115$
Health symptoms	91.9 (17.3)	94.4 (18.9)	84.5 (8.78)	$F(2, 54) = .94, p = .399$	$F(2, 54) = 2.61, p = .084$

The 6-CLS subscale comprises Busy, Care, Esteem, Image, Share, and Tactile.

Note. The p values reported are the true values, which have not been corrected

Part 2. Amongst the young adults living at home, are pet owners less lonely than non-pet owners?

This analysis explored whether participants who had recently left school, but were still living at home (the school sample), differed in loneliness according to their pet ownership status. The types of pet owned were 16 cats, 6 dogs, 4 'other' types of pet, and 12 multiple types of pet. As Studies I, II and III had found no difference due to the type of pet that was owned, due to the low numbers of dog owners and 'other' types of pet available, it was considered unfeasible to explore type of pet in an ancillary analysis.

Of the 122 participants in the school sample that were sent questionnaires, 56 participants completed them at Time 1. Due to the relatively small number of participants, multivariate analysis was not appropriate and one-way ANCOVAs were conducted instead for each of the 12 dependent variables. The between-subjects factor was pet ownership status (no pet/ pet, but not close/ close pet). Participants' gender and age were entered as covariates. Because of an increased chance of a *type-I* error occurring, the Bonferroni correction principle was applied, which reduced the criterion for significance in the multivariate tests to p = .004, from the more usual level of p =.05. Table 7.3 reports the mean scores for levels of pet separation status and the univariate test statistics for each of the 12 dependent variables.

None of the univariate tests were significant at p = .004, and only one (negative affect) would have been significant at p = .05. The assumption of homogeneity of variance was not violated in any of the analyses. There were no missing data in these analyses.

Table 7.3. Mean scores and univariate test statistics on pet ownership status for each of the twelve dependent variables

Dependent variable		Mean scores for levels of pet separation status (SD in parentheses)			Main effect of pet ownership	Effect of the grouped covariates
		No pet ($n = 18$)	Pet, but not close ($n = 11$)	Close pet ($n = 27$)		
Busy		29.72 (7.27)	25.81 (7.42)	30.22 (7.79)	$F(2, 51) = 1.415, p = .252$	$F(2, 51) = .27, p = .764$
Care		29.83 (5.64)	30.72 (6.66)	31.93 (6.25)	$F(2, 51) = .660, p = .521$	$F(2, 51) = 1.65, p = .203$
Esteem	6-CLS	14.16 (4.43)	14.18 (5.43)	15.51 (5.47)	$F(2, 51) = .475, p = .625$	$F(2, 51) = .21, p = .809$
Image		17.22 (5.91)	20.09 (8.71)	18.62 (6.07)	$F(2, 51) = 1.614, p = .545$	$F(2, 51) = .19, p = 830$
Share		14.77 (5.38)	13.54 (3.20)	14.48 (6.05)	$F(2, 51) = .110, p = .896$	$F(2, 51) = .91, p = .408$
Tactile		18.61 (7.17)	14.63 (4.29)	18.77 (6.87)	$F(2, 51) = 1.642, p = .204$	$F(2, 51) = .88, p = .422$
UCLA-LS		32.83 (5.77)	35.63 (9.93)	36.33 (9.11)	$F(2, 51) = .937, p = .398$	$F(2, 51) = .01, p = .986$
Loneliness distress (LDS)		31.36 (9.66)	26.81 (15.09)	35.66 (15.43)	$F(2, 51) = 1.726, p = .188$	$F(2, 51) = 2.93, p = .062$
Negative affect (PANAS)		20.77 (4.03)	23.81 (4.97)	26.33 7.52	$F(2, 51) = 4.217, p = .020$	$F(2, 51) = 1.85, p = .168$
Positive affect (PANAS)		37.38 (6.54)	36.27 (7.21)	35.03 (7.36)	$F(2, 51) = .688, p = .507$	$F(2, 51) = 1.70, p = .193$
Subjective Well Being		25.55 (5.63)	25.27 (7.77)	23.59 (6.38)	$F(2, 51) = .572, p = .568$	$F(2, 51) = .86, p = .428$
Health symptoms checklist		74.27 (18.74)	80.09 (22.19)	88.06 (22.03)	$F(2, 51) = 2.627, p = .082$	$F(2, 51) = 3.56, p = .036$

Note. The p values reported are the true values, which have not been corrected

Part 3. The longitudinal exploration of pet separation

The school sample participants who replied at both Time 1 and Time 2 were used in this analysis. Firstly, as not all of the participants who replied at Time 1 had replied to the Time 2 questionnaire, it was possible that a self-selection bias may have occurred. For example, lonely people may have replied at Time 2, whilst non-lonely people did not. Therefore, prior to the main part of analysis 3, preliminary analyses were used to check for evidence of self-selection in which the participants at Time 1 had opted to return questionnaires at Time 2. Due to the relatively small number of participants, multivariate analysis was not appropriate. Therefore, a series of 12 one-way ANCOVAS were used. The between-subjects factor was whether the ex-school students who had completed Time 1 questionnaires completed follow-up questionnaires at Time 2 (yes/no). As analysis 2 showed there was clearly no effect of participants' gender and age, these were not included as covariates in this analysis. To control for the increased chance of a *type-1* error when conducting multiple analyses, the Bonferroni correction principle was applied. This reduced the criterion for significance to $p = .004$, from the more usual level of $p = .05$. The mean scores at Time 1 for participants who did or did not reply at Time 2 and the results of the univariate analyses for each of the 12 dependent variables are summarised in Table 7.4.

None of the univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$, which implies there were no differences at Time 1 between participants who did or did not reply at Time 2. There was strong evidence that the assumption of homogeneity of variance had been violated for the dependent variable Loneliness Distress, Cochran's $C(27, 2) = .75, p = .006$. It was not possible to correct this using square root, square or log transformations, therefore some caution may be necessary in interpreting this finding. There were no missing data in this analysis.

Table 7.4. *Mean scores and univariate statistics for differences at Time 1 between participants who did or did not reply to the follow up questionnaire*

Dependent variable	Mean scores at Time 1 for whether participants replied at Time 2 (*SD* in parentheses)		Main effect of difference at Time 1 for whether participant replied at Time 2
	Did not reply at Time 2	Did reply at Time 2	
Busy	28.72 (8.38)	30.11 (5.95)	$F(1, 54) = .41, p = .525$
Care	30.94 (6.01)	31.15 (6.44)	$F(1, 54) = .01, p = .903$
Esteem 6-CLS	15.24 (5.74)	14.00 (3.55)	$F(1, 54) = .87, p = .355$
Image	18.49 (7.08)	18.42 (5.59)	$F(1, 54) < .01, p = .972$
Share	15.00 (5.78)	13.21 (4.18)	$F(1, 54) = 1.43, p = .237$
Tactile	19.03 (7.23)	15.74 (4.8)	$F(1, 54) = 3.19, p = .080$
UCLA-LS	36.11 (8.97)	33.06 (6.79)	$F(1, 54) = 1.69, p = .199$
Loneliness distress (LDS)	33.77 (15.84)	30.15 (9.15)	$F(1, 54) = .84, p = .364$
Positive affect (PANAS)	35.83 (7.51)	36.42 (6.15)	$F(1, 54) = .03, p = .772$
Negative affect (PANAS)	24.67 (6.88)	22.84 (5.68)	$F(1, 54) = .99, p = .323$
Subjective Well Being	24.19 (6.77)	25.26 (5.71)	$F(1, 54) = .35, p = .557$
Health symptoms checklist	82.02 (23.06)	82.03 (18.95)	$F(1, 54) < .01, p = .995$

The primary aim of Part 3 was to ascertain whether participants who owned pets and who underwent pet separation when they started at university, increased in loneliness more than the non-pet owning students when they started at university.

A series of 12 two-way mixed-model analysis of variance tests were carried out. The within-subjects factor 'time' had two levels: five-weeks before the start of University term time; and, three-weeks after the start of university term time. This would explore the effect of moving from living at home to living at university.

The between-subjects factor (pet separation status) now only had two levels (close pet owned at home v. no pet owned at home), as all pet owning participants reported that they had felt close to their pet. As all pet owning participants at Time 1 had undergone pet separation by Time 2, the test of particular interest was the pet separation status x time interaction. In effect, this would determine whether the magnitude of differences between Time 1 and Time 2 was greater for those undergoing pet separation than for those who were not. As analysis 2 showed there was clearly no effect of participants' gender and age, these were not included as covariates in this analysis. To control for the increased chance of a *type-1* error when conducting multiple analyses, the Bonferroni correction principle was applied. This reduced the criterion for significance to $p = .004$, from the more usual level, $p = .05$. Mean scores at Time 1 (pet owners and non-pet owners), mean scores at Time 2 (pet separation and no-pet separation), and the results of the mixed-model ANOVAs for each of the 12 dependent variables are reported in Table 7.5.

None of the univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$. There were no missing data in this analysis. There was no evidence that the univariate assumption of homogeneity of variance or the repeated measures assumption of sphericity had been violated for any of the dependent variables.

The univariate analyses provided no evidence that pet separation caused higher levels of any of the dependent variables under investigation. Although there was only a small sample in this analysis, the F statistics did not suggest that with a larger sample size a significant effect would become apparent.

Table 7.5. *Mean scores at Time 1 for pet owners and non pet owners, mean scores at Time 2 for pet separation and non separation, and the univariate statistics for the twelve dependent variable*

Dependent variable	Mean scores at Time 1 (SD in parentheses)		Mean scores at Time 2		Main effect 'Pet ownership'	Main effect 'Time'	Interaction effect
	Non-pet owner (n = 6)	Pet owner (n = 7)	No-pet separation (n = 6)	Pet separation (n = 7)	All degrees of freedom = 1, 11		
Busy	30.77 (6.84)	28.66 (3.38)	33.23 (6.59)	30.33 (7.06)	$F = 1.40, p = .261$	$F = 2.96, p = .113$	$F = .08, p = .778$
Care	30.54 (7.17)	32.50 (4.76)	29.30 (5.10)	31.67 (6.86)	$F = 1.18, p = .30$	$F = .21, p = .656$	$F = .21, p = .656$
Esteem	14.23 (3.78)	13.50 (3.27)	15.69 (4.53)	14.71 (4.69)	$F = .01, p = .934$	$F = .11, p = .746$	$F = .62, p = .449$
Image	19.31 (5.70)	16.50 (5.28)	18.00 (3.91)	18.42 (7.38)	$F = .07, p = .791$	$F = .13, p = .726$	$F = .00, p = .953$
Share	13.46 (4.13)	12.66 (4.63)	13.07 (3.66)	13.00 (2.36)	$F = .11, p = .751$	$F = .05, p = .833$	$F = 1.11, p = .315$
Tactile	15.76 (5.24)	15.66 (4.13)	19.53 (8.03)	19.16 (5.74)	$F = .00, p = .960$	$F = 3.16, p = .103$	$F = .13, p = .724$
UCLA-LS	33.46 (6.46)	32.18 (8.04)	36.38 (10.94)	32.66 (8.54)	$F = .03, p = .871$	$F = .88, p = .296$	$F = 1.02, p = .334$
Loneliness distress (LDS)	30.15 (7.16)	30.16 (13.34)	38.15 (15.31)	41.83 (21.51)	$F = 1.18, p = .301$	$F = 1.09, p = .320$	$F = .11, p = .742$
Negative affect (PANAS)	22.53 (3.84)	23.50 (8.96)	19.84 (6.24)	19.83 (7.53)	$F = .51, p = .488$	$F = 1.79, p = .208$	$F = .54, p = .478$
Positive affect (PANAS)	37.00 (6.09)	35.16 (6.67)	35.53 (8.96)	35.00 (7.61)	$F = 1.45, p = .254$	$F = .15, p = .702$	$F = .28, p = .605$
Subjective Well Being	24.76 (5.54)	26.33 (6.47)	25.46 (7.42)	26.67 (6.25)	$F = .02, p = .769$	$F = .43, p = .524$	$F = .18, p = .722$
Health symptoms checklist	78.00 (18.44)	90.79 (18.49)	86.17 (26.16)	84.66 (29.67)	$F = .36, p = .558$	$F = .11, p = .751$	$F = .91, p = .361$

(6-CLS comprises the variables Busy, Care, Esteem, Image, Share, Tactile)

Note. The p values reported are the true values, which have not been corrected

Part 4. The between-subjects (pseudo-) longitudinal exploration of pet separation

As the attrition rate of the school sample was expected to be high, this analysis compared the school sample at Time 1, with the university sample at Time 2. In effect, this would compare differences between pet owners and non-pet owners whilst they lived at home with differences between pet owners who had undergone pet separation and non-pet owners who had left home (the school sample) to start at university. The mean scores at Time 1 (pet owners and non-pet owners), mean scores at Time 2 (pet separation and non-pet owners) for each of the dependent variables are reported in Table 7.6.

Table 7.6. *Mean scores at Time 1 (the school sample) for pet ownership (no pet/close pet/pet, but not close) and mean scores at Time 2 for pet separation from (no pet/close pet/pet, but not close), for each of the 12 dependent variables*

Dependent variable	Mean scores at Time 1 (The School sample)				Mean scores at Time 2 (The university sample)	
			(SD in parentheses)			
	No pet (n = 18)	Pet, but not close (n = 11)	Close pet (n = 27)	No pet (n = 31)	Separated from pet, but not close (n = 15)	Separated from close pet (n = 47)
Busy	29.72 (7.27)	25.81 (7.42)	30.22 (7.79)	27.56 (4.77)	26.78 (5.88)	26.23 (5.22)
Care	29.83 (5.64)	30.72 (6.66)	31.93 (6.25)	32.32 (4.72)	31.06 (4.75)	31.21 (4.72)
Esteem (6-CLS)	14.16 (4.43)	14.18 (5.43)	15.51 (5.47)	16.61 (4.11)	16.40 (1.80)	16.66 (5.32)
Image	17.22 (5.91)	20.09 (8.71)	18.62 (6.07)	20.27 (4.30)	19.49 (3.79)	18.52 (4.12)
Share	14.77 (5.38)	13.54 (3.20)	14.48 (6.05)	13.45 (4.42)	16.73 (5.88)	15.58 (5.73)
Tactile	18.61 (7.17)	14.63 (4.29)	18.77 (6.87)	26.64 (6.71)	24.33 (6.92)	23.70 (7.32)
UCLA-LS	32.83 (5.77)	35.63 (9.93)	36.33 (9.11)	37.96 (6.51)	38.20 (7.03)	36.01 (7.43)
Loneliness Distress	31.36 (9.66)	26.81 (15.09)	35.66 (15.43)	37.38 (8.64)	36.86 (7.37)	37.93 (11.19)
Negative affect (PANAS)	20.77 (4.03)	23.81 (4.97)	26.33 7.52	19.06 (5.31)	20.66 (5.19)	21.31 (5.84)
Positive affect (PANAS)	37.38 (6.54)	36.27 (7.21)	35.03 (7.36)	34.12 (5.66)	35.00 (5.89)	34.00 (5.93)
Subjective Well-Being	25.55 (5.63)	25.27 (7.77)	23.59 (6.38)	23.64 (5.79)	23.60 (6.08)	23.87 (6.24)
Health Symptom Checklist	74.27 (18.74)	80.09 (22.19)	88.06 (22.03)	93.26 (16.37)	87.31 (13.03)	91.75 (18.69)

A two-way MANCOVA was used to explore differences on the set of 12 dependent variables. Between-subjects factors were whether the student had a pet at home (no pet/close pet/pet, but not close) and sample (school/university). Participants' gender and age were entered as covariates. A multivariate test provided no evidence of differences due to pet ownership status, Wilks' $\Lambda = .801$; $F(24, 250) = 1.22$, $p = .224$ (although this finding is not interpretable as showing no differences between pet owners and non-pet owners as the pet owners in the university sample had actually been separated from their pets). The multivariate test provided strong evidence of a differences between the school sample and the university; Wilks' $\Lambda = .622$; $F(12, 125) = 6.316$, $p < .0005$. These are interpretable as the differences associated with leaving home to start at university. The univariate differences for between the school and the university samples are shown in Table 7.7 for each of the 12 dependent variables. The multivariate test provided no evidence of a significant interaction between sample and pet ownership; Wilks' $\Lambda = .779$; $F(24, 250) = 1.388$, $p = .112$, which would be interpretable as the effect of pet separation. Lastly, there was evidence of a significant effect of the grouped covariates, Wilks' $\Lambda = .728$; $F(24, 250) = 1.791$, $p = .015$. There was no evidence of problems with the univariate assumption of homogeneity, but there was some evidence that the multivariate assumption of homogeneity of covariance had been violated, Box's χ^2 (312, 12902, $n = 144$) = 1.15, $p = .043$. However, as this was clearly less than Tabachnick and Fidell's (2001) recommended criterion for α ($p < .001$), this was assumed not to have seriously affected the interpretation of the Wilk's test. Fourteen participants were excluded from this analysis due to their data being missing for one or more of the dependent variables or covariates.

Table 7.7. *Mean scores the school at Time 1, the university sample at Time 2 and the univariate statistics*

Dependent variable	Univariate statistics (df = 1, 136)		Mean Scores		
	F-Statistic	Sig.	School	University	
Tactile	31.83	<.0005	17.07	24.84	*
Esteem	12.29	.001	13.75	16.30	*
Distress of loneliness	10.77	.001	29.58	36.46	*
UCLA-LS	7.71	.006	33.69	37.34	*
Health symptoms	4.30	.040	80.54	87.67	*
Subjective Well Being	1.69	.195	25.54	24.07	*
Share	1.51	.221	13.59	14.71	*
Image	2.21	.140	17.97	19.44	*
Positive affect	3.14	.078	36.87	34.70	*
Care	1.00	.319	30.71	31.72	*
Busy	1.80	.181	29.16	27.49	#
Negative affect	8.38	.004	23.19	20.00	#

(Note: Where the dependent variables are annotated *, the differences are significant and consistent with the move to university causing loneliness. The items annotated # was not consistent with the move to university leading to higher levels of loneliness).

Discussion

This study sought to determine whether pet separation led to higher levels of loneliness. Part 1 compared university students who had been separated from a pet with university students who had not been separated from a pet. In essence, this was a replication of Study III, but with the inclusion of a number of additional measures (e.g., subjective well being, positive/negative affect, negative health symptoms and loneliness distress). The results provided no evidence that

participants who had undergone pet separation, irrespective of the degree of closeness they reported to their pet, differed from participants who had not undergone pet separation. These findings were consistent with the conclusion of Study III, which suggested that pet separation did not appear to lead to higher levels of loneliness.

Also in part 1, an ancillary analysis explored whether there were differences between people separated from cats only, dogs only, or 'other' types of pets only. The results provided no evidence that differences due to pet type affected the interpretation of this study.

If pet owning students were less lonely than non-pet owning students before pet separation occurred, then even if pet separation led to increased levels of loneliness, cross sectional designs would be unlikely to show any effect. Therefore, Part 2 explored whether a comparable sample that lived at home (the school sample), many of whom would soon leave home to become students, differed on any of the dependent variables according to whether they were pet owners or non-pet owners. The results showed no evidence that pet owning students differed from non-pet owning students on any of the dependent variables being investigated. This finding was consistent with the findings of Studies I and II, which also found no differences between pet owners and non-pet owners whilst living at home.

Part 3 was a within-subjects longitudinal analysis. An important assumption of the longitudinal study was that participants who completed the follow-up phase of the

study were no different from those who did not. However, there was no evidence of any systematic differences between the participants who completed both phases of the study and those who did not. The main analysis provided no evidence that pet separation led to higher levels of loneliness. Contrary to the findings of Cutrona (1982) and Shaver et al. (1985), there was no evidence that leaving home to start at university led to increased levels of loneliness. However, the sample size was very small.

It was predicted the sample size available for Part 3 might compromise interpretation of the analysis. Therefore, in Part 4 the effect of pet separation was explored by comparing the school sample at Time 1 with the undergraduates at Time 2. The 2 samples differed as to whether pet separation had or had not occurred yet, but it was assumed that the two samples were otherwise essentially similar. No differences were found due to pet separation, although a number of univariate differences were found between the two samples. This, presumably, was due to the school sample still living at home and the university sample having left home to start at university. This was consistent with the findings of Study IV, when the initial version of the Loneliness Distress Scale was pilot tested, and university students (most of which had left home) reported higher levels of loneliness distress than further education students (most of which still lived at home), and was therefore consistent with the findings of Cutrona (1982) and Shaver et al. (1985).

Overall, the four parts of Study IV provided no evidence to support the hypothesis that pet separation leads to higher levels of loneliness. The lack of support for this

hypothesis, in turn, fails to support the theory that pets can help to alleviate loneliness. However, as was suggested in Study III, the lack of support may not necessarily imply that the pets and loneliness theory is wrong. Rather, it might be that pet acquisition helps to alleviate loneliness, but subsequent pet separation does not increase loneliness.

Aim

The primary aim of this study was to investigate whether pet acquisition helps to alleviate loneliness. Three secondary aims were also investigated: 1) amongst people seeking to acquire a pet, are pet owners less lonely than non-pet owners; 2) are people seeking to acquire a pet lonelier than people not seeking to acquire a pet; and 3) an examination of the test-retest reliability of the measures used in this study.

Introduction

Ideally, the following design specification would be used for this study. Firstly, a sample of non-pet owners, approximately half of which lived alone, would be recruited from the general population, and a baseline measure of loneliness would be obtained at what is designated as Time 1. Secondly, a pet of their choice would then be randomly allocated to half of the participants who lived alone and half of the participants who lived with others (the experimental group), whilst the remaining participants would not be allocated a pet (the control group). Finally, at what is designated Time 2, a pre-determined time after pet allocation, loneliness would be measured. The mean difference in loneliness between Time 1 and Time 2 would be compared between the experimental group and the control group. If the time 1 – Time 2 difference indicated a decrease in loneliness, or smaller increase, amongst participants who had acquired a pet in comparison to participants who had not yet acquired a pet, then this would suggest pet acquisition helped to alleviate loneliness.

In practice, a number of constraints determined how this study could be run. For example, to allocate a pet to a person not expecting one, or to withhold a pet from a prospective owner capable of owning one, would be impractical. However, similar to the quasi-experimental studies of pet separation (Studies III & V), a freely occurring situation was ideally suited for use in this study. That is, a large number of people visit pet re-homing centres with the intention of acquiring a new pet. Thus, people who were looking for a pet, but had not yet have acquired one, could then be recruited (Time 1). After a predetermined period the participants recruited at Time 1 could be asked to complete a follow-up questionnaire (Time 2), by which time some would presumably have acquired a pet, whilst others had not. Ideally, only participants seeking to acquire their first pet would be used, because if pets do alleviate loneliness it may only occur for the first pet. However, this would possibly involve the rejection of a substantial amount of data, as some people are likely to own pets already. Therefore, a compromise solution was that current pet ownership (yes/no) could be explored as a factor in its own right.

In the cross-sectional studies of this thesis, a possible source of confounding was identified, whereby people who had become pet owners may have been lonelier before pet acquisition than non-pet owners. If pet acquisition helped to alleviate loneliness, this may simply have narrowed what would otherwise be a difference in loneliness between pet owners and non-pet owners. Thus, pets may help alleviate loneliness, but this would not become apparent by comparing pet owners to non-pet owners. Some evidence is consistent with this possibility, as Endenburg et al. (1994) reported that 79% of people seeking to acquire a pet stated companionship as one of their main reason for doing so. If people are seeking out companionship, then this

implies that they may not have the level or type of companionship that they would like, which is Peplau and Perlmans' (1982) main criterion of loneliness.

In addition to the primary aim of exploring the effect of pet acquisition, this study directly investigates the possibility that people who acquire pets do so because they are lonely. Participants seeking to acquire a pet would be compared with 2 control groups of participants who were not currently seeking to acquire a pet.

Method

Participants and procedure

The participants who were seeking to acquire pets were recruited from an animal re-homing centre situated in Coventry, a medium sized city in the English Midlands. As far as possible, all of the people looking at animals (primarily cats and dogs) were asked to participate in the study to avoid the possibility of any systematic bias in participant selection. Prospective participants were invited to take part in a study of pet acquisition and those who agreed were given a questionnaire and a Freepost envelope in which to return the questionnaire once completed. Participants were recruited between 12.00hrs and 15.45hrs on Saturdays and Sundays between February 2001 and early September 2001. Due to a foot and mouth epidemic, there was a period of 7 weeks from March 15th 2001 during which the re-homing centre was closed to the public and participant recruitment could not take place. In total, 151 participants who were seeking to acquire a pet were recruited. These participants were called the 'pet acquisition group'.

There were two control groups comprising people not seeking to acquire pets. Control Group 1 were employees and their friends at a university in south-west

England. Control Group 2 comprised the data collected for Study II of this thesis. In both control groups there were assumed to be very few people who were actively looking to acquire a pet, although it is feasible that there may have been a small number who were.

Design

The first questionnaire was given to participants when they were looking to acquire a pet (Time 1) or, in the case of Control Group 1, during the same time-period. Six months after the first questionnaire was returned (Time 2), a follow-up questionnaire was sent to pet acquisition group who had given their address for communication. The Time 1 and Time 2 questionnaires were essentially identical, and differed primarily in the grammatical tense that was used. The first questionnaire asked why pets were being sought, and the second questionnaire asked whether a pet had been acquired.

At both Times 1 and 2 participants were asked to complete the following measures: UCLA-LS, 6-CLS, Loneliness Distress Scale, Positive and Negative Affect, Subjective Well-being and a Health Symptom Checklist. In addition, participants reported their age, gender, living arrangements and whether or not they already owned a pet. At Time 1, participants were asked why they wanted to acquire a new pet and to write down their three most important reasons for pet acquisition (open-format questions). Participants were also asked how much they agreed with the 16 reasons for pet acquisition (closed-format questions) reported by Endenburg et al. (1994) using a 4-point Likert Scale (*Not at all true- A little true- Quite true- Completely true*). The 16 questions are shown in Table 8.1. At Time 2, participants were asked to report the extent to which their reasons for pet acquisition were fulfilled.

Table 8.1. *Participants' reasons for pet acquisition*

1.   To provide me with extra companionship *

2.   Primarily for the children (e.g., fun, education, company etc)*

3.   Because I gain pleasure from stroking it, etc...*

4.   I want to take care of a pet*

5.   I've always owned pets

6.   A pet would be useful (for security, etc...)*

7.   As company for another pet*

8.   To stop me feeling lonely*

9.   Personal health reasons*

10.   Feeling sorry for animals in the shelter.

11.   They simply look pleasing to the eye*

12.   A pet would be something that is especially mine

13.   I am interested in training animals

14.   I feel a special bond with animals

15.   To help me meet more people*

16.   Because there are times when I have nothing to do*

(Only the items marked * were re-explored after pet acquisition had occurred)

A time lapse of 6 months was chosen between Time 1 and Time 2 after observing the rate at which animals were being homed by the centre. As it was not possible to control how long participants had had their new pet by Time 2, which might have affected any benefits that accrued, participants were also asked how long they had owned their new pet at Time 2 if a pet had been acquired. The data were explored to see whether the length of time since pet acquisition was associated with any of the dependent variables under investigation.

The analyses in this study are reported as follows: 1) descriptive statistics are reported for the pet acquisition group at Times 1 and 2 and for the control group at

Time 1; 2) the test-retest validity of each of the measures is examined using the Time 1 and Time 2 data; 3) amongst the participants who were seeking to acquire a pet at Time 1, existing pet owners are compared with non-pet owners; 4) the participants who were seeking to acquire a pet at Time 1 are compared with the two control groups, who were not seeking to acquire a pet; 5) people's expectations of pet acquisition are explored using correlations and multivariate tests; 6) people who stated companionship as one of their three main reasons for pet acquisition are compared with the participants not stating this reason to explore whether they were lonelier; 7) a series of correlations explored whether participants' expectations of pet acquisition were fulfilled; and 8) two assumptions for the longitudinal analysis were tested; 9) reports the longitudinal analyses; 10) explored whether there were differences associated with whether cats or dogs had been acquired; and 11) explored whether there was a relationship between the length of time the pet had been owned and any changes in loneliness.

Measures

1) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most widely used measure of global loneliness. The range of possible scores is 20 to 80, with higher scores indicating higher levels of loneliness. Participants indicate how often they felt the way described in each question using a 4-point Likert scale (*never – rarely – sometimes – always*). Russell et al. (1980) found the internal consistency of the UCLA-LS, as measured by Cronbach's Alpha (α) was .94. Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

2) The 6-CLS. This consisted of 6 scales measuring: a need to feel valued, loved understood and wanted (Esteem); a need to keep busy to avoid feeling lonely (Busy); a need to care for others (Care); a need for tactile affection (Tactile); a need to share

(Share); and peoples belief that they are perceived as lonely (Image). There were nine items in each of the first two scales and the possible range of scores in each scale was 9 - 45, and in each of the latter four scales there were eight items, and the possible range of scores in each scale was 8 - 40. In each case, higher scores indicate a higher likelihood of loneliness. In Study II, the internal consistencies (Cronbach's α) were in the range .78 to .88. Full details of the 6-CLS were reported in Study II.

3) The Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) was used to measure participants' mood. There are two separate scales, one measuring positive affect and the other measuring negative affect, each with ten adjectives. The frequency that each adjective describes how the participant has felt in the 'last few weeks' is scored using a 5-point Likert scale (very slightly - extremely). The possible range of scores is therefore 10 – 50. Higher scores indicate higher levels of negative or positive affect. Watson et al. (1988) reported internal consistencies of .87 for both scales when exploring participants mood during the past few weeks. The PANAS is shown in Appendix 4g.

4) Participants' health was measured using the shortened symptom checklist developed by McNicholas and Collis (1995). The checklist was designed to measure symptoms of ill health likely to exist as the result of stress and was therefore particularly suited to the purpose of this study. There were 30 items in total, 15 measure physical symptoms and 15 measure psychological symptoms, which in total provide a measure of participants overall health. The 30 symptoms were scored using a 6-point Likert scale (*never* to *almost always*), and the range of possible scores was 30 to 180. Higher scores indicate higher incidence of negative health symptoms. In Study II the internal consistency of the checklist, measured using Cronbach's α, was found to be .92, and a Pearson's correlation of $r = .36$ was found between the checklist and the UCLA-LS. The checklist is shown in Appendix 4e.

5) Loneliness Distress (LDS). This scale measured the affective component of loneliness and consisted of 13 items each measuring loneliness distress (e.g., are you ever unhappy about the amount of time you spend alone?). To each of the 13 items, participants' stated the extent to which they agree, using a 6-point Likert scale ('doesn't apply' to 'almost always applies'). Higher scores indicate higher levels of loneliness distress (possible range scores 13 – 78). In Study IV, the internal consistency of the scale was .91. Full details of the LDS were reported in Study IV.

6) Subjective Well-Being was measured by The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffen, 1985). This scale measures subjective well-being using 5 items (e.g., The conditions of my life are excellent) to which participants report the extent to which they agree using a 7-point Likert-type scale. The range of possible scores is therefore 5 – 35. Higher scores indicate higher subjective well-being. Diener et al. (1985) report internal consistency of .85. This measure was used instead of Dupuy's (1984) GPWS, which was used in Study II, primarily because of its shorter length. This was deemed important, as the overall number of questions participants would be asked in this study was relatively high. The Satisfaction with Life Scale is shown in Appendix 4h.

7) Participants were also asked their reasons for wanting to acquire a pet as described in the 'design' section of this study. In the second questionnaire, sent six months after the first one was returned, the wording was changed slightly. The second set of questions asked to what extent the pet had fulfilled the participants' reasons for acquisition, although some items were not included due to difficulty in wording them to make conceptual sense. The items marked * in Table 8.1 were reworded into past tense for the second questionnaire (e.g., if you acquired a pet, did it provide you with

extra companionship?). The items not marked * did not make conceptual sense to ask again.

8) Participants also reported their age (as continuous ordinal data), gender, living arrangements (live alone/with others), and whether they already owned a pet. In the Time 2 questionnaire, participants were asked whether they had acquired a new pet, and if so, how long it had been in their possession and its species type.

Results

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made as recommended by Tabachnick and Fidell (2001). As there was no evidence of any serious deviation from normality, the natural data were used. Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test.

Wherever missing responses were found for a participant's individual questionnaire items, if they accounted for less than 10% of the total number of items of any individual scale, *pro rata* scores were calculated based on the items they had answered.

In each of the analyses where the statistical test is multivariate analysis of variance, the univariate dependent variables are as follows: UCLA-LS, the 6-CLS, Positive affect, Negative affect, Health Symptom Checklist, Loneliness Distress, and Subjective Well-Being.

1. Descriptive information of the pet acquisition group and control group participants

The participants in the pet acquisition group at Time 1 are summarised in Table 8.2, of whom all were seeking to acquire a new pet. The participants in the pet acquisition group at Time 2 are summarised in Table 8.3, all of whom had replied at both Time 1 and Time 2.

Table 8.2. *Summary of participants in the pet acquisition group at Time 1*

- **Response rate**

  Of 825 questionnaires handed out at Time 1, 151 questionnaires were returned completed (response rate of 18.3%).

- **Gender**

  108 female

  42 male

  1 failed to specify gender

- **Age**

  Mean age 36.67 years old

  Range of ages 16 to 78 ($SD = 12.35$)

- **Pet ownership**

  92 already owned a pet

  59 did not yet own a pet

- **Living arrangements**

  18 lived alone

  133 lived with at least one other person

Table 8.3. *Summary of participants in the pet acquisition group at Time 2*

- **Response rate**

  59 questionnaires were returned at Time 2 (response rate of 39%), of whom 35 had

  acquired a pet and 24 had not.

Acquired a pet	Not acquired a pet
- **Gender**	- **Gender**
23 female	20 female
11 male	4 male
1 failed to specify gender	
- **Age**	- **Age**
Mean age 39.82 years old	Mean age 39.08 years old
Range of ages 18 to 65 (*SD* = 11.44)	Range of ages 19 to 70 (*SD* = 14.69)
- **Pet ownership**	- **Pet ownership**
18 already owned a pet	13 already owned a pet
17 did not yet own a pet	11 did not yet own a pet
- **Living arrangements**	- **Living arrangements**
5 lived alone	5 lived alone
30 lived with at least one other person	19 lived with at least one other person
- **Types of pets acquired**	
16 dogs	
15 cats (3 participants acquired 2 cats)	
3 rabbits	
1 ferret	

Exploratory tests were carried out on the pet acquisition group who completed

questionnaires at Time 1 and Time 2. Chi-square analysis indicated no difference in

the ratio of males to females between participants who acquired a pet and the

participants who did not, $\chi^2(1, n=58) = 1.81, p = .18$ (one participant did not report

gender). Chi-square analysis indicated no difference in the proportion of participants

who acquired a pet by Time 2 between participants who lived alone and participants who lived with others, $\chi^2(1, n=59) = .434, p = .51$. Chi-square analysis indicated no difference in the proportion of existing pet owners amongst participants who acquired a pet by Time 2 and participants who did not, $\chi^2(1, n = 59) = .043, p = .87$.

There were two control groups of people who were not currently seeking to acquire a new pet. In Control Group 1, 50 questionnaires were distributed, of which 22 were returned, representing a return rate of 44%. Control Group 2 comprised the data collected for Study II. A summary of the participants in both control groups is shown in Table 8.4

Table 8.4. *Summary of participants in the two control groups*

Control group 1 (*N* = 22)	Control group 2 (*N* = 200)
• **Gender**	• **Gender**
14 female	115 female
8 male	85 male
• **Age**	• **Age**
Mean age 32.05 years	163 participants < 30 years
Range of ages 19 to 50 (*SD* = 8.19)	16 participants 30 to 40 years
	16 participants 40 to 50 years
	5 participants >50 years
• **Pet ownership**	• **Pet ownership**
9 pet owners	134 pet owners
13 non-pet owners	66 non-pet owners
• **Living arrangements**	• **Living arrangements**
4 lived alone	12 lived alone
18 lived with other people	188 lived with other person

2. Test-retest reliability (Time 1 v. Time 2 scores) and the internal consistency for each dependent variable

To measure test-retest reliability, a series of correlations using Pearson's r for each dependent variable were carried out using the pet acquisition group Time1 and Time 2 scores. The Time 1 –Time 2 correlations and internal consistencies are reported in Table 8.5. All except one of the correlations were strongly significant. The size of the correlations were consistent with the six month period between Times 1 and 2 and the fact that many intervening factors might have changed how people feel in that period. The internal consistencies of each dependent variable were comparable to those found in the previous studies of this thesis.

Table 8.5. *Correlations between Time 1 and Time 2 scores for each dependent variable, and the internal consistencies of the Time 1 data and Time 2 data.*

Dependent variable	Time1/Time2 Correlations (Pearson's r)	Cronbach's alpha coefficient (α) Time 1	Time 2	n
Busy	.65**	.88	.88	58
Care	.49**	.82	.77	59
Esteem 6-CLS	.71**	.88	.91	59
Image	.54**	.83	.76	59
Share	.74**	.84	.88	59
Tactile	.85**	.88	.89	59
UCLA-LS	.85**	.93	.92	59
Loneliness Distress	.83**	.95	.95	59
Negative affect (PANAS)	.36*	.85	.83	56
Positive affect (PANAS)	.53**	.88	.89	56
Subjective Well-Being	.82**	.88	.90	59
Health symptom checklist	.79**	.92	.95	59

* = sig. at $p <.01$; ** = sig. at $p <.0005$

3. Amongst the pet acquisition group at Time 1, are pet owners less lonely than non-pet owners, or are differences apparent only amongst people who live alone?

Mean scores for pet owners and non-pet owners who lived alone or with others for each of the 12 dependent variables are shown in Table 8.6. Controlling for participants' age and gender, a multivariate test using the set of 12 dependent variables at Time 1 provided no evidence that pet owners differed from non-pet owners; Wilks' Λ = .885; $F(12,126)$ = 1.37, p = .189. However, there was evidence that people who lived alone differed from those who lived with other people; Wilks' Λ = .820; $F(12,126)$ = .2.30, p = .011. Univariate statistics provided evidence that people who lived alone reported higher levels of loneliness, as measured by the Tactile scale; $F(1,137)$ = 10,27, p = .002. The mean Tactile loneliness score for participants who lived alone was 28.50, whilst for participants who lived with other people it was 18.35. There was no evidence of an interaction between the two factors; Wilks' Λ = .870; $F(12, 126)$ = 1.56, p = .111. There was strong evidence of an effect of the grouped covariates, Wilks' Λ = .592; $F(24, 252)$ = 3.15, p < .001. There was no evidence of a violation of univariate homogeneity of variance, or multivariate homogeneity of covariance. Five participants were excluded from this analysis due to missing data on one or more of the dependent variables, or one or more of the covariates.

Table 8.6. Mean scores for pet owners and non-pet owners who live alone or with others

Dependent variable	Pet owners		Non-pet owners	
		(SD in parentheses)		
	Live alone (n = 11)	Live with others (n = 81)	Live alone (n = 7)	Live with others (n = 52)
Busy	31.63 (9.90)	32.13 (7.47)	35.14 (6.060)	30.73 (7.09)
Care	29.36 (5.16)	30.02 (5.89)	28.00 (2.51)	29.15 (4.49)
Esteem (6-CLS)	19.54 (5.80)	17.75 (6.99)	14.71 (7.13)	18.54 (6.01)
Image	18.37 (5.36)	19.50 (5.66)	17.86 (6.41)	19.04 (4.44)
Share	16.54 (6.74)	14.40 (5.51)	14.85 (6.03)	14.46 (5.12
Tactile	30.97 (6.87)	17.99 (7.41)	26.23 (8.76)	18.88 (6.99)
UCLA-LS	42.33 (11.02)	35.91 (10.63)	37.61 (12.36)	37.72 (11.11)
Loneliness distress	45.18 (10.25)	32.31 (11.75)	35.71 (15.03)	32.90 (14.51)
Health symptoms	93.54 (20.75)	86.28 (19.96)	86.57 (31.46)	86.03 (22.35)
Subjective well being	13.63) (5.33)	23.35 (7.34)	22.42 (8.69)	22.76 (6.03)
Negative affect	19.90 (7.18)	18.73 (7.02)	20.85 (5.92)	17.28 (7.32)
Positive affect	27.54 (8.42)	30.04 (7.22)	28.71 (8.82)	28.84 (7.38)

To explore whether differences between the types of pets that were already owned could have obscured any effect of pet ownership, a series of one-way ANCOVAs explored whether there were differences at Time 1 due to the type of pet that was owned. The between-subjects factor was therefore the type of pet that participants' owned and had 4 levels: 37 owned cats (but no other type of pet); 15 owned dogs (but no other type of pet); 20 owned 'other' types of pet; and 20 owned multiple categories of pet. Participants' age and gender were entered as covariates. Due to the increased chance of a *type-I* error occurring, the Bonferroni correction principle was applied, which reduced the criterion for significance to $p = .004$, from the more usual level of $p = .05$. The mean scores for the four levels of type of pet owned and the univariate test statistics are reported in Table 8.7.

None of the main effect univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$, which implies there were no differences associated with the type of pet that participants' owned on any of the 12 dependent variables at Time 1.

Table 8.7. Mean scores and univariate test results for differences by pet type (cat, dog, other types, multiple types) for the 12 dependent variables

Dependent variable	Pet type (SD in parentheses)				Main effect of difference due to pet type	Grouped effect of covariates
	Cat (n = 37)	Dog (n = 15)	Other (n = 20)	Multiple types (n = 20)		
Busy	32.80 (8.05)	31.81 (7.72)	34.13 (6.05)	29.95 (8.91)	$F(3, 84) = 1.35, p = .264$	$F(2, 84) = 5.37, p = .006$
Care	29.00 (8.01)	31.03 (4.77)	29.30 (6.21)	29.30 (5.22)	$F(3, 84) = .65, p = .583$	$F(2, 84) = 1.35, p = .264$
Esteem	20.27 (7.69)	17.30 (6.65)	17.50 (6.70)	17.95 (6.92)	$F(3, 84) = .67, p = .570$	$F(2, 84) = .35, p = .704$
Image	18.53 (5.26)	20.45 (5.47)	19.00 (6.62)	18.35 (5.09)	$F(3, 84) = .84, p = .476$	$F(2, 84) = 3.18, p = .046$
Share	15.87 (6.63)	14.73 (5.74)	14.00 (4.10)	14.25 (6.63)	$F(3, 84) = .37, p = .773$	$F(2, 84) = 2.34, p = .102$
Tactile	19.40 (7.02)	19.03 (8.54)	19.38 (6.64)	21.51 (10.59)	$F(3, 84) = .06, p = .980$	$F(2, 84) = 2.70, p = .073$
UCLA-LS	36.73 (11.21)	36.57 (10.26)	37.10 (10.60)	36.42 (12.50)	$F(3, 84) = .282, p = .842$	$F(2, 84) = 1.28, p = .284$
Loneliness distress (LDS)	29.88 (13.16)	33.67 (10.60)	36.80 (11.84)	34.20 (14.81)	$F(3, 84) = .97, p = .409$	$F(2, 84) = 2.18, p = .120$
Health symptoms checklist	82.82 (24.52)	86.92 (17.22)	90.76 (22.79)	87.18 (20.00)	$F(3, 84) = .38, p = .766$	$F(2, 84) = 1.75, p = .179$
Subjective Well Being	21.60 (8.42)	22.19 (7.05)	22.90 (8.58)	21.85 (8.26)	$F(3, 83) = .06, p = .981$	$F(2, 83) = .41, p = .663$
Negative affect (PANAS)	18.06 (6.83)	18.07 (7.00)	19.30 (7.39)	20.50 (6.97)	$F(3, 82) = .42, p = .738$	$F(2, 82) = .68, p = .512$
Positive affect (PANAS)	30.40 (6.23)	30.48 (8.70)	26.90 (6.45)	30.75 (6.13)	$F(3, 82) = 1.60, p = .196$	$F(2, 82) = .83, p = .440$

(The first six variables — Busy, Care, Esteem, Image, Share, Tactile — are bracketed as 6-CLS.)

Note. The p values reported are the true values, which have not been corrected

4. Testing whether the pet acquisition group at Time 1 was lonelier than the two control groups

To test whether the pet acquisition group at Time 1 was lonelier than the general population, the pet acquisition group was compared with two control groups who were not thinking of acquiring a pet. Due to the low number of participants who lived alone in the two control groups, it was not possible to explore 'living alone' as a separate factor in either of the following 2 analyses.

a) Pet acquisition group v. Control Group 1

The first comparison was between the pet acquisition group and control group 1, which comprised a sample of university employees who were not currently thinking of acquiring a pet. Due to the small sample size of the control group, multivariate analysis was not appropriate. Therefore, two-way between-subjects ANCOVAs explored each of the 12 dependent variables. Participants' age and gender were entered as covariates. The between-subjects factors were pet acquisition status (seeking to acquire a pet/not seeking to acquire a pet) and pet ownership status (yes/no). The mean scores for the pet acquisition group and control group I for pet owners and non-pet owners for each of the 12 dependent variables are shown in Table 8.8

Table 8.8. *The mean scores for the pet acquisition group and control group 1 by existing pet ownership for each of the dependent variables*

Dependent variable	Pet acquisition group		Control group 1	
	Pet owner	Non-pet owner	Pet owner	Non-pet owner
	(*n* = 92)	(*n* = 59)	(*n* = 9)	(*n* = 13)
Busy	32.07 (7.74)	31.25 (7.08)	37.22 (6.07)	29.77 (6.67)
Care	29.94 (5.78)	29.01 (4.30)	30.88 (5.53)	28.46 (4.59)
Esteem	17.96 (6.86)	18.08 (6,21)	15.77 (4.77)	15.76 (5.24
Image	19.36 (5.61)	18.90 (4.67)	21.88 (6.91)	18.31 (4.34)
Share	14.65 (5.67)	14.51 (5.19)	11.11 (4.40)	15.31 (5.13)
Tactile	19.71 (8.37)	19.13 (7.71)	17.78 (6.70)	21.15 (6.03)
UCLA-LS	36.68 (10.82)	37.71 (11.15)	31.50 (7.04)	36.53 (8.12)
Loneliness distress	33.84 (12.27)	33.24 (14.46)	32.22 (7.46)	40.38 (10.82)
Health symptoms	87.15 (20.08)	86.09 (23.27)	91.92 (10.46)	86.00 (15.40)
Subjective well-being	22.17 (7.78)	22.73 (6.31)	27.66 (3.20)	22.54 (4.94)
Negative affect	18.88 (7.01)	17.71 (6.22)	21.67 (7.77)	16.46 (3.36)
Positive affect	29.73 (7.36)	29.71 (7.49)	33.50 (5.90)	30.00 (6.83)

(The Busy through Tactile variables are bracketed together as 6-CLS)

Due to the increased chance of a *type-1* error occurring, the Bonferroni correction principle was applied, which reduced the criterion for significance to $p = .004$, from the more usual level of $p = .05$. Table 8.9 shows the univariate test statistics for each of the 12 dependent variables.

The univariate tests provided no evidence that people seeking to acquire a pet were lonelier than people not seeking to acquire a pet, irrespective of whether they already owned a pet. There was also no evidence that pet owners were less lonely than non-pet owners. There was no evidence of violation of the assumption of homogeneity of variance.

Table 8.9. *Univariate test statistics for differences by pet acquisition (yes/no) and existing pet ownership (yes/no) between the pet acquisition group and control group 1*

Dependent variable		Sample (Pet acquisition group v. control group 1)	Pet ownership (yes/no)	Sample x Pet Ownership Interaction	Grouped effect of covariates.
Busy		$F(1, 164) = 2.02, p = .157$	$F(1, 164) = 5.99, p = .015$	$F(1, 164) = 3.72, p = .055$	$F(2, 164) = 2.69, p = .071$
Care		$F(1, 164) = .04, p = .839$	$F(1, 164) = 1.68, p = .196$	$F(1, 164) = .42, p = .676$	$F(2, 164) = 2.03, p = .134$
Esteem	6-CLS	$F(1, 164) = 2.31, p = .130$	$F(1, 164) <.01, p = .951$	$F(1, 164) = .01, p = .913$	$F(2, 164) = .53, p = .589$
Image		$F(1, 164) = .21, p = .644$	$F(1, 164) = 3.12, p = .644$	$F(1, 164) = 1.66, p = .199$	$F(2, 164) = 4.32, p = .015$
Share		$F(1, 164) = 1.82, p = .179$	$F(1, 164) = 2.62, p = .107$	$F(1, 164) = 2.92, p = .089$	$F(2, 164) = 4.67, p = .011$
Tactile		$F(1, 164) = 2.30, p = .131$	$F(1, 164) = 4.20, p = .042$	$F(1, 164) = 4.48, p = .030$	$F(2, 164) = 4.91, p = .009$
UCLA-LS		$F(1, 164) = 1.10, p = .295$	$F(1, 164) = 1.79, p = .182$	$F(1, 164) = 1.74, p = .494$	$F(2, 164) = .84, p = .435$
Loneliness distress		$F(1, 163) = 1.37, p = .244$	$F(1, 163) = 2.26, p = .134$	$F(1, 163) = 1.98, p = .162$	$F(2, 163) = 3.60, p = .030$
Subjective well being		$F(1, 163) = 1.70, p = .194$	$F(1, 163) = 2.16, p = .143$	$F(1, 163) = 3.03, p = .083$	$F(2, 163) = 3.37, p = .037$
Negative affect		$F(1, 161) = .18, p = .673$	$F(1, 161) = 3.92, p = .049$	$F(1, 161) = 1.48, p = .226$	$F(2, 161) = 2.49, p = .086$
Positive affect		$F(1, 164) = .87, p = .351$	$F(1, 164) = 1.15, p = .285$	$F(1, 164) = .99, p = .321$	$F(2, 164) = 1.36, p = .261$
Health symptoms		$F(1, 164) = .42, p = .516$	$F(1, 164) = .27, p = .604$	$F(1, 164) = .41, p = .521$	$F(2, 164) = 3.88, p = .023$

Note. The *p* values reported are the true values, which have not been corrected

Pet acquisition group v. Control Group 2

As control group 1 consisted of only 22 participants, a further comparison was made between the pet acquisition group ($n = 151$) and control group 2 ($n = 200$). However, as the control group 2 data comprised only the UCLA-LS, the 6-CLS and the Health Symptom Checklist, comparisons could not be made for the dependent variables Loneliness Distress, Negative and Positive Affect or Subjective Well-Being. The mean scores for the pet acquisition group and control group 2 by existing pet ownership for each of the 8 dependent variables are shown in Table 8.10.

Table 8.10 *Mean scores for the pet acquisition group and control group 2 by existing pet ownership (yes/no) for each of the 8 dependent variables*

Dependent variable		Pet acquisition group		Control group 2	
		(SD in parentheses)			
		Pet owner	Non-pet owner	Pet owner	Non-pet owner
		($n = 92$)	($n = 59$)	($n = 134$)	($n = 66$)
Busy		32.07 (7.74)	31.25 (7.08)	32.89 (6.76)	29.64 (6.87)
Care		29.94 (5.78)	29.01 (4.30)	30.03 (4.47	30.54 (4.28
Esteem	6-CLS	17.96 (6.86)	18.08 (6,21)	15.52 (5.16	17.30 (5.08)
Image		19.36 (5.61)	18.90 (4.67)	17.67 (5.72	19.81 (5.37)
Share		14.65 (5.67)	14.51 (5.19)	13.06 (4.25)	16.11 (5.76)
Tactile		19.71 (8.37)	19.13 (7.71)	21.44 (7.17)	21.88 (7.26)
UCLA-LS		36.68 (10.82)	37.71 (11.15)	33.37 (7.07)	36.44 (8.25)
Health symptoms		87.15 (20.08)	86.09 (23.27)	83.58 (17.75)	89.19 (20.39)

A two-way between-subjects MANCOVA was used to explore whether the pet acquisition group were lonelier than control group 2 participants on the set of 8 dependent variables, and also whether this depended on whether or not participants

already owned a pet. Controlling for participants' age and gender, the multivariate test using the UCLA-LS, 6-CLS and health symptoms as dependent variables provided evidence of a group effect associated with whether the participant was seeking to acquire a pet, Wilks' $\Lambda = .916$; $F(8, 318) = 4.26, p < .001$. Univariate tests showed that people seeking to acquire a pet reported a lower score on the Tactile scale, $F(1, 325) = 5.55, p = .019$; a lower score on the Care scale, $F(1, 325) = 5.61, p = .018$; a higher level of loneliness as scored on the UCLA-LS $F(1, 325) = 4.56, p = .033$; and a higher score on the Esteem scale, $F(1, 325) = 10.66, p = .001$ than those not seeking to acquire a pet. The multivariate test provided evidence of a group effect associated with whether an existing pet was owned, Wilks' $\Lambda = .907$; $F(8, 318) = 2.07, p = .038$. Univariate tests showed that people who already owned a pet reported: a higher need to keep busy, $F(1, 325) = 8.40, p = .004$; a lower need to share, $F(1, 325) = 8.32, p = .004$; and a lower level of loneliness as scored on the UCLA-LS, $F(1, 325) = 4.51, p = .035$. The multivariate test provided no evidence of an interaction between the two factors, Wilks' $\Lambda = .966$; $F(8, 318) = 1.60, p = .133$. There was strong evidence of an effect of the grouped covariates, Wilks' $\Lambda = .823$; $F(16, 636) = 4.66, p < .001$. There was strong evidence of a violation of the multivariate assumption of homogeneity of covariance, Box's $\chi^2(84, n = 331) = 141.86, p < .001$. Therefore, as recommended by Tabachnick and Fidell (2001), Pillai's criterion was examined instead of Wilk's Λ, which did not alter the overall interpretation. Twenty participants were excluded from this analysis due to missing data on one or more of the dependent variables or one or more of the covariates.

Although there was evidence of differences between people seeking to acquire a pet and people not seeking to acquire a pet (in control group 2), there was no clear evidence that one group was lonelier than the other. That is, although the pet acquisition group were lonelier on two scales they were also less lonely on two

scales. Similarly, although pet owners scored higher on the 'Busy' scales, they scored lower on the 'Share' scale and the UCLA-LS.

5. The expectations of pet acquisition

a) The main answers participants gave as their 'top three' reasons for pet acquisition are reported in Table 8.11. The majority of participants' answers were allocated to one of six categories: companionship; to help animals; love of animals; exercise; entertainment; and security. A large number of other reasons were given for pet acquisition (e.g., girlfriend wanted it, for father, for daughter) and these were grouped together as 'other reasons'. The primary reason given for pet acquisition was companionship.

Table 8.11. *Participants' top-three reasons for pet acquisition.*

Participants' reasons gave for pet acquisition	Percentage of participants giving each reasons for pet acquisition as their 1st, 2nd, or 3rd reason for pet acquisition (Actual number of participants in parentheses)			
	1st Reason	2nd Reason	3rd Reason	Total
Companionship	43% (65)	24.5% (37)	9.9% (15)	70.2% (106)
To help animals	9.3% (14)	11.9% (18)	13.2% (20)	34.4% (52)
Love of animals	11.9% (18)	11.9% (18)	8.6% (13)	32.4% (49)
Exercise	1.3% (2)	17.9% (27)	6% (9)	25.2% (38)
Entertainment	2.6% (4)	5.3% (8)	5.3% (8)	13.2% (20)
Security	1.3% (2)	4% (6)	6.6% (10)	11.9% (18)
Other reasons	27.2% (41)	20.5% (31)	35.8% (54)	83.5% (126)

b) The degree to which participants agreed with each of the reasons for pet acquisition reported by Endenburg et al. (1994) are reported in Table 8.12.

Participants rated each reason using a 4-point Likert scale (*not at all true – a little true – quite true – completely true*). The primary reasons for pet acquisition were for 'companionship' and 'wanting to take care of a pet'. 'Having always owned pets' and 'the pleasure of stroking a pet' were also reported as being important reasons for pet acquisition. In contrast, very few people gave the reasons 'to help me meet more people', ' for times when I have nothing to do, or 'for personal health reasons'.

Table 8.12. *Participants' agreement with Endenburg, Hart and Bouw's (1994) reasons for pet acquisition*

Reason for pet acquisition	Percentage and number (in parentheses) of participants giving each answer							
	Not at all true		A little true		Quite true		Completely true	
To provide me with extra companionship	2.6%	(4)	11.3%	(17)	31.8%	(48)	53.6%	(81)
Primarily for the children	58.3%	(88)	14.6%	(22)	11.9%	(18)	7.3%	(11)
Because I gain pleasure from stroking it	3.3%	(5)	15.2%	(23)	37.1%	(56)	43%	(65)
I want to take care of a pet	1.3%	(2)	11.3%	(17)	28.5%	(43)	58.3%	(88)
I've always owned pets	22.5%	(34)	12.6%	(19)	18.5%	(28)	43.7%	(66)
A pet would be useful (for security, etc…)	39.1%	(59)	29.8%	(45)	14.6%	(22)	15.2%	(23)
As company for another pet	58.3%	(88)	11.3%	(17)	10.6%	(16)	17.9%	(27)
To stop me feeling lonely	40.4%	(61)	32.5%	(49)	15.2%	(23)	10.6%	(16)
Personal health reasons	70.9%	(107)	11.9%	(18)	9.9%	(15)	6.6%	(10)
Feeling sorry for animals in the shelter.	19.9%	(30)	29.8%	(45)	27.8%	(42)	19.9%	(30)
They simply look pleasing to the eye	59.6%	(90)	20.5%	(31)	14.6%	(22)	3.3%	(5)
To be something that is especially mine	50.3%	(76)	28.5%	(43)	11.3%	(17)	9.3%	(14)
I am interested in training animals	50.3%	(76)	27.8%	(42)	13.9%	(21)	5.3%	(8)
I feel a special bond with animals	17.9%	(27)	17.2%	(26)	29.8%	(45)	33.1%	(50)
To help me meet more people	76.8%	(116)	13.9%	(21)	4.6%	(7)	3.3%	(5)
For times when I have nothing to do	74.2%	(112)	15.2%	(23)	6.0%	(9)	4.0%	(6)

(Note: Percentages may not equal 100% as some participants failed to answer all questions)

6. Were participants who stated companionship or loneliness as one of their reasons for pet acquisition lonelier than people not stating these reasons?

a) Of the 151 participants in the pet acquisition group at Time 1, 106 (70.2%) stated companionship as one of their 'top-three' reasons for acquiring a pet. The 106 participants were compared with the 45 who did not give companionship as one of their top-three reasons for pet acquisition to explore whether those seeking pets for companionship differed from those who were not seeking companionship on any of the dependent variables. The mean scores of participants who were seeking a pet for companionship (yes/no) as one of their top-three reasons for pet acquisition are reported in Table 8.13 for each of the 12 dependent variables.

Table 8.13. *Mean scores for seeking to acquire a pet for companionship (yes/no) as one of their top three reasons for pet acquisition for each of the dependent variables*

Dependent variable		Seeking a pet for companionship as one of their top-three reasons (*SD* in parentheses)	
		No (*n* = 45)	Yes (*n* = 106)
Busy	6-CLS	32.39 (8.72)	31.52 (6.91)
Care		28.73 (5.43)	29.94 (5.17)
Esteem		17.42 (6.46)	18.26 (6.66)
Image		18.78 (4.50)	19.36 (5.55)
Share		14.35 (5.77)	14.69 (5.36)
Tactile		17.14 (8.03)	20.48 (7.67)
UCLA-LS		35.59 (10.13)	37.71 (11.23)
Loneliness distress		31.04 (12.43)	34.71 (13.31)
Subjective well-being		23.31 (7.72)	22.01 (7.00)
Negative affect		17.12 (6.14)	18.95 (7.40)
Positive affect		31.32 (6.71)	29.07 (7.58)
Health symptoms		82.97 (19.18)	88.38 (22.05)

Controlling for age and gender, one-way between-subjects MANCOVA using the set of 12 dependent variables provided no evidence of a difference between participants who stated companionship as one of their top-three reasons for pet acquisition and those who did not, Wilks' $\Lambda = .925$; $F(12,128) = .862$, $p = .587$. There was strong evidence of an effect of the grouped covariates, Wilks' $\Lambda = .587$; $F(24, 256) = 3.25$, $p < .001$. There was no evidence of a violation of univariate homogeneity of variance, or multivariate homogeneity of covariance. Eight participants' data were excluded from this analysis, as their data were missing for one or more of the covariates, or one or more of the dependent variables.

b) A similar analysis was carried out based on participants' answers to Endenburg et al.'s Item 1, 'to provide me with extra companionship'. The degree to which participants agreed with this statement was measured on a 4-point Likert scale (*not at all true – a little true – quite true – completely true*). As only 4 participants had stated this reason was not at all true, participants who reported 'not at all true' or a 'little true' were categorised as not seeking a pet for companionship. In contrast, participants who answered 'quite true' or 'completely true' were categorised as having sought a pet for companionship. Using this criterion, there were 21 participants who did not acquire a pet for companionship, 129 who did and one who had failed to provide this information. The mean scores of participants who were and were not seeking a pet for companionship (yes/no) are reported in Table 8.14 for each of the dependent variables.

Table 8.14. *Mean scores for whether participants were seeking to acquire a pet for companionship (Endenburg's Item 1) for the 12 dependent variables*

Dependent variable		Seeking a pet for companionship as one of their top-three reasons (*SD* in parentheses)			
		No (*n* = 21)		Yes (*n* = 129)	
Busy	6-CLS	31.42	(6.49)	31.77	(7.66)
Care		28.42	(5.57)	29.84	(5.12)
Esteem		20.29	(6.68)	17.67	(6.54)
Image		19.93	(5.28)	19.11	(5.24)
Share		16.57	(6.64)	14.28	(5.24)
Tactile		17.00	(6.66)	19.80	(8.01)
UCLA-LS		38.63	(10.91)	36.83	(10.99)
Loneliness distress		33.00	(11.41)	33.71	(13.41)
Subjective well-being		22.90	(6.67)	22.34	(7.35)
Negative affect		16.23	(6.23)	18.72	(7.17)
Positive affect		29.16	(4.93)	29.83	(7.76)
Health symptoms		82.34	(21.95)	87.44	(21.29)

Controlling for age and gender, one-way between-subjects MANCOVA on the 12 dependent variables provided no evidence of differences associated with participants' responses to the question as to whether pet acquisition was 'to provide me with extra companionship', Wilks' Λ = .923; $F(12,128)$ = .883, p = .566. There was strong evidence of an effect of the grouped covariates, Wilks' Λ = .597; $F(24, 256)$ = 3.12, p <.001. There was no evidence of a violation of univariate homogeneity of variance, or multivariate homogeneity of covariance. Eight participants' data were excluded from this analysis, as their data were missing for one or more of the covariates, or one or more of the dependent variables.

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c) A similar analysis was performed based on participants' responses to Endenburg et al.'s item 8 at Time 1, 'to stop me feeling lonely'. Participants responding 'not at all true' or a little true' were categorised as 'disagree', and participants who responded 'quite true' or 'completely true' were classified as 'agree'. Sixty-one participants reported that they sought to acquire a pet to reduce loneliness, and 88 disagreed with this reason. The mean scores for whether participants were seeking a pet to help with loneliness are reported in Table 8.15 for each of the dependent variables

Table 8.15. *Mean scores for whether participants were seeking a pet to help with loneliness for each of the dependent variables*

Dependent variable		Seeking a pet to help with loneliness (Endenburg's Item 8) (SD in parentheses)	
		No (n = 88)	Yes (n = 61)
Busy		32.32 (6.84)	31.21 (7.91)
Care		28.03 (5.83)	30.65 (4.37)
Esteem	6-CLS	18.18 (6.32)	18.03 (6.81)
Image		18.70 (4.69)	19.59 (5.60)
Share		14.27 (5.56)	14.90 (5.50)
Tactile		16.54 (6.45)	21.52 (8.11)
UCLA-LS		34.35 (9.91)	39.10 (11.28)
Loneliness distress		29.50 (10.83)	36.67 (13.74)
Subjective well-being		23.75 (6.10)	21.43 (7.83)
Negative affect		15.78 (5.50)	20.07 (7.53)
Positive affect		30.51 (7.00)	29.16 (7.67)
Health symptoms		82.41 (18.03)	89.98 (23.01)

Controlling for age and gender, one-way between-subjects MANCOVA provided strong evidence of a difference associated with participants' responses to the question as to whether pet acquisition was 'to stop me feeling lonely' (agree/disagree), Wilks' Λ = .773; $F(12,127)$ = 3.10, p <.001. The univariate statistics are shown in Table 8.16. There was strong evidence of an effect of the grouped covariates, Wilks' Λ = .584; $F(24, 254)$ = 3.26, p <.001. There was no evidence of a violation of univariate homogeneity of variance, however, there was evidence of a violation of multivariate homogeneity of covariance, Box's $\chi^2(78, n=151)$ = 117.1, p = .003. However, as this was less than Tabachnick and Fidell's (2001) recommended criterion for α (p<.001), this was assumed not to have seriously affected the interpretation of the Wilk's test. Nine participants' data were excluded from this analysis, as their data were missing for one or more of the covariates, or one or more of the dependent variables.

Table 8.16. *Univariate test statistics for whether pet acquisition was ' to stop me feeling lonely (yes/no)' for the 12 dependent variables*

Dependent variable	Univariate statistic
Busy	$F(1, 138)$ = 1.10, p = .296
Care	$F(1, 138)$ = 8.62, p = .004
Esteem	$F(1, 138)$ = .02, p = .897
Image	$F(1, 138)$ = 1.01, p = .320
Share	$F(1, 138)$ = .49, p = .484
Tactile	$F(1, 138)$ = 13.30, p <.001
UCLA-LS	$F(1, 138)$ = 4.93, p = .028
Loneliness distress	$F(1, 138)$ = 7.82, p = .006
SWB	$F(1, 138)$ = 3.81, p = .053
Negative affect	$F(1, 138)$ = 11.48, p = .001
Positive affect	$F(1, 138)$ = .87, p = .353
Health symptoms	$F(1, 138)$ = 2.91, p = .090

The univariate statistics provided strong evidence that the participants who acquired pets because they were lonely, were indeed lonelier than the participants who did not state this as a reason, but only on some specific dimensions.

7. Exploring whether participants' expectations of pet acquisition were fulfilled

Participants' expectations of the benefits of pet ownership at Time 1 were compared with the degree to which they reported the expectations as being fulfilled at Time 2. For example, participants' agreement (on the 4-point Likert scale: *not at all true – a little true – quite true – completely true*) with the statement that a pet was 'to provide me with extra companionship' at Time 1, was compared with participants answer' (on the same 4-point Likert scale) to the question: 'Has your pet provided you with companionship?' at Time 2. This was done for each item where it made conceptual sense to do so, which were annotated * in Table 8.1. Pearson's *r* was used to explore the correlations between expectation and outcome of pet acquisition, and are reported in Table 8.17.

Table 8.17. *Correlations of expectation with outcome of pet acquisition*

Expectation of pet acquisition	Outcome of pet acquisition	Pearson's r	n
To be useful (e.g., for security)	Has been useful (e.g., for security)	.59**	35
As company for another pet	Has been good company for other pet	.53**	34
For the pleasure of stroking	Has been pleasurable to stroke	.41*	35
To stop me feeling lonely	Stopped me feeling lonely	.36*	35
For personal health reasons	Has helped personal health	.33*	35
Something to take care of	Has provided something to care for	.29	35
A pet would be pleasing to the eye	Visually pleasing	.27	35
For when I've had nothing to do	Helpful when I've had nothing to do	.26	35
To help me meet more people	Has helped me meet more people	.17	35
To provide companionship	Companionship provided	.06	35

** = sig. at $p<.001$, * = sig. at p = .05

The highest concordance between expectation and fulfilment appears to have been if the pet was acquired for security or as company for another pet. However, participants appeared to believe that if they had acquired the pet to stop them feeling lonely, then it had been successful to some extent. Perhaps surprisingly, there was no indication whatsoever that if a pet had been acquired for companionship the expectation had been fulfilled.

8. Testing two assumptions of the longitudinal analysis

To ensure the longitudinal analysis was a valid test of the belief that pets can help to alleviate loneliness, two potential sources of confounding need to be eliminated: a) whether participants who completed Time 2 questionnaires were different from participants who only completed Time 1 questionnaires; and b) whether participants who had or had not acquired a pet by Time 2 were different at Time 1.

a) Comparing the Time 1 scores of participants who replied at Time 2 with participants who did not reply at Time 2.

To explore whether there may have been some sort of self-selection bias at Time 1, participants who replied to the Time 2 questionnaire were compared with participants who did not reply. The mean scores at Time 1 for participants who did or did not reply at Time 2 are reported in Table 8.18. Controlling for age and gender, one-way between-subjects MANCOVA using the 12 dependent variables provided no evidence of a group effect associated with whether the participants replied to the follow-up questionnaire, Wilks' $\Lambda = .906$; $F(12,128) = 1.28$, $p = .233$. There was strong evidence of an effect of the grouped covariates, Wilks' $\Lambda = .588$; $F(24, 256) = 3.23$, $p < .001$. There was no evidence of a violation of univariate homogeneity of variance, or multivariate homogeneity of covariance. Due to missing data for either the dependent variable or covariates, 8 participants' data were excluded from this analysis.

Table 8.18. *Mean scores at Time 1 for participants who did or did not reply at Time 2 for each of the 12 dependent variables.*

Dependent variable	Mean scores at Time 1 for whether participants replied at Time 2 (*SD* in parentheses)	
	No	Yes
Busy	31.47 (7.60)	32.18 (7.32)
Care	28.95 (5.42)	30.56 (4.88)
Esteem 6-CLS	17.78 (6.76)	18.37 (6.37)
Image	19.34 (5.54)	18.93 (4.80)
Share	14.90 (5.47)	14.11 (5.48)
Tactile	18.69 (7.78)	20.70 (8.01)
UCLA-LS	37.20 (11.09)	36.91 (10.75)
Loneliness distress	33.46 (13.23)	33.85 (13.06)
Subjective well-being	23.04 (7.01)	21.39 (7.47)
Negative affect	18.61 (7.21)	18.12 (6.94)
Positive affect	30.15 (7.67)	29.04 (7.11)
Health symptoms	86.40 (21.40)	87.27 (21.34)

b) Comparing participants who acquired a pet by Time 2 with participants who had not acquired a pet by Time 2

The Time 1 scores of participants who acquired a pet by Time 2 were compared with those who did not acquire a pet by Time 2 to ensure there was no self-selection bias occurring. The mean scores at Time 1 for participants who did and did not acquire a pet by Time 2 are reported in Table 8.19.

Table 8.19. *Mean scores at Time 1 for participants who did and did not acquire a new pet at Time 2 for each of the 12 dependent variables.*

Dependent variable	Mean scores at Time 1 for whether participants had acquired a new pet at Time 2 (SD in parentheses)	
	No	Yes
Busy	31.66 (7.72)	32.05 (6.68)
Care	29.47 (5.25)	29.97 (5.33)
Esteem	17.44 (6.51)	19.61 (6.60)
Image	19.31 (5.32)	19.37 (4.94)
Share	14.42 (5.31)	15.17 (6.03)
Tactile	19.24 (8.07)	20,27 (7.37)
UCLA-LS	36.17 (13.02)	37.63 (11.49)
Loneliness distress	33.17 (13.02)	35.06 (13.52)
Subjective well-being	22.79 (7.55)	21.09 (7.55)
Negative affect	18.40 (7.01)	18.52 (7.49)
Positive affect	30.44 (7.39)	27.23 (6.95)
Health symptoms	85.89 (21.11)	89.53 (21.67)

(The variables Busy, Care, Esteem, Image, Share, Tactile are bracketed together as 6-CLS.)

Due to the small sample size, a multivariate test was not appropriate. Therefore, twelve one-way between-subjects ANCOVAs were conducted, each using one of the 12 dependent variables. Participants' age and gender were entered as covariates in each of the analyses. Due to the increased chance of a *type-1* error occurring, the Bonferroni correction principle was applied which reduced the criterion for significance in each of the tests to $p = .004$, from the more usual level of $p = .05$. Table 8.20 shows the univariate test statistics and number of participants in each comparison.

Table 8.20. *Univariate test results comparing the Time 1 scores of participants who acquired a pet by Time 2 with participants who did not acquire a new pet by Time 2*

Dependent variable	Main effect of pet acquisition	Grouped effect of covariates	N
Busy	$F(1, 52) = .19, p = .663$	$F(2, 52) = .64, p = .531$	56
Care	$F(1, 52) = 1.62, p = .208$	$F(2, 52) = .77, p = .468$	56
Esteem	$F(1, 52) = 3.49, p = .067$	$F(2, 52) = 1.22, p = .304$	56
Image	$F(1, 52) = .02, p = .898$	$F(2, 52) = 1.57, p = .217$	56
Share	$F(1, 52) = .978, p = .327$	$F(2, 52) = 3.45, p = .039$	56
Tactile	$F(1, 52) = .02, p = .895$	$F(2, 52) = 1.30, p = .282$	56
The UCLA-LS	$F(1, 52) = .19, p = .662$	$F(2, 52) = .30, p = .743$	56
Loneliness distress	$F(1, 52) = .30, p = .586$	$F(2, 52) = .60, p = .553$	56
Subjective Well-Being	$F(1, 52) = .01, p = .944$	$F(2, 52) = .36, p = .697$	56
Negative affect (PANAS)	$F(1, 50) = .83, p = .368$	$F(2, 50) = .97, p = .385$	54
Positive affect (PANAS)	$F(1, 50) = 3.36, p = .073$	$F(2, 50) = .67, p = .517$	54
Health symptoms	$F(1, 52) = 1.09, p = .301$	$F(2, 52) = 3.28, p = .046$	56

The variables Busy, Care, Esteem, Image, Share, and Tactile are grouped as 6-CLS.

None of the univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$, which implies that there were no systematic differences at Time 1 between the participants who had acquired a pet by Time 2 and those who had not. There were no violations of the assumption of homogeneity of variance in any of the analyses.

9. The longitudinal analysis

Of the 151 participants seeking to acquire a new pet who replied at Time 1, the 59 who replied to the follow up questionnaire at Time 2 were entered into the longitudinal analysis. By Time 2, 35 participants had acquired a new pet and 24 had not yet acquired a new pet.

To explore whether pet acquisition helped to alleviate loneliness and whether this depended on whether or not participants already owned a pet, the difference between Time 1 and Time 2 scores were calculated for each of the dependent variables. The dependent variables were now the difference scores, rather than a within-subjects factor of 'Time' (Time 1/Time 2), and were explored using a series of two-way ANCOVAs. The between-subjects factors were: 1) "pet acquisition" - whether the participant had acquired a pet by Time-2 (yes/no); and 2) "ownership" - whether the participant already owned a pet (yes/no). Due to an increased chance of a *type-1* error when making multiple comparisons the Bonferroni correction principle was applied, making the level of significance $p = .004$, instead of the more usual $p = .05$.

As the dependent variables were the Time 1 − Time 2 difference scores, the main effect of Time was tested by comparing the mean difference scores against zero (analogous to a one-sample *t* test on difference scores). The main effect of pet acquisition on the difference scores is interpretable as the Time difference x pet acquisition interaction; that is, whether the difference across Time differed according to whether or not the participant had acquired a new pet. The main effect of ownership on the difference scores is interpretable as the Time difference x ownership interaction; that is, whether the difference across Time depended on whether or not participants already owned a pet when they were recruited to the

study. Finally, the pet acquisition x ownership test on the difference scores is interpretable as the pet acquisition x ownership x Time difference interaction. The mean difference scores for each dependent variable for participants who did and did not acquire a pet by Time Time 2 are shown at Times 1 & 2 in Table 8.21. The 12 univariate test statistics are shown in table 8.22.

None of the tests were significant at $p = .004$, and none would have been significant at $p = .05$. This implies that pet acquisition, irrespective of whether or not participants already owned a pet, does not help to reduce loneliness, or any of the other dependent variables used to measure aspects of well-being.

Similar to the rationale used in Study I for grouping the individual UCLA-LS items, it was possible that if the 12 dependent variables in this study could be grouped into a smaller number of loneliness components, then differences may be apparent on one or more loneliness components.

To group the 12 dependent variables together a Principle Components Analysis (PCA) was carried out using the 12 sets of difference scores as data. The PCA revealed five eigenvalues with a score greater than one. The eigenvalues and the variance that they account for is shown in Table 8.23. A scree-plot of the eigenvalues is shown in Figure 8.1.

Table 8.21. Mean difference scores for pet acquisition (yes/no) by existing pet ownership (yes/no)

Dependent variable	Did not acquire a new pet		Did acquire a new pet	
	No pet already owned ($n = 11$)	Pet already owned ($n = 13$)	No pet already owned ($n = 17$)	Pet already owned ($n = 18$)
	(SD in parentheses)			
Busy	.636 (3.80)	.750 (6.41)	.823 (6.26)	.666 (7.26)
Care	1.727 (4.24)	2.076 (4.46)	-.706 (4.93)	-.778 (4.69)
Esteem	1.454 (4.78)	.000 (3.58)	.647 (3.18)	.222 (7.22)
Image	.818 (4.02)	-1.69 (5.37)	.891 (5.81)	.278 (4.14)
Share	.363 (3.00)	.077 (4.90)	-.706 (4.76)	.889 (3.66)
Tactile	1.077 (4.01)	-.109 (3.16)	-1.823 (5.34)	-.611 (5.29)
UCLA-LS	1.971 (6.54)	-1.931 (6.41)	-2.632 (5.33)	-.994 (5.03)
Loneliness distress (LDS)	-3.454 (7.94)	-2.538 (5.69)	-1.764 (9.22)	-4.143 (7.61)
H/Symptom checklist	6.421 (15.51)	-9.217 (14.75)	-1.501 (12.78)	-1.178 (13.27)
Subjective Well Being	1.021 (2.68)	0.033 (5.95)	.471 (5.06)	.944 (3.20)
Negative affect (PANAS)	-.100 (8.56)	-3.769 (10.30)	-.916 (7.80)	-.921 (5.20)
Positive affect (PANAS)	-4.100 (8.57)	.188 (5.80)	-4.063 (9.05)	-3.836 (6.22)

Busy, Care, Esteem, Image, Share, Tactile — 6-CLS

Table 8.22. *Tests on the 12 sets of difference scores by pet acquisition (yes/no) and existing pet ownership (yes/no)*

Difference component	Test that difference scores are not zero	Test for effect of whether it is the first pet (yes/no) on difference scores	Test for effect of pet acquisition (yes/no) on difference scores	Test for interaction between first pet x pet acquisition on difference scores	Test for combined covariates
Busy (6-CLS)	$F(1, 53) = 3.781, p = .056$	$F(1, 53) = .022, p = .883$	$F(1, 53) = .205, p = .653$	$F(1, 53) = .033, p = .856$	$F(2, 53) = 1.112, p = .293$
Care (6-CLS)	$F(1, 53) = .475, p = .366$	$F(1, 53) = .003, p = .959$	$F(1, 53) = 3.771, p = .057$	$F(1, 53) = .029, p = .866$	$F(2, 53) = 1.112, p = .293$
Esteem (6-CLS)	$F(1, 53) = .034, p = .855$	$F(1, 53) = .414, p = .523$	$F(1, 53) = .073, p = .788$	$F(1, 53) = .115, p = .736$	$F(2, 53) = 1.112, p = .293$
Image (6-CLS)	$F(1, 53) = .171, p = .681$	$F(1, 53) = 207, p = .277$	$F(1, 53) = .332, p = .567$	$F(1, 53) = .320, p = .574$	$F(2, 53) = 1.112, p = .293$
Share (6-CLS)	$F(1, 53) = 1.112, p = .293$	$F(1, 53) = .528, p = .293$	$F(1, 53) = 206, p = .652$	$F(1, 53) = .762, p = .387$	$F(2, 53) = 1.112, p = .293$
Tactile (6-CLS)	$F(1, 53) = .616, p = .462$	$F(1, 53) = .006, p = .941$	$F(1, 53) = 1.229, p = .273$	$F(1, 53) = .849, p = .361$	$F(2, 53) = 1.112, p = .293$
UCLA-LS	$F(1, 53) = .009, p = .923$	$F(1, 53) = .773, p = .383$	$F(1, 53) = .929, p = .340$	$F(1, 53) = 3.752, p = .058$	$F(2, 53) = 1.112, p = .293$
Loneliness distress (LDS)	$F(1, 53) = 1.171, p = .283$	$F(1, 53) = .232, p = .632$	$F(1, 53) = .045, p = .832$	$F(1, 53) = .412, p = .524$	$F(2, 53) = 1.112, p = .293$
H/Symptom checklist	$F(1, 53) = .204, p = .654$	$F(1, 53) = 3.799, p = .058$	$F(1, 53) = .074, p = .787$	$F(1, 53) = 3.661, p = .061$	$F(2, 53) = 1.112, p = .293$
Subjective Well Being	$F(1, 53) = 1.600, p = .211$	$F(1, 53) = .089, p = .766$	$F(1, 53) = .032, p = .858$	$F(1, 53) = .808, p = .373$	$F(2, 53) = 1.112, p = .293$
Negative affect (PANAS)	$F(1, 53) = 1.069, p = .306$	$F(1, 53) = .982, p = .327$	$F(1, 53) = .177, p = .676$	$F(1, 53) = 1.094, p = .301$	$F(2, 53) = 1.112, p = .293$
Positive affect (PANAS)	$F(1, 53) = .001, p = .978$	$F(1, 53) = 1.403, p = .242$	$F(1, 53) = .793, p = .377$	$F(1, 53) = 1.277, p = .264$	$F(2, 53) = 1.112, p = .293$

Note. The *p* values reported are the true values, which have not been corrected

Table 8.23. *Initial solution eigenvalues for the PCA of difference scores for the twelve dependent variables*

Factor	Eigenvalue	% of Variance	Cum %
1	2.56	21.4	21.4
2	1.78	14.8	36.2
3	1.35	11.2	47.4
4	1.15	9.6	57.0
5	1.003	8.4	65.5
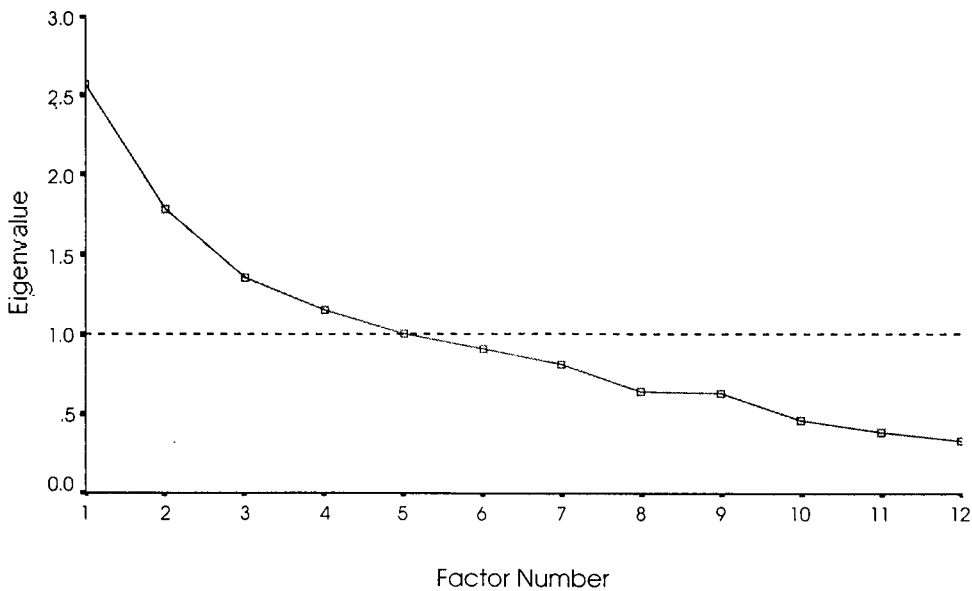
Figure 8.1. **Factor scree-plot**

Because the five-factor solution contained two single-item factors and one eigenvalue close to one, the PCA was re-run specifying a four-factor solution. A

varimax rotation was used to facilitate interpretation of the factors. The loadings of the dependent variables onto the four factors are shown in Table 8.24. The dependent variables are grouped according to the factor they load upon, as shown in the first column of Table 8.24.

Table 8.24. *The Rotated factor solution*

Loads onto	Dependent variable	Component I	Component II	Component III	Component IV
I	Negative health symptoms	**.72427**	-.16000	.05369	.04325
	UCLA-LS	**.69923**	.17116	.11845	-.07133
	Negative affect	**.71259**	-.19902	-.32690	.15366
	Positive affect	**-.61270**	-.30523	.19604	.20146
II	Share	.01193	**.76325**	-.29070	-.09376
	Busy	-.04404	**-.67117**	.17946	-.01320
	Esteem	-.01126	**.66181**	.25436	.16004
III	Care	-.12925	-.15540	**.74843**	.31212
	Tactile	.12308	-.02503	**.71351**	-.18829
	Subjective Well-Being	-.29884	-.28982	**.44302**	-.29377
IV	Image	.03951	.13027	.03354	**.82215**
	Loneliness distress	.40204	.18792	.19173	**-.43606**

The factor scores were calculated using the regression option available in SPSS factor analysis. The weights used to calculate the factor scores are shown in Table 8.25.

Table 8.25. *The Factor Score Coefficient Matrix*

Dependent variable		Component I	Component II	Component III	Component IV
Busy		.02795	-.36673	.02959	-.00699
Care		.02554	.00859	.46768	.28037
Esteem	6-CLS	-.01022	.41781	.25201	.14166
Image		.06757	.07627	.06684	.70125
Share		-.06396	.40854	-.09648	-.08955
Tactile		.10481	.06791	.46548	-.12959
UCLA-LS		.33144	.07745	.15154	-.01225
Loneliness distress		.17018	.11294	.16643	-.33874
Subjective Well-Being		-.11189	-.09742	.21970	-.25415
Negative affect (PANAS)		.33678	-.19496	-.17643	.16649
Positive affect (PANAS)		-.24948	-.12145	.04754	.13840
Health symptoms		.36334	-.12530	.07378	.08532

Having grouped the difference scores of the twelve dependent variables to form four orthogonal loneliness factors, two-way ANCOVAs were carried out using each of the 4 difference scores loneliness components as dependent variables. Participants' age and gender were entered as covariates. As before, there were two between-subjects factors in each test, each with two levels: 1) "pet acquisition" - whether the participant had acquired a pet by Time-2 (yes/no); and 2) "ownership" - whether the participant already owned a pet (yes/no).

Similar to the analyses using the 12 sets of difference scores, as the dependent variables were the Time 1 – Time 2 difference scores, the main effect of Time was tested by comparing the mean difference scores against zero (analogous to a one-sample t test on difference scores). The main effect of pet acquisition on the difference scores is interpretable as the Time difference x pet acquisition interaction; that is, whether the difference across Time depended on whether or not the participant had acquired a pet. The main effect of ownership on the difference scores is interpretable as the Time difference x ownership interaction; that is, whether the difference across Time depended on whether or not participants already owned a pet when they were recruited to the study. Finally, the pet acquisition x ownership test on the difference scores is interpretable as the pet acquisition x ownership x Time difference interaction. The test statistics are shown in table 8.26. Due to an increased chance of a *type-1* error occurring, the Bonferroni correction principle was applied, making the level of significance $p = .0125$, instead of the more usual $p = .05$.

None of the univariate tests were significant at $p = .0125$, and none would have been significant at $p = .05$. Participants' gender and age were entered as covariates. The assumption of homogeneity of variance was not violated in any of the analyses. Thus, the results of the 4 univariate tests provided no evidence that pet acquisition helped to alleviate loneliness. The test that the difference scores were not zero indicated that there were no changes attributable to the main effect of 'Time' (the difference between Time 1 and Time 2).

Table 8.26. Tests on the four difference components by pet acquisition (yes/no) and existing pet ownership (yes/no)

Difference component	Test that difference scores are not zero	Test for effect of whether it is the first pet (yes/no) on difference scores	Test for effect of pet acquisition (yes/no) on difference scores	Test for interaction between first pet x pet acquisition on difference scores	Test for combined covariates ($df = 2, 49$)
		The degrees of freedom in each of the statistics reported below = 1, 49			
I	$F = .12, p = .729$	$F = 2.91, p = .089$	$F = .03, p = .862$	$F = 3.47, p = .064$	$F = 1.63, p = .207$
II	$F = .888, p = .351$	$F = .40, p = .529$	$F = .77, p = .385$	$F = .08, p = .786$	$F = 2.11, p = .133$
III	$F = .97, p = .330$	$F = .06, p = .809$	$F = 1.88, p = .177$	$F = .13, p = .724$	$F = 1.71, p = .192$
IV	$F = 1.04, p = .312$	$F = .48, p = .493$	$F = .01, p = .933$	$F = .156, p = .694$	$F = 4.41, p = .018$

Note. The p values reported are the true values, which have not been corrected

Ancillary longitudinal analysis 1

Of the 59 participants in the longitudinal analyses, 36 participants reported that pet acquisition was to help alleviate loneliness whilst 23 participants did not report that pet acquisition was to alleviate loneliness. Part 6c of this study, showed that the participants who acquired a pet to alleviate loneliness tended to be lonelier at Time 1. Therefore, an ancillary longitudinal analysis was conducted where only the participants who acquired a pet to alleviate loneliness (they had replied ' true', or 'completely true' to this question) were compared to the people who had not yet acquired a pet. Due to the small sample size, as the previous analyses had showed no evidence of an interaction between existing pet ownership and any of the other variables, only the effect of pet acquisition on the difference scores were tested.

Twelve one-way between-subjects ANCOVAs were carried out, each controlling for participants' age and gender. The between-subjects factor was "pet acquisition" - whether the participant had acquired a pet by Time-2 (yes/no). The dependent variables in each of the 12 analyses were the difference scores for each of the 12 dependent variables. Due to an increased chance of a *type-1* error occurring the Bonferroni correction principle was applied, making the level of significance $p = .004$, instead of more usual $p = .05$. The results of the univariate tests are reported in Table 8.27. The main effects and interactions are interpreted as in the previous analysis.

Table 8.27. *Tests on the 12 sets of difference scores by pet acquisition (yes/no) for participants who stated pet acquisition was to reduce loneliness*

Difference component	Test that difference scores are not zero	Test for effect of pet acquisition (yes/no) on the difference scores
Busy	$F(1, 34) = .024, p = .877$	$F(1, 34) = .083, p = .774$
Care	$F(1, 34) = 2.880, p = .099$	$F(1, 34) = 1.156, p = .290$
Esteem 6-CLS	$F(1, 34) = .003, p = .955$	$F(1, 34) = .014, p = .906$
Image	$F(1, 34) = .087, p = .770$	$F(1, 34) = 1.556, p = .221$
Share	$F(1, 34) = .037, p = .849$	$F(1, 34) = .109, p = .743$
Tactile	$F(1, 34) = 1.008, p = .322$	$F(1, 34) = .915, p = .345$
UCLA-LS	$F(1, 34) = 2.045, p = .162$	$F(1, 34) = .205, p = .654$
Loneliness distress (LDS)	$F(1, 34) = 5.776, p = .022$	$F(1, 34) = .323, p = .573$
H/Symptom checklist	$F(1, 34) = 4.31, p = .045$	$F(1, 34) = .640, p = .429$
Subjective Well Being	$F(1, 34) = .034, p = .855$	$F(1, 34) = .001, p = .975$
Negative affect (PANAS)	$F(1, 34) = .446, p = .509$	$F(1, 34) = 1.323, p = .258$
Positive affect (PANAS)	$F(1, 34) = 1,939, p = .173$	$F(1, 34) = .596, p = .445$

None of the univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$. The assumption of homogeneity of variance was not violated in any of the analyses. Thus, Table 8.27 shows that amongst participants who acquired pets to stop themselves feeling lonely, there was no evidence that pet acquisition helped to alleviate loneliness.

The same analysis was carried out using the grouped differences scores in each of the loneliness components in turn (I – IV). The results of the 4 univariate tests are reported in Table 8.28. Due to an increased chance of a *type-1* error occurring the Bonferroni correction principle was applied, making the level of significance $p =$

.0125, instead of more usual $p = .05$. The main effect and interaction are interpreted as in the previous analysis.

Table 8.28. *Univariate tests on the 4 sets of grouped difference scores by pet acquisition (yes/no) for participants who stated a pet was acquired to alleviate loneliness*

Difference component	Test that difference scores are not zero	Test for effect of pet acquisition (yes/no) on difference scores
I	$F(1, 34) = .224, p = .639$	$F(1, 34) = .826, p = .370$
II	$F(1, 34) = .006, p = .939$	$F(1, 34) = .077, p = .783$
III	$F(1, 34) = .080, p = .780$	$F(1, 34) = 1.143, p = .243$
IV	$F(1, 34) = .055, p = .661$	$F(1, 34) = .511, p = .479$

None of the univariate tests were significant at $p = .0125$ and none would have been significant at $p = .05$. Thus, using the 4 loneliness components again there was no evidince that pet acquisition helped to alleviate loneliness amongst people who sought to acquire a pet to allevaite loneliness.

10. Exploring whether there were differences between the type of pet acquired (cats v. dogs) on any of the four difference components.

Although pet acquisition *per se* did not appear to alleviate loneliness, it was possible different types of pet acquisition may help to alleviate loneliness. For example, the effect of pet acquisition on the difference scores may be greater for dogs than for cats. Fifteen participants acquired only a cat and 16 acquired only a dog. The mean difference scores for cat acquired or dog acquired are reported in Table 8.28

Table 8.29. *Mean difference scores for cat acquired or dog acquired by Time 2*

Dependent variable	Mean difference scores for type of pet acquired. (SD in parentheses)	
	Cat acquired	Dog acquired
Busy	2.13 (6.37)	.63 (6.65)
Care	-1.33 (3.69)	.56 (5.37)
Esteem 6-CLS	-.40 (6.64)	.06 (3.51)
Image	.67 (2.47)	.12 (6.7)
Share	.266 (3.01)	-.31 (4.4)
Tactile	-1.53 (6.78)	-.63 (3.97)
UCLA-LS	-.84 (4.55)	-3.32 (5.76)
Loneliness distress	-5.93 (5.53)	-1.28 (9.73)
Subjective well-being	.33 (4.22)	1.75 (4.09)
Negative affect	.19 (6.82)	-3.12 (5.51)
Positive affect	-4.51 (7.11)	-3.68 (8.84)
Health symptoms	4.26 (11.54)	-6.42 (11.87)

Controlling for participants' age and gender, one-way ANCOVAs explored each of the dependent variables using 'type of pet acquired' (cat v. dog) as the between-subjects factor. The main effect of pet type on the difference scores was interpretable as the Time difference x pet type interaction. Due to an increased chance of a *type-1* error occurring, the Bonferroni correction principle was applied, making the level of significance $p = .004$, instead of more usual $p = .05$. The univariate test statistics are shown in Table 8.28.

Table 8.30. *Univariate test statistics for type of pet acquired (cat/dog)*

Difference component	Main effect of pet acquired (cat. v. dog)	Grouped effect of covariates.
Busy	$F(1, 26) = .05, p = .820$	$F(2, 26) = .98, p = .389$
Care	$F(1, 26) = 2.15, p = .155$	$F(2, 26) = .46, p = .638$
Esteem — 6-CLS	$F(1, 26) = .10, p = .749$	$F(2, 26) = .11, p = .893$
Image	$F(1, 26) = .30, p = .591$	$F(2, 26) = 2.32, p = 119$
Share	$F(1, 26) = .48, p = .497$	$F(2, 26) = .65, p = .529$
Tactile	$F(1, 26) = .15, p = .703$	$F(2, 26) = .55, p = .583$
UCLA-LS	$F(1, 26) = 3.11, p = .090$	$F(2, 26) = 2.24, p = .127$
Loneliness distress	$F(1, 26) = .34, p = .565$	$F(2, 26) = 4.60, p = .019$
Subjective well-being	$F(1, 26) = .30, p = .588$	$F(2, 26) = 1.00, p = .383$
Negative affect	$F(1, 26) = 2.21, p = .150$	$F(2, 26) = 1.54, p = .233$
Positive affect	$F(1, 26) = 1.05, p = .316$	$F(2, 26) = 1.44, p = .255$
Health symptoms	$F(1, 26) = 5.20, p = .031$	$F(2, 26) = 1.16, p = .329$

None of the main effect univariate tests were significant at $p = .004$, and only health symptoms would have been significant at $p = .05$. There was no evidence that the univariate assumption of homogeneity had been violated on any of the four comparisons. This implies that the type of pet (cat v. dog) that participants acquired did not effect the overall interpretation of this study; that is, there were no differences due to whether a cat or dog had been acquired.

As a further check, controlling for participants' age, one-way ANCOVAs explored each of the 4 loneliness components using 'type of pet acquired' (cat v. dog) as the between-subjects factor. The main effect of pet type on the difference scores was interpretable as the Time difference x pet type interaction. Due to an increased chance of a *type-I* error occurring, the Bonferroni correction principle was applied,

making the level of significance $p = .0125$, instead of more usual $p = .05$. The univariate test statistics and mean scores for type of pet that was acquired (cats/dogs) are shown in Table 8.31.

Table 8.31. *Univariate test statistics for type of pet acquired (cat/dog)*

Difference component	Main effect of pet acquired (cat. v. dog)	Grouped effect of covariates.
I	$F(1, 25) = 3.92, p = .059$	$F(2, 25) = 3.17, p = .059$
II	$F(1, 25) = .40, p = .531$	$F(2, 25) = .54, p = .590$
III	$F(1, 25) = 1.25, p = .273$	$F(2, 25) = .48, p = .623$
IV	$F(1, 25) = .14, p = .708$	$F(2, 25) = 4.14, p = .028$

None of the main effect univariate tests were significant at $p = .0125$, and none would have been significant at $p = .05$. There was no evidence that the univariate assumption of homogeneity had been violated on any of the four comparisons. This implies that the type of pet (cat v. dog) that participants acquired did not effect the overall interpretation of this study.

11. Exploring the relationship between the time since the new pet had been acquired and the difference scores.

It was possible that the length of time since the new pet had been owned may be related to any changes in loneliness that occurred. However, as this information applied only to the 35 participants who had acquired a pet by Time 2, it could not be

entered as a covariate in the previous analyses. Therefore, using Pearson's r, the correlations between how long the participant had owned their new pet and each of the 12 dependent variable differences scores and 4 loneliness component scores were explored. The correlations for each of the dependent variables and loneliness components are shown in Table 8.31.

Table 8.32. *Correlation between time since pet acquisition with each of the difference components*

Dependent variable or loneliness component	Correlation between length of Time of new pet ownership and difference scores (Pearson's r)
Share ⎫	$r = -.106, n = 35, p = .531$
Care ⎪	$r = -.095, n = 35, p = .574$
Busy ⎬ 6-CLS	$r = -.121, n = 35, p = .484$
Tactile ⎪	$r = -.206, n = 35, p = .220$
Esteem ⎪	$r = -.001, n = 35, p = .996$
Image ⎭	$r = .208, n = 35, p = .217$
UCLA-LS	$r = -.197, n = 35, p = .242$
Loneliness distress	$r = .105, n = 35, p = .536$
Subjective well-being	$r = .107, n = 35, p = .527$
Negative affect	$r = .219, n = 35, p = .192$
Positive affect	$r = .007, n = 35, p = .968$
Health symptoms	$r = .033, n = 35, p = .847$
Component I	$r = -.020, n = 35, p = .906$
Component II	$r = -.139, n = 35, p = .419$
Component III	$r = -.62, n = 35, p = .345$
Component IV	$r = -.143, n = 35, p = .406$

None of the correlations approached significance, which implies that the length of time a new pet had been owned had no effect on any of the dependent variables.

Overall discussion

The primary aim of this study was to explore whether pet acquisition led to lower levels of loneliness and whether any effects, if they occurred, were contingent upon whether participants lived alone. As such, it was the most direct test of whether pet ownership can help to alleviate loneliness.

The longitudinal analyses provided no evidence that pet acquisition led to lower levels of loneliness irrespective of whether participants already owned a pet or whether they lived alone. An ancillary analysis provided no evidence of a difference due to type of pet acquired (cat v. dog).

As qualitative data showed the participants who had acquired a pet to help with loneliness felt that it had been helpful with regard to feeling lonely, an ancillary longitudinal analysis was carried out using only the participants who acquired a pet to help reduce feelings of loneliness. However, there was no quantitative evidence that pets helped alleviate loneliness for this sub-group of participants who reported that they believed their new pet had helped to alleviate loneliness.

It was somewhat paradoxical that some participants appeared to believe that pets help to alleviate loneliness, but that this was not reflected by the empirical evidence. There are two possible explanations for this finding. When people acquire a pet they tend to believe their reason for acquisition was fulfilled, though the empirical evidence suggested it was not. Alternatively, although measures were specifically

used to measure phenomenological differences in loneliness, these may have failed to reflect qualitative changes that did in fact occur.

In addition to the primary investigation, a number of secondary analyses were also carried out, either to strengthen the validity of the hypothesis under test, or to address issues raised in previous studies of this thesis. Firstly, the participants who were already pet owners were compared with the non-pet owners at Time 1. No evidence was found that the existing pet owners were less lonely than the non-pet owners, irrespective of whether they lived alone. This finding was consistent with the findings of studies I, II and V.

Secondly, participants seeking to acquire a pet were compared with participants not seeking to acquire a pet. A possible source of confounding in the cross-sectional studies (I & II) was that before pet ownership, pet owners differed from non-pet owners. This was therefore investigated in this study. The results suggested that people seeking to acquire a pet were lonelier than people not seeking to acquire a pet as measured by the UCLA-LS and the 6-CLS Esteem scale. Although this finding would require replication, it appears that the failure to find an effect in the earlier studies could potentially have been due to pet owners being lonelier than non-pet owners before acquiring their current pet on two scales (UCLA-LS and Esteem).

Thirdly, participants' reasons for pet acquisition were explored. In the study reported here, 77.4% of participants stated in an 'open' format question that 'companionship' was one of their three top reasons for pet acquisition. This was supported by 85.4% of the participants agreeing with a 'closed' format question that pet acquisition was to 'provide me with extra companionship'. These findings were consistent with those

reported by Endenburg et al. (1994), where 79% of people state that companionship was one of the main reasons for pet acquisition.

Although 64% of the participants already owned pets, it was interesting that 77 - 85% of the participants in this study were still seeking pets for companionship reasons. This suggests that the pet that people already owned had not provided companionship, although it is possible that at the time the existing pet was acquired, it was for a different reason. However, this is consistent with the finding that if pets were acquired for companionship this need was not fulfilled.

Fourthly, two assumptions were tested before running the longitudinal analysis, which could have led to confounding: a) there was no evidence that people seeking to acquire a pet were any different from the general population; and b) there was no evidence that those who eventually acquired pets were any different from those who did not.

Finally, as this was the first study to have had an adequate sample size, the stability of the measures was tested over time. The results showed a wide variation in Time 1- Time 2 correlations, although all were strongly significant (r = .36 to .85). These were commensurate with a reasonable degree of stability over time, but allowed for the fact that during the intervening period participants would have likely experienced many uplifts, hassles or changes in their social networks.

Overall conclusion

The study reported here failed to reveal any quantitative evidence that pet acquisition helps to alleviate loneliness. As such, the test of the final hypothesis did not support

the theory that pets can help to alleviate loneliness. It remains possible that pet acquisition or ownership will help to alleviate loneliness amongst people who are at high risk of being lonely. The final exploratory study will investigate this possibility.

Study VII - Pets, hearing dogs and loneliness amongst deaf people

Aim

The primary aim of this study was to explore the issue of whether pet owners are less lonely than non-pet owners using a population who are especially likely to be lonely (deaf people). Two secondary issues were also explored: 1) are deaf people lonelier than non-deaf people; and 2) is the acquisition of a hearing-dog causally related to decreased levels of loneliness.

Introduction

The studies reported so far in this thesis have sought to test the three hypotheses derived from the pets and loneliness theory using samples representative of the general population. Studies I and II, using cross-sectional designs, failed to show that pet owners were less lonely than were non-pet owners. Study III showed that pet-separation, in effect the opposite of pet-acquisition, was not associated with increased levels of loneliness. Using a longitudinal paradigm, Study V found no evidence that pet separation led to higher levels of loneliness. Study VI found no evidence that pet acquisition was causally related to lower levels of loneliness using a longitudinal design. As each of these studies used participants representative of the general population, this last study explored the possibility that the pets and loneliness theory may apply only to people at high risk of loneliness. The findings of Goldmeier (1986) and Zasloff and Kidd (1994) implied this possibility, as they reported pet ownership was associated with lower levels of loneliness amongst people who live alone, whom Stack (1998) reported

are more likely to be lonely than people who live with others (e.g., married couples).

Many different groups have been identified as being at high risk of loneliness, for example, people who have recently moved home, undergone bereavement, the ill or the incapacitated. Evidence suggests that people with hearing impairment are another such group. Danermark, Strom-Sjölund, & Börg (1996) reported that amongst 26 hard of hearing students, feelings of loneliness, as measured by a single item, were more apparent than amongst a control group of 45 hearing students. However, there were two potential confounds in this study. Firstly, it was reported that there were a greater number of males amongst the hearing impairment sample. As males are more likely to be lonely (Borys and Perlman, 1985), this alone could have led to the hearing impaired sample appearing lonelier than the non-hearing impaired sample. Secondly, the mean age of the hearing sample was one year greater than the hearing impairment sample. Although participants' year of study was not reported, it was reported that the non-hearing impaired sample had completed more years of education. If this meant the non-hearing impaired sample were a year senior to the hearing impaired sample this might also have confounded the results, as freshmen are more likely to experience loneliness than are sophomores (Cutrona et al., 1982).

Murphy (1987) also reported that a sample of 170 hearing impaired students were lonelier than a non-hearing impaired sample, although in fact the data for the non-hearing impaired group had been collected by Russell et al. 1980. That said, as both groups comprised similar age students and similar ratios of 30% freshman and 70% sophomore or above, it was reasonable to have compared the two

groups. The mean UCLA-LS score for the non-hearing impaired sample was 36.6 (Russell et al.'s 1980 data) versus a mean score of 44.5 for the hearing impaired sample (Murphy, 1987). Murphy also found no evidence of differences in loneliness between 76 hard of hearing students and 94 who were deaf, nor differences for either gender or year of study. However, Murphy (1987) did not report in which term the data were collected, although Russell et al (1980) reported their data were collected in the spring term. As loneliness is greatest in the first term of college (Rubenstein and Shaver, 1982b), if Murphy (1987) had collected data in the first term, then this could have confounded the outcome of the analysis.

Consistent with the possibility that deafness is causally related to loneliness, Knutson, Tyler, Schartz, Hinrichs, Gantz, & Woodworth (1991) found that 18 months after a cochlear implant, there was a significant reduction in loneliness amongst previously deaf participants. In contrast, Furth (1973) suggested that hearing impaired people who both consider themselves deaf, and use sign language as their primary means of communicating, form a subculture that contributes to a sense of self and group identity, which may help to reduce susceptibility to loneliness.

When studying the relationship between pet ownership and loneliness, people with hearing impairment are a particularly interesting sample. Not only are they at high risk of loneliness, but some own pets and some own hearing dogs, or are on a waiting list to acquire one. Hart et al. (1996) suggested that it is reasonable to assume that hearing dogs will confer many of the positive benefits of a straightforward pet dog. Therefore, a sample recruited from amongst hearing-

impaired people who either have or are waiting to receive a hearing dog is well suited to test the hypothesis that pets help to alleviate loneliness amongst people at high risk of loneliness. Although it cannot be determined whether pet owners and non-pet owners differed before the pet owners acquired their pets, it is reasonable to assume that people with hearing dogs were similar to the people on the hearing dog waiting list except for their owning a hearing dog. This means that a difference between hearing dog owners and those on a waiting list may be a good indication of the effect of acquiring a hearing dog.

Hearing dogs: A brief overview

For many years guide dogs have been utilised to assist those with visual impairment (Frank, 1957), and more recently, people with a wide range of physical disabilities (Lane, McNicholas, & Collis, 1998). Since the 1980's, assistance dogs have also been trained to assist those with hearing difficulties (Hart, Hart, & Bergin, 1987). Unlike guide dogs for the visually impaired, hearing dogs can sometimes be dogs that the owner has previously kept as a pet, and they can come from a variety of breeds. Similar to all types of assistance dogs, hearing dogs are expected to be well trained and exhibit a minimum of behavioural problems.

The primary function of a hearing dog is to provide warnings of various auditory stimuli such as the phone, doorbell, fire alarms, microwave timers, crying babies or smoke alarms. Evidence suggests that owning an assistance dog may also confer a number of health related benefits (Allen & Blascovich, 1996; Lane et al., 1998). More specifically, Hart et al. (1996) reported that hearing dogs help to alleviate loneliness, although there were a number of potential flaws in this study

(see Chapter 2). However, this does not preclude the possibility that either hearing dog ownership or pet ownership may be associated with, or even lead to, lower levels of loneliness amongst a sample of deaf people, and this is therefore well worth investigating.

Method

Participants

Questionnaires were sent to 163 hearing-impaired people that had already received a hearing dog. Ninety-eight questionnaires were returned completed, representing an overall response rate of 60%, of whom 25 were male and 73 were female. Twenty-three respondents reported owning a pet in addition to the hearing dog. The mean age of the hearing dog owners was 58.5 years (*S.D.* = 18.0).

Questionnaires were also sent to 58 hearing-impaired people waiting for a hearing dog to be allocated. Thirty-three (57%) of questionnaires were returned completed, of whom 8 were male and 25 were female. Nine respondents reported already owning a pet. The mean age of the participants awaiting a hearing dog to be allocated was 52.3 years (*S.D.* = 16.6).

The data collected for Study II were used as a control group to test the assumption that hearing impaired participants were lonelier than non-hearing impaired participants. There were 115 females and 85 males, of whom 163 (81.5%) were less than 30 years, 16 (8%) were 30-40 years, 16 (8%) were 41-50 years, and 5 (2.5%) were 51-64 years. Sixty-six participants owned pets and 134 participants did not own pets.

The data collected for Study IV were also used as a control group to test the assumption that hearing impaired participants experience higher levels of Loneliness Distress than non-hearing impaired participants. There were 52 participants, but no demographic information had been collected.

Design

There were four parts to this study: Part 1 explored the characteristics of the two groups; Part 2 used a between-subjects design to test the assumption that deaf people are lonelier than non-deaf people (control groups 1 & 2); Part 3 was a between-subjects design to explore whether pet-ownership (yes/no) or hearing dog status (received/awaiting) was associated with loneliness; and Part 4 used a within-subjects longitudinal study to explore the Time 1 – Time 2 differences between the people who were waiting to be allocated a hearing dog at Time 1, and to whom a dog had since been allocated by Time 2.

Measures

1) The UCLA-LS (Russell et al, 1980) was used to measure loneliness as it is the most widely used measure of global loneliness. The range of possible scores is 20 to 80, with higher scores indicating higher levels of loneliness. Participants indicate how often they felt the way described in each question using a 4-point Likert scale (*never – rarely – sometimes – always*). Russell et al. (1980) found the internal consistency of the UCLA-LS, as measured by Cronbach's Alpha (α) was .94. Full details of the UCLA-LS were reported in Chapter 1. The UCLA-LS is shown in Appendix 4a.

2) The 6-CLS. This consisted of 6 scales measuring: a need to feel valued, loved understood and wanted (Esteem); a need to keep busy to avoid feeling lonely (Busy); a need to care for others (Care); a need for tactile affection (Tactile); a need to share (Share); and peoples belief that they are perceived as lonely (Image). There were nine items in each of the first two scales and the possible range of scores in each scale was 9 - 45, and in each of the latter four scales there were eight items, and the possible range of scores in each scale was 8 - 40. In each case, higher scores indicate a higher likelihood of loneliness. In Study II, the internal consistencies (Cronbach's α) were in the range .78 to .88. Full details of the 6-CLS were reported in Study II.

3) The Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988) was used to measure participants' mood. There are two separate scales, one measuring positive affect and the other measuring negative affect, each with ten adjectives. The frequency that each adjective describes how the participant has felt in the 'last few weeks' is scored using a 5-point Likert scale (very slightly - extremely). The possible range of scores is therefore 10 – 50. Higher scores indicate higher levels of negative or positive affect. Watson et al. (1988) reported internal consistencies of .87 for both scales when exploring participants' mood during the past few weeks. The PANAS is shown in Appendix 4g.

4) Participants' health was measured using the shortened symptom checklist developed by McNicholas and Collis (1995). This checklist was designed to measure symptoms of ill health likely to exist as the result of stress and was therefore particularly suited to the purpose of this study. There were 30 items in total, 15 measure physical symptoms and 15 measure psychological symptoms,

which in total provide a measure of participants overall health. Each of the 30 symptoms were scored using a 6-point Likert scale (*never* to *almost always*), and the range of possible scores was 30 to 180. Higher scores indicate higher incidence of negative health symptoms. In Study II the internal consistency of the checklist, measured using Cronbach's α, was found to be .92, and a Pearson's correlation of $r = .36$ was found between the checklist and the UCLA-LS. The checklist is shown in Appendix 4e.

5) Loneliness Distress (LDS). This scale measured the affective component of loneliness and consisted of 13 items each measuring loneliness distress (e.g., are you ever unhappy about the amount of time you spend alone?). To each of the 13 items, participants' stated the extent to which they agree, using a 6-point Likert scale ('doesn't apply' to 'almost always applies'). Higher scores indicate higher levels of loneliness distress (possible range scores 13 – 78). In Study IV, the internal consistency of this scale was .91. Full details of this measure were reported in Study IV.

6) Subjective Well-Being was measured by The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffen, 1985). This scale measures subjective well-being using 5 items (e.g., The conditions of my life are excellent) to which participants report the extent to which they agree using a 7-point Likert-type scale. The range of possible scores is therefore 5 – 35. Higher scores indicate higher subjective well-being. Diener et al. (1985) report internal consistency of .85. This measure was used instead of Dupuy's (1984) GPWS, which was used in Study II, primarily because of its shorter length. This was deemed important, as the overall number of questions participants would be asked in this study was relatively high. The Satisfaction with Life Scale is shown in Appendix 4h.

7) Participants also reported their age (as continuous ordinal data), gender and whether they already owned a pet.

Procedure

All of the hearing impaired participants were contacted through the charity 'Hearing Dogs for Deaf People' and were sent questionnaires by the charity to maintain their confidentiality. The group awaiting hearing dog allocation were asked to give their address to enable a follow up questionnaire to be sent to them direct by the investigator. FREEPOST envelopes were included for the questionnaire to be returned once complete.

The two non-hearing impaired groups (the data from Studies II part 2, and IV part 2) were recruited at the following two locations: 1) Visitors to the Warwick Art Centre; and 2) People sitting outside the Warwick University Student's Union building.

Results

Data Screening

The data were checked for normality of distribution by adopting Brown's (1996) recommended criteria that skewness and kurtosis statistics should be less than twice the standard error of skewness or kurtosis, respectively. In addition, a visual check was also made as recommended by Tabachnick and Fidell (2001). Homogeneity of variance was tested using Cochran's 'C'. The multivariate test for homogeneity of covariance was Box's Chi-square test.

Part 1

Characteristics of the hearing-impairment groups

The ratio of males to females in both hearing impairment groups was similar, $\chi^2(1, n = 131) = .02, p = .88$. The ratio of pet owners to non-pet owners was also similar (excluding hearing dogs), $\chi^2(1, n = 131) = .19, p = .66$. There was strong evidence of a difference in ages between the two groups, $t(122) = 35.58, p < .001$; the mean age of those who had been allocated a hearing dog was 58.5 years and the mean age of those still waiting for a hearing dog to be allocated was 52.3 years.

Part 2

Exploring whether the deaf sample were lonelier than a non-deaf sample

Hearing-impaired (HI) people were chosen for this study because they were believed to be at high risk of loneliness. Two analyses were carried out to confirm that the HI sample was in fact lonelier than 2 non-HI samples. Firstly, to compare scores on the 6-CLS the UCLA-LS, and the Health Symptom checklist the HI sample were compared with the data that had been collected for Study II.

Comparing 131 HI participants with 200 non-HI participants, using the set of 8 dependent variables, the multivariate test provided strong evidence of a group difference associated with hearing impairment; Wilks' $\Lambda = .728$; $F(8, 302) = 15.61, p < 001$. Participants' age and gender were entered as covariates. (Twenty-eight participants were excluded from this analysis, as their data were missing for one or more of the dependent variables or one or more of the covariates). Univariate statistics showed that the hearing impairment sample were significantly lonelier than the non-hearing impairment sample on the following

dependent variables: UCLA-LS, $F(1,309) = 53.37$, $p<.001$; Health Symptom Checklist, $F(1,309) = 12.08$, $p = .001$; Esteem, $F(1,309) = 17.77$, $p<.001$; Busy, $F(1,309) = 31.09$, $p <.001$; and Tactile, $F(1,309) = 6.48$, $p<.01$. There was evidence of an effect of the grouped covariates, Wilks' $\Lambda = .875$; $F(16, 604) = 2.60$, $p = .001$. There was, however, strong evidence of a violation of the multivariate assumption of homogeneity of covariance, Box's $\chi^2(36, n=343) = 73.10$, $p <.001$. Therefore, as recommended by Tabachnick and Fidell (2001), Pillai's criterion was examined instead of Wilk's Λ, which did not alter the overall interpretation. The mean scores for the 8 dependent variables for the hearing impaired participants and the data collected in Study II part 3 are reported in table 9.1.

Table 9.1. *Mean scores by hearing status (HI non-HI) for the seven dependent variables*

Dependent variable	HI sample ($n = 131$)		Non-HI sample ($n = 200$)	
	(SDs in parentheses)			
Busy**	35.27	(6.66)	30.71	(6.99)
Care	31.28	(5.69)	30.41	(4.38)
Esteem**	18.72	(6.61)	15.90	(5.09)
Image	19.73	(4.86)	19.05	(5.52)
Share	15.14	(6.32)	15.03	(5.49)
Tactile*	23.70	(6.98)	21.58	(7.20)
UCLA-LS**	42.58	(9.35)	35.36	(7.99)
Health Symptom Checklist	93.29	(24.91)	87.31	(19.68)

(Busy, Care, Esteem, Image, Share, Tactile grouped as 6-CLS)

Differences on dependent variables marked * were significant at p<.01, and ** at p<.001.

As the Loneliness Distress Scale had not been developed when the Study II data were collected, the HI sample were compared with the non-HI data collected to test properties of the shortened Loneliness Distress Scale (Study IV, part 2).

A one-way analysis of variance provided no evidence that the sample with hearing impairment reported higher levels of loneliness distress compared to those with no hearing impairment $F(1,181) = 5.15, p = .024$. (Covariates were not entered, as no demographic data had been collected for Study IV). There was strong evidence that the assumption of homogeneity of variance had been violated, $C(91, 2) = .66$, $p = .001$, which was not possible to correct using transformations (e.g., square root, logarithmic, square). The mean scores for loneliness distress for the hearing impaired and non-hearing impaired groups are shown in Table 9.2.

Table 9.2. *Mean Loneliness Distress scores by hearing status (HI/non-HI)*

Dependent variable	HI sample $N = 131$		Non-HI sample $N = 52$	
	(Standard deviation in parentheses)			
Loneliness Distress	39.34	(13.18)	34.73	(9.27)

Thus, consistent with previous research, the HI sample in the present study reported being lonelier than the non-HI sample. However, this was not apparent for all types of loneliness (e.g., there was no evidence of higher loneliness as measured by the 6-CLS scales, Share, Care or Image). The mean UCLA-LS score (44.5) reported by Murphy (1987) was similar to the mean UCLA-LS score of the HI sample reported in this study (42.6).

Part 3

Investigating whether pets or hearing dogs are associated with loneliness

To test whether existing ownership of a pet or hearing dog was associated with differences on the set of 12 dependent variables, two-way MANCOVA was used to explore the effect of pet ownership (yes/no) and hearing dog status (yes/no) using a between-subjects design. The mean scores for the 12 dependent variables by pet ownership and hearing dog status are shown in Table 9.3.

Table 9.3. *Mean scores by hearing dog ownership and pet ownership*

Dependent variable		Awaiting a hearing dog		Hearing dog owners	
		Non-pet owner	Pet owner	Non-pet owner	Pet owner
		(SDs in parentheses)			
Busy	6-CLS	33.94 (7.53)	34.54 (6.17)	34.91 (6.32)	37.45 (6.55)
Care		31.49 (6.04)	31.73 (5.64)	30.52 (5.94)	32.49 (5.28)
Esteem		20.11 (8.40)	22.50 (7.55)	19.58 (6.65)	19.50 (5.35)
Image		20.34 (4.94)	20.76 (4.47)	19.07 (5.27)	20.79 (4.38)
Share		15.70 (7.46)	15.94 (6.57)	15.03 (6.13)	14.41 (5.68)
Tactile		24.41 (6.95)	22.55 (7.02)	23.69 (7.20)	24.77 (6.65)
UCLA-LS		43.99 (9.32)	46.15 (12.25)	41.62 (9.78)	44.33 (8.78)
Loneliness distress (LDS)		41.17 (12.10)	44.82 (14.56)	36.99 (12.63)	40.15 (14.11)
H/Symptom checklist		92.60 (23.83)	112.78 (30.58)	92.05 (23.47)	95.79 (25.22)
Subjective Well Being		21.89 (8.80)	19.29 (7.57)	20.40 (7.66)	21.68 (6.58)
Negative affect (PANAS)		20.23 (8.83)	22.88 (12.19)	20.31 (7.26)	20.95 (7.52)
Positive affect (PANAS)		31.16 (9.14)	28.06 (8.93)	32.08 (5.28)	33.18 (7.75)

Controlling for age and gender, there was no evidence of a significant main effect for whether or not the participant owned a pet (irrespective of whether they owned a hearing dog), Wilks' Λ = .875; $F(12, 88)$ = 1.04, p = .416; no evidence of a significant main effect for whether or not the participant had a hearing dog (irrespective of whether they owned a pet), Wilks' Λ = .885; $F(12, 88)$ = .95, p = .502; no evidence of a significant interaction between the two factors, Wilks' Λ = .882; $F(12, 88)$ = .980, p = .474 and no evidence of an effect of the grouped covariates, Wilks' Λ = .695; $F(24, 176)$ = 1.47, p = .085 There was no evidence that either univariate assumption of homogeneity of variance, or multivariate assumption of homogeneity of covariance had been violated. Due to missing data on one or more of the dependent variables, or one or more of the covariates, 26 participants were excluded from this analysis.

Part 4

Exploring the effect of acquiring a hearing dog

As 33 participants were awaiting a hearing dog at Time 1, the possibility of adding a longitudinal component to this study arose. Therefore, six months after they were initially approached, a follow up questionnaire was sent out to the 33 participants who were on the waiting list at the time of completing the first questionnaire, of whom it was assumed that some would by now have been allocated their hearing dog. As before, the questionnaires were sent out with a covering letter and a FREEPOST envelope for their return.

Fourteen questionnaires were returned by people who had since acquired a hearing dog and 4 were returned by people still waiting for a hearing dog to be

allocated, which represented an overall response rate of 55%. As only four of the participants who were still waiting for a hearing dog replied at this time, it was not practical to include these as a control condition to make this a fully longitudinal design. Therefore only the participants who were waiting for a hearing dog at Time 1, and who had been allocated a hearing dog by Time 2 were included in the quantitative analysis.

A series of univariate analyses were used to explore whether there were differences due to hearing-dog acquisition. As one participants' data were missing for age, due to the already small sample size available for analysis, only gender was included in the following analyses as a covariate. Due to the increased chance of a *type-1* error occurring, the Bonferroni correction principle was applied which reduced the criterion for significance in each of the tests to $p = .004$, from the more usual level of $p = .05$. Table 9.4 shows the mean scores for participants before (Time-1) and after (Time-2) hearing dog acquisition and the univariate test statistics. None of the univariate tests were significant at $p = .004$, and none would have been significant at $p = .05$. Although none of the univariate tests were significant, it was noted that the difference due to pet acquisition was in the predicted direction for nine of the twelve dependent variables.

Table 9.4. Mean scores and univariate test statistics for hearing dog acquisition (yes/no)

Dependent variable	Mean scores before and after hearing dog acquisition		Univariate test of hearing dog acquisition	Univariate test of covariate (gender)	Whether the mean scores were consistent with hearing dogs helping to alleviate loneliness
	Time-1	Time-2			
Busy	35.27	33.07	$F(1, 12) = .42, p = .531$	$F(1, 12) = 1.78, p = .212$	yes
Esteem	23.21	21.45	$F(1, 12) = .81, p = .385$	$F(1, 12) = 1.90, p = .195$	yes
Image	19.65	19.21	$F(1, 12) = .23, p = .637$	$F(1, 12) = 1.45, p = .252$	yes
Loneliness distress	43.77	40.04	$F(1, 12) = 2.36, p = .148$	$F(1, 12) = 2.36, p = .148$	yes
Negative affect	22.64	20.85	$F(1, 12) = .55, p = .473$	$F(1, 12) = 4.14, p = .064$	yes
Subjective well being	20.79	23.14	$F(1, 12) = 2.64, p = .128$	$F(1, 12) = 1.87, p = .197$	yes
Positive affect	32.07	33.00	$F(1, 12) = .28, p = .605$	$F(1, 12) = 1.27, p = .281$	yes
UCLA -LS	46.11	45.75	$F(1, 12) = .03, p = .867$	$F(1, 12) = .52, p = .486$	yes
Health symptoms	96.31	88.46	$F(1, 12) = 3.69, p = .077$	$F(1, 12) = 3.31, p = .094$	yes
Care	30.67	31.66	$F(1, 12) = 1.43, p = .256$	$F(1, 12) = 1.75, p = .212$	no
Share	16.07	17.21	$F(1, 12) = 2.86, p = .117$	$F(1, 12) = .02, p = .879$	no
Tactile	25.71	26.21	$F(1, 12) = .64, p = .441$	$F(1, 12) = 1.76, p = .211$	no

Note. The p values reported are the true values, which have not been corrected

Despite the fact that many of the difference scores in Table 9.4 were consistent with the possibility that hearing dogs helped to alleviate loneliness, an alternative explanation is that the differences were actually due to confounding factors related to the passing of time. To explore whether any differences may have been accounted for by factors other than hearing dog acquisition, a qualitative comparison was made with the mean scores of the four participants who were waiting for a hearing dog at Time 1, but had not yet received them by Time 2. If the direction of any change was found to mirror that of the participants who had been allocated their hearing dogs by Time 2, it would imply that the differences were more likely to be explained by a confounding variable, than by hearing dog acquisition. The mean scores for the 4 participants who were still waiting for a hearing dog at Time 2 are reported in Table 9.5.

Table 9.5. *Changes over time in the control group*

Dependent variables	Mean scores for participants who were still waiting for a hearing dog to be allocated		Whether the direction of change was the same as the participants who had acquired a hearing dog
	Time-1	Time-2	
Negative health symptoms	85.50	79.75	**yes**
Loneliness distress	38.50	39.25	no
Subjective well being	23.00	21.50	no
Negative affect	14.75	19.50	no
Busy	34.25	31.25	**yes**
Esteem	26.50	27.81	no
Positive affect	25.50	25.75	**yes**
Image	24.50	27.00	no
UCLA -LS	48.05	47.75	**yes**
Care	29.25	28.00	no
Share	16.75	15.50	no
Tactile	18.25	19.50	**yes**

The qualitative comparison between the mean scores of the 2 groups suggested that reductions in Loneliness Distress, Subjective Well Being, Negative Affect, Esteem and Image might be related to benefits associated with hearing dog. That is, they occurred for the participants who had been allocated their hearing dogs by Time 2, but not the participants who were still awaiting their hearing dog to be allocated.

Discussion

The rationale for using deaf people as a sample at high risk of loneliness was confirmed. As in previous research (e.g., Murphy, 1987; Danermak et al., 1996), deaf people were found to be lonelier than non-deaf people on a number of measures of loneliness and well-being.

The findings of Part 3 in the present study suggest no evidence that either pet ownership or hearing dog ownership were associated with lower levels of loneliness amongst a sample with a high risk of loneliness. This suggests that the lack of differences between pet owners and non-pet owners in Studies I – IV were not because pet ownership affects loneliness only amongst people who are lonelier than is typical.

However, before pet acquisition, it is possible that the pet owners were lonelier than typical. Thus, comparing pet owners with non-pet owners may have found no difference even if pets do help to alleviate loneliness. However, the same caveat did not apply to the interpretation of the main effect of hearing dog ownership. As hearing dog owners were compared to a group of people waiting to become

hearing dog owners, it was assumed that before the hearing dog owners were allocated a hearing dog they were essentially similar. This implies that as the hearing dog owners were not less lonely than non-hearing dog owners, hearing dogs do not help alleviate loneliness.

This finding was not consistent with the findings of Hart et al. (1996), who reported that participants awaiting a hearing dog were lonelier than those with a hearing dog. Whilst replication is desirable, due to the improved methodology of the study reported here, indications are that hearing dog and pet ownership are not associated with cognitive beliefs about loneliness or any of the measures to reflect the phenomenological experience of loneliness.

Due to the small numbers of hearing dogs placed per month the current study was designed primarily as a cross-sectional comparison. However, approximately six-months after completing the first questionnaire 18 participants who were originally on the hearing dog waiting list responded to a further questionnaire. Fourteen had since acquired a hearing dog and four were still waiting for one to be allocated. Unfortunately, four was too few to comprise a control group, as this would only contain four participants' data. Therefore, the longitudinal analysis was conducted using just the group who had acquired a hearing dog. Inspection of the relative size and direction of the changes showed that many of the differences were consistent with the possibility that hearing dogs conferred positive benefits upon their owners, but this was not statistically significant. Inspection of data from the participants who were still awaiting a hearing dog at Time 2, showed some similar differences had occurred irrespective of hearing dog acquisition.

However, differences on Loneliness Distress, Subjective Well-Being, Negative Affect, Esteem and Image may have been due to hearing dog acquisition as these changes had not occurred amongst the participants still waiting for a hearing dog at Time 2.

Conclusion

Overall, there was some qualitative evidence that hearing dog acquisition may help to alleviate loneliness. However, there was no empirical evidence that pet or hearing dog ownership is associated with lower levels of loneliness. A provisional interpretation is that any benefits conferred by hearing dogs relate to functions that they have been specially trained to perform, rather than for their role as a pet.

Summary, evaluation of experimental findings and conclusion

The principal aim of this thesis was to test the theory that pet ownership helps to alleviate loneliness. To achieve this, three hypotheses were derived from the theory: 1) pet owners are less lonely than non-pet owners; 2) pet separation leads to higher levels of loneliness; and 3) pet acquisition leads to lower levels of loneliness. The three hypotheses were tested in a series of empirical studies.

Although pet ownership was the primary focus of this thesis, wherever possible ancillary analyses were used to check that there were no differences between different species of animals that people kept as pets.

This final chapter is structured as follows. Firstly, the findings of the empirical studies are used to evaluate each of the three hypotheses derived from the pets and loneliness theory. Secondly, the degree to which the three hypotheses support the pets and loneliness theory is discussed. Thirdly, an attempt is made to reconcile the results of the 3 hypotheses with the popularity of the pets and loneliness belief and the theory that had been articulated.

Evaluation of the three hypotheses

Hypothesis 1. Pet owners less lonely than non-pet owners

If pet ownership helps to alleviate loneliness, then it seems reasonable to expect that overall, pet owners would be less lonely than non-pet owners. Although, in studies

that have compared pet owners with non-pet owners, only one, a non-peer reviewed article, has actually found a straightforward main effect amongst elderly people where pet owners were less lonely than non-pet owners (Roberts et al., 1996). In addition, two studies have reported that amongst females living alone, pets are associated with lower levels of loneliness (Goldmeier, 1986; Zasloff & Kidd, 1994).

Study I of this thesis re-examined whether pet owners are less lonely than non-pet owners amongst the general population and whether effects are more pronounced, or only occur, amongst people who live alone. Controlling for participants' age and gender there was no evidence that pet owners were less lonely than non-pet owners, as measured by the UCLA-LS, irrespective of whether they lived alone. Two further analyses used the individual items of the UCLA-LS as dependent variables and also four components derived from the 20 UCLA-LS items by PCA as dependent variables. Both analyses found no evidence of a difference between owners of cats, dogs (pet or club) and non-pet owners.

As data had also been collected for Psychological General Well Being in Study I, it was explored as an additional dependent variable. If differences associated with pet ownership were evident for a measure of psychological well-being, this could explain why people believe pets could help to alleviate loneliness. That is, whilst pet owners and non-pet owners might not differ in loneliness, the pet owners may have experienced higher levels of well being making loneliness seem somehow less unpleasant. However, no evidence of differences in well-being were found to be associated with pet ownership.

Whilst Study I provided no grounds for rejecting the null hypothesis, there were three reasons why Study I may not have been an ideal test of the theory that pets help to alleviate loneliness: a) it is possible that the UCLA-LS was not sensitive to differences in loneliness associated with pet-ownership; b) before the acquisition of their current pet, pet owners may have been lonelier than the participants who currently are non-pet owners; and c) pet owners may be less lonely than non-pet owners, but only amongst certain sub-sections of the population.

a) Was the lack of a difference in Study I due to insensitive measures?

Study II developed 6 Complementary Loneliness Scales (6-CLS) for use in conjunction with the UCLA-LS to increase the chance of detecting differences in loneliness associated with pet ownership. The 6-CLS was designed especially for the purposes of this thesis, and consisted of six scales measuring whether people were lonely because of: 1) a desire to feel valued, needed, understood and loved (Esteem); 2) a need for tactile affection (Tactile); 3) a need to care for others (Care); 4) keeping busy to avoid feeling lonely (Busy); 5) a need to share (Share); and 6) a belief that they appeared lonely (Image).

In Study II, pet owners and non-pet owners were compared on each of the six new scales and the UCLA-LS. Differences were found on two of the six new complementary loneliness scales. Pet owners were less likely to 'feel a need to share', as measured by the 'Share' scale, and less likely to 'believe they were perceived as

lonely', as measured by the 'Image' scale. As these scales both correlated significantly with the UCLA-LS ($r = .57$ and $r = .44$, respectively), this provided an indication that pet owners may be less lonely than the non-pet owners, but only on some specific dimensions of loneliness. Although differences were found on 2 of the 6 complementary scales, there was no evidence of any differences between pet owners and non-pet owners as measured by the UCLA-LS, which was consistent with the findings of Study I. This implies that the issue of sensitivity identified in the discussion of Study I may have led to a failure to detect differences that truly did exist. It was not possible to explore whether any effects occurred specifically amongst people who lived alone in Study II, as there were too few participants who lived alone (12 out of a total of 200, only 3 of whom owned a pet). An ancillary analysis provided no evidence of a difference between cat owners, dog owners, or owners of 'other' types of pets, on any of the set of the seven dependent variables, which might have masked any overall effect of pet ownership.

To further increase sensitivity, in Study IV the Loneliness Distress Scale (LDS) was developed to measure people's feelings about being lonely, as opposed to their beliefs. This was to address the possibility that although pets only affected people's *beliefs* about loneliness, as measured by 2 of the 6 Complementary Loneliness Scales, they may also affect the degree to which people *feel* distressed about loneliness. A thirteen item scale was developed, which, at face value, appeared to measure global loneliness distress. Initial indications were that the new scale might prove to be a useful additional means to explore the effect of pet ownership.

Having now developed the 6-CLS and the LDS to address concerns about a lack of sensitivity to the effect of pet ownership when using only the UCLA-LS, three further studies re-examined whether pet owners were less lonely than non-pet owners. In Study V, pet owners and non-pet owners were compared for differences in loneliness beliefs (UCLA-LS and the 6-CLS), Loneliness Distress (the LDS) and three further measures to reflect the phenomenological experience of loneliness (PANAS, The Satisfaction with Life Scale and the Health Symptom Checklist). The participants were young adults who had just left school, of whom many were expected to start at university in the following autumn. There was no evidence of differences on any of the set of 12 dependent variables, irrespective of whether participants reported feeling close to the pet.

Study VI focussed on people seeking to acquire a new pet. Amongst people seeking to acquire a new pet, those who already had a pet (pet owners) were compared with those who were seeking to acquire their first pet (non-pet owners). No evidence was found that they differed on loneliness (UCLA-LS, 6-CLS and LDS), or any of the variables chosen to reflect phenomenological differences in loneliness (PANAS, The Satisfaction with Life Scale and the Health Symptom Checklist). Ancillary analyses provided no evidence of a difference between cat owners, dog owners, owners of 'other' types of pets or owners of multiple pet types on any of the set of 12 dependent variables.

Finally, Study VII used deaf people, who as a group are believed to be at high risk of loneliness, and focussed on the effect of pet ownership and/or hearing dog ownership.

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Comparing pet owners with non-pet owners and people already allocated a hearing dog with people on a waiting list to be allocated a hearing dog, no evidence was found of a main effect for either factor on the same 12 dependent variables used in Studies V and VI.

The findings of Studies V, VI and VII suggested no evidence that the first issue identified in the discussion of Study I - a lack of instrument sensitivity – had led to a *type-II* error having occurred. That is, although differences on 2 of the 6-CLS were identified in Study II (Share and Image), they were not replicated in Studies V, VI or VII. Thus, at face value, pet owners appear to be no less lonely than non-pet owners.

b) Prior to acquiring a pet, are pet owners lonelier than non-pet owners?

The second issue raised in the discussion of Study I was the possibility that, before pet acquisition, the pet owners were lonelier than non-pet owners. If subsequent pet ownership reduced loneliness, this would reduce the difference between the two groups so that a cross-sectional analysis would be less likely to reveal differences between pet owners and non-pet owners.

Study VI compared people actively seeking to acquire a new pet with 2 control groups of people: 1) a sample collected especially for the purpose of this study; and 2) the data collected for Study II. Participants in both control groups were not actively seeking to acquire a pet. No evidence was found of differences between the pet acquisition group and control group 1 on loneliness (UCLA-LS, 6-CLS and the

LDS), or the variables used to measure phenomenological aspects of loneliness (PANAS, The Satisfaction with Life Scale and the Health Symptom Checklist). However, there was some evidence of differences between the pet acquisition group and control group 2 on loneliness (UCLA-LS and the 6-CLS). Specifically, people seeking to acquire a new pet reported higher levels of loneliness as measured by the UCLA-LS and the Esteem scale, but lower levels of loneliness as measured by the Care and the Tactile scales.

Due to the complex nature of the relationship between people seeking and not seeking to acquire a pet, for practical purposes, the results of testing Hypothesis 1 owners may be too complex to interpret as a test of the pets and loneliness theory.

c) Are differences in loneliness between pet owners and non-pet owners confined to particular sub-groups in the general population?

The third issue raised in the discussion of Study I was that differences in loneliness between pet owners and non-pet owners may be confined to particular groups of people, especially those at risk of loneliness. Study VII focussed on people with impaired hearing, a group known to be at high risk of loneliness. There was no evidence that either hearing dogs or ordinary pets were associated with lower levels of loneliness. Although there was no difference for this particular group, it is possible there are groups for whom a difference would be apparent.

Summary of the tests of Hypothesis 1

The issue of sensitivity and/or specific sub groups (although sub groups other than deaf people may have revealed an effect) did not appear to have led to a *type-II* error, whereby an effect that truly did exist was not detected. However, Study VI suggested that prior to pet acquisition there might have been a number of complex differences between pet owners and non-pet owners, which made interpretation of this difficult. Thus, although potentially interesting in its own right, Hypothesis 1 may not have been an ideal test of the pets and loneliness theory.

Hypothesis 2. Pet separation leads to increased loneliness

The second hypothesis derived from the theory that pets help to alleviate loneliness was that pet separation would be associated with higher levels of loneliness. Two studies tested this possibility, using a mix of cross-sectional, longitudinal and pseudo-longitudinal designs.

Study III used a cross-sectional design to investigate whether students who had recently left home to live at university were lonelier if they had also undergone pet separation. There was no evidence that pet separation was associated with increased levels of loneliness, as measured by the UCLA-LS or the 6-CLS. This was irrespective of whether the student referred to their relationship with the pet as having been close. In addition, an ancillary analysis provided no evidence of a difference between people separated from cats, dogs, or 'other' types of pets, on any of the set of 7 dependent variables.

Similar to the three issues raised in the discussion of Study I, there were three reasons why Study III may not have been an ideal test of the theory that pets help to alleviate loneliness: a) it is possible that the UCLA-LS and the 6-CLS were not sensitive to differences in loneliness associated with pet separation; b) before separation from their current pet, pet owners may have been less lonely than the participants who currently are non-pet owners; and c) pet separation may be associated with higher levels of loneliness, but only amongst certain sub-sections of the population.

a) Was the lack of differences due to insensitive measures?

This possibility was addressed in Part 1 of Study V using the Loneliness Distress Scale developed in Study IV and measures to detect phenomenological differences in loneliness (PANAS, The Satisfaction with Life Scale and the Health Symptom Checklist). In effect, Part 1 was a replication of Study III, but using the additional measures to address the first issue raised in the discussion of Study III. Similar to Study III, there was no evidence that participants who had undergone pet separation were lonelier than students who had not undergone pet separation, irrespective of whether they reported feeling close to the pet. At face value, people who had undergone pet separation were no lonelier than people who had not. In addition, an ancillary analysis provided no evidence of a difference between people separated from cats, dogs, or 'other' types of pets, on any of the set of 12 dependent variables.

b) Prior to pet separation, were pet owners less lonely than non-pet owners?

The second issue raised in the discussion of Study III concerned the use of a cross-sectional design. It was possible that before leaving home, the pet owning student

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were less lonely than the non-pet owning students, and that this had masked any differences once the students had left home. However, Studies I and II provided no evidence this was the case, at least amongst adults, as neither study found pet owners differed in loneliness from non-pet owners. Furthermore, in Study III, participants were asked a series of 18 questions to determine whether the students who had owned pets had higher levels of support from their families and friends prior to leaving home, than did the non pet owning students. If the pet owners reported greater levels of support from families and friends than did non-pet owners, it would suggest differences other than those attributable to pet ownership between the two groups before leaving home. There was no evidence that this was the case, as pet owners and non-pet owners reported similar levels of support from both friends and families. This suggests that the second issue raised in the discussion of Study III had not affected the interpretation of Study III.

Part 2 of Study V directly explored the second issue raised in the discussion of Study III. That is, whether differences between pet owning students and non-pet owning students before pet separation occurred had masked any differences once the students had left home. There was no evidence of any systematic differences between pet owners and non-pet owners who lived at home prior to starting at university and pet separation occurring. This suggests that in principle, Study III, which compared people who had undergone pet separation with people who had not, was a valid test of the pets and loneliness theory.

Part 3 of Study V controlled for the second issue raised in the discussion of Study III by using a fully longitudinal exploration of pet separation, where loneliness was measured before (whilst students still lived at home) and after (when students had moved to university) pet separation had occurred. Although there was no evidence that pet separation caused increased levels of loneliness, due to the very small number of participants in this analysis, it was unlikely that these tests could reach significance. However, as none of the F statistics (in the interaction between pet ownership x time) were greater than 1, it was unlikely that differences would have become evident had a larger sample size been available.

Study V was designed so that a pseudo-longitudinal analysis would also control for the possibility that differences between pet owners and non-pet owners before pet separation occurred had masked any effect of pet separation. Therefore, in Part 4 of Study V, the pet owners and non-pet owners just about to leave home, which Part 2 had shown were no different, were compared with a similar group of participants who had left home and the pet owners had now undergone pet separation. There was no evidence that pet separation was associated with differences on any of the dependent variables, although there was very strong evidence that the school sample who still lived at home, were less lonely than the university sample who had recently moved to live in university campus accommodation. This was consistent with the effect found by Rubenstein and Shaver (1982b) and Cutrona (1982), whereby moving to university caused increased levels of loneliness to be reported.

c) Are differences in loneliness due to pet separation confined to particular sub-groups in the general population?

It is possible that differences may have been apparent amongst a different sample from the one used in this study. For example, had the effect of pet separation been explored amongst people entering long term care or hospital, rather than students leaving home, an effect may have been found. This is an issue that could be explored in future research.

Summary of the tests of Hypothesis 2

Overall, Studies III and V provided no evidence that pet separation was related to increased levels of loneliness amongst students. Study III and Part 1 of Study V provided no evidence of a differential effect associated with the type of pet (cat v. dog v. 'other') from which participants had been separated. Thus, as pet separation did not appear to lead to higher levels of loneliness, the tests of Hypothesis 2 did not support the theory that pets help to alleviate loneliness.

Hypothesis 3. Pet acquisition helps to reduce loneliness

Studies II and VI explored whether pet acquisition was causally related to lower levels of loneliness, which arguably is the most important of the 3 hypotheses to test the theory that pets help to alleviate loneliness. In addition, Study VII explored whether a related concept, acquisition of a hearing dog, led to lower levels of loneliness amongst a deaf sample who were at high risk of loneliness.

The first test of Hypothesis 3 (Part 5 of Study II) was non-experimental, and used structural equation modelling techniques to explore whether the pattern of correlations in data that had been collected for Study II was consistent with the possibility that pet ownership leads to lower levels of loneliness. Specifically, the question was whether the pattern of data obtained in Study II part 4 could be predicted by a model whereby pet ownership, and personality characteristics (hardiness and optimism) predicted loneliness, which in turn predicted health symptoms associated with stress. Pet ownership appeared to significantly predict an overall factor of loneliness, but not the UCLA-LS or any of the six complementary scales (6-CLS). Thus, the technique of structural equation modelling suggested that the theory that pet ownership helps to alleviate loneliness is consistent with the pattern of correlational data collected. However, as this finding was based on correlational data, it would need to be backed up by prospective experimental studies

Study VI was the principal study of this thesis and used a longitudinal design to explore whether pet acquisition led to lower levels of loneliness. Amongst a sample of people seeking to acquire a pet, a longitudinal analysis found no evidence that participants who acquired pets became less lonely than participants who had not yet acquired pets. This finding was irrespective of whether participants were seeking a first pet or an additional pet as measured by the set of 12 dependent variables (UCLA-LS, 6-CLS, PANAS, The Satisfaction with Life Scale, Health Symptom Checklist). An ancillary analysis provided no evidence of differences associated with whether participants acquired a new cat or a new dog.

Participants were also asked why they sought to acquire a pet and, in the follow-up questionnaire, whether the reason for acquisition had been met. The most common reason for pet acquisition was for companionship, which was consistent with Endenburg (1994). However, the degree to which participants acquired a pet for this reason was not associated with the degree to which participants reported that the pet helped provide companionship. In contrast, the degree to which participants stated that pet acquisition was to help stop them feeling lonely (25.8% stated this was either completely or quite true), was significantly correlated ($r = .36$) with the degree to which they believed this criteria to have been fulfilled.

This finding suggested a *post hoc* longitudinal analysis where only participants who were seeking to acquire a pet to help alleviate loneliness were used to explore the effect of pet acquisition. Similar to the previous analysis, there was no empirical evidence that pet acquisition helped to alleviate loneliness.

Part 3 of Study VII explored the effect of hearing dog acquisition amongst a sample of deaf people believed to be at high risk of loneliness. Similar to the findings of Study VI, there was no empirical evidence that hearing dog acquisition led to lower levels of loneliness or improvements on any of the other variables being investigated.

Summary of the tests of Hypothesis 3

The two prospective studies showed no evidence that pet acquisition led to lower levels of loneliness. Thus, the provisional interpretation of the structural equation model including pet ownership information (Model 3) in Part 5 of Study II was not

supported. Since there have been no other prospective studies of the effects of pet acquisition upon loneliness it is not possible to compare these findings with previous research. It is however possible that any benefits of pet acquisition are confined to particular sub-groups of the general population. For example, people who have recently moved to a new area or who are undergoing relational difficulties may become less lonely if they acquire a pet.

Evaluating whether pets help alleviate loneliness

Three separate hypotheses tested the theory that pets help to alleviate loneliness. Of the three hypotheses, only Hypothesis 3 was a direct test of the theory that pets can help to alleviate to loneliness. Hypotheses 1 and 2 were, in effect, indirect tests of the pets and loneliness theory. Thus, more significance should logically be placed on the results of testing Hypothesis 3.

In total, Hypothesis 1 was tested in six studies, Hypothesis 2 was tested in 2 studies, and Hypothesis 3 was tested in 3 studies (although only two were prospective). Part 2 of Study II provided some evidence to support Hypothesis 1, that pet owners are less lonely than non-pet owners. However, this finding was not replicated in any of the other 4 studies which tested this hypothesis (Studies I, V, VI and VII). The tests of Hypotheses 2 and 3 received no support whatsoever. Therefore, it is concluded that none of the three hypotheses provided any reason to support the theory that pets help to alleviate loneliness amongst the general population.

Final thoughts

The findings of this thesis did not support the popular belief that pets help to alleviate loneliness, nor the theory that had been articulated. There are two reasons why this might be so: 1) the methodology adopted in this thesis failed to reveal an effect that truly exists; or 2) both the widespread belief and the theory about pets and loneliness are false.

1) Potential limitation of the methodology in this thesis

In the case of non-significant findings, it is always possible that an effect that truly exists has failed to be detected. For example, if the means by which a dependent variable is measured lack sensitivity, then clearly any effect will almost certainly go undetected. Similarly, if the variable of interest is operationalised wrongly or inappropriately, the same outcome may be likely. In the context of companion animal research, Endenburg (2002) suggested that it is possible that researchers are blind to essential things that escape their scientific methods. More generally, there may be something about quantitative research in psychology that fails to capture the qualitative nature of people's experience of pet ownership.

Two possible explanations for the non-significant findings in this thesis have been identified. Firstly, in hindsight, it is possible that too great an emphasis was placed on operationalising loneliness using the cognitive discrepancy model of loneliness. That is, exploring loneliness within what may be an overly narrow framework may have concealed effects that would have become evident had a broader framework been used. Whilst attempts were made to increase the breadth in which loneliness was

investigated, using measures such as the LDS, 6-CLS and PANAS, these variables were not an exhaustive means by which loneliness could be explored. Therefore, it remains possible that the way in which loneliness was operationalised in this thesis was ultimately either too general or too narrow, and that specific effects that truly did occur simply went undetected.

Specifically, it is possible that had this thesis adopted a greater emphasis upon using qualitative research methodology, it would have revealed evidence that the quantitative research had not. For example, whilst quantitative investigation consistently finds no evidence of an effect, pet owners may be able to describe in their own words how their pets alleviate loneliness. Indeed, it may be the case that a qualitative framework would ultimately have been a better means to investigate the effect of pet ownership on loneliness. Such an approach has been adopted by Kidd and Kidd (1994), Carmack (1991) and Kehoe (1990), and at face value provided a strong case for the notion that pets alleviate loneliness. However, a more critical interpretation is that these researchers may have been susceptible to a confirmatory bias (e.g., Baron, 1994) and simply reported anecdotal evidence consistent with their predictions and/or personal beliefs.

Secondly, it is possible that pets do indeed help to alleviate loneliness, but only for some specific subgroups of the population or particular personality types, and that this effect has somehow been generalised in popular belief to the more general population. Consequently, it is possible that pets help to alleviate loneliness for any number of specific sub groups of the population that were not explicitly explored in

this thesis. For example, Carmack (1991) provided anecdotal evidence that pet ownership helps to alleviate loneliness amongst people with Aids. Similarly, Kidd and Kidd (1994) recounted reasons why homeless people might benefit from owning pets, as many of those who did own pets reported it was their only source of love or companionship. The findings of McNicholas and Collis (2001) also suggested that children might be a further group for whom the presence of pets might alleviate loneliness.

A possible direction for future research may be to attempt to identify other specific groups of people or personality types for which pets appear to alleviate loneliness, assuming there are some groups for who this effect truly does occur, and to investigate the mechanisms by which the effect occurs using a mix of quantitative and qualitative research. Subsequently, a more detailed theory might be articulated which could explicitly predict types or groups from the general population who could benefit from pet ownership, which in turn could be empirically tested.

2) The theory and peoples' beliefs about pets and loneliness are false

Given the strength of the belief that pets alleviate loneliness, and the fact that it is arguably a rather pleasant notion, it would be easy to overlook the possibility that the belief and the theory are simply wrong. Endenburg (2002) suggested an explanation for why the belief that pets help to alleviate loneliness might exist even though empirical evidence suggests it is false. It could be that people are victims of self-illusions: they see more than really happens.

One explanation for why this might occur is through a process of faulty syllogistic reasoning. For example, if owning a pet makes loneliness appear less of a problem, it would be reasonable for an owner to conclude that pets therefore alleviate loneliness. However, it is possible that in fact pets provide a sense of stability and structure to the owner's day that subsequently reduces the time that a person dwells upon issues related to loneliness. Thus, although loneliness *per se* has not changed, the pet has reduced the degree to which loneliness is a conscious problem. This, of course, may well be a valuable function in itself, but more importantly, it would explain why the belief might endure even although ultimately it is false.

Cognitive dissonance theory (e.g., Festinger, 1957) may also offer a further explanation for the perseverance of the pets and loneliness belief. For example, if owning pets only caused increased work, inconvenience and cost – which, if owners are honest, they do cause – then it simply wouldn't make sense for pet ownership to be so popular. However, if owners were to convince themselves there were tangible benefits to pet ownership, even if there were not, then any dissonance might be reduced. Given that pets appear to be viewed as a member of the family, it may seem logical to assume that pets perform a similar function to that of family. That is, they provide companionship, which in turn alleviates loneliness, when or if it should occur.

Conclusion

This thesis began with the popular belief that pets help to alleviate loneliness. From this belief, empirical evidence and anecdotal observations were used to articulate a theory as to why pets might be expected to help alleviate loneliness. Three hypotheses were derived from this theory and were tested by a number of empirical studies. There were some grounds to reject null Hypothesis 1, although doubts about the feasibility of this hypothesis as a test of the pets and loneliness theory were raised. There were no grounds to reject either null Hypotheses 2 or 3, the latter of which was the most direct test of the pets and loneliness theory. It is therefore concluded that, so far, the belief that pets can help to alleviate loneliness, at least amongst the general population, is a pleasing notion, but one for which there is no evidence-based support.

The possibility remains that there are specific groups of the population or specific personality traits for which pets do have an effect on loneliness. In addition, it is possible that pets do help to alleviate loneliness, but not in ways that were revealed by the methodology adopted in this series of studies. Further research should attempt to investigate this possibility.

Epilogue

Two days after the examination of this thesis my wonderful, beautiful companion Dusty died in a freak accident. He was just 3 years old and full of life. During the final year of writing this thesis he was a constant source of friendship and fun. I always had a reason to go home. I have no doubt Dusty loved me, trusted me, needed me and seemed to understand my every mood. It gave me great pleasure to care for him and he accounted for quite a lot of my free time. It was great to walk with him: there were plenty of new conversations initiated by his presence. Whilst in his company I never once felt I was doing something alone. He was always good to sit next to: when reading a book or watching the television I often found myself unconsciously stroking his fur or simply looking at him. I don't think there was a single meal (mine, not his) that didn't get shared. Although I lived alone, the house was never empty and I can honestly say I never once felt lonely.

Dusty

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The belief that pets can help to alleviate loneliness: A classroom demonstration

To demonstrate the popular belief that pets can help to alleviate loneliness 103 first-year psychology undergraduates took part in a classroom demonstration to explore whether or not they believed pets could help to alleviate loneliness.

The students were taking part in a two-hour lecture on questionnaire design, and the following question was asked as an example of a single item question. The students were divided into 3 separate groups of approximately 34 students. In two of the sessions (1 & 3) the students were asked to respond *yes* or *no* to the question 'Do you believe that pets can help to alleviate loneliness?' In the other session, to counterbalance the design, the students were asked to respond *yes* or *no* to the question 'Do you believe that pets cannot help to alleviate loneliness?'

The responses to the second question were reverse-scored. Overall 101 students agreed with the statement 'Do you believe that pets can help to alleviate loneliness' and 2 disagreed with the statement.

Script for moderator in focus groups

To be read out by moderator:

Loneliness is commonplace, and most people will be lonely at some time or another in their lives. Often there's a reason for feeling lonely – maybe you've just split up with a partner, or maybe you've lost a partner. Sometimes there's no reason for feeling lonely, you just feel lonely.

I can remember some of the times in my life that I felt lonely. One of these was when I was a teenager and some of my friends had girlfriends, but I did not. During this period I found I wanted to go out with friends, but they were out with their girlfriends instead.

When I was a soldier, I spent some time abroad in a country where I couldn't speak the language. It was okay during the week when everyone was around, but at the weekend many of the guys were married and would spend the weekend with their families. However, being single, I often found myself with nothing to do and I remember sometimes feeling very lonely.

Maybe some of you have had similar experiences, and I hope you'll be able to share them with the group. Okay, does anyone have any thoughts on this?

The questions and instructions used in Study VI to ascertain people's reasons for pet acquisition at Time 1

Instructions: The following statements are some of the reasons that people have given for getting new pets. Please state how much each statement applies to you.

	Not at all true	A little true	Quite true	Completely true
To provide me with extra companionship				
Primarily for the children (e.g., fun, education, company etc)				
Because I gain pleasure from stroking it, etc…				
I want to take care of a pet				
I've always owned pets				
A pet would be useful (for security, etc…)				
As company for another pet				
To stop me feeling lonely				
Personal health reasons				
Feeling sorry for animals in the shelter.				
They simply look pleasing to the eye				
A pet would be something that is especially mine				
I am interested in training animals				
I feel a special bond with animals				
To help me meet more people				
Because there are times when I have nothing to do				

The UCLA-Loneliness Scale (Russell, Peplau & Cutrona, 1980)

The following statements describe how people sometimes feel. For each statement, please indicate how often **you** feel the way described by ticking the relevant box. (Please tick only one answer per line).

	Never	Rarely	Sometimes	Always
I feel in tune with the way of life around me.	☐	☐	☐	☐
I lack companionship.	☐	☐	☐	☐
There is no one I can turn to.	☐	☐	☐	☐
I do not feel alone.	☐	☐	☐	☐
I feel part of a group of friends.	☐	☐	☐	☐
I have a lot in common with the people around me.	☐	☐	☐	☐
I am no longer close to anyone.	☐	☐	☐	☐
My interests and ideas are not shared by those around me.	☐	☐	☐	☐
I am an outgoing person.	☐	☐	☐	☐
There are people I feel close to.	☐	☐	☐	☐
I feel left out.	☐	☐	☐	☐
My social relationships are superficial.	☐	☐	☐	☐
No one really knows me well.	☐	☐	☐	☐
I feel isolated from others.	☐	☐	☐	☐
I can find companionship when I want it.	☐	☐	☐	☐
There are people who really understand me.	☐	☐	☐	☐
I am unhappy being so withdrawn.	☐	☐	☐	☐
People are around me but not with me.	☐	☐	☐	☐
There are people I can talk to.	☐	☐	☐	☐
There are people I can turn to.	☐	☐	☐	☐

Psychological General Well Being (PGWB) (Dupuy, 1984)

These questions ask about how you feel and how things have been going ***during the past month.*** For each question please tick the box next to the answer which best applies to you.

1. How have you been feeling in general?

 [ ]   In excellent spirits
 [ ]   In very good spirits
 [ ]   In good spirits mostly
 [ ]   I have been up and down in spirits a lot
 [ ]   In low spirits mostly
 [ ]   In very low spirits

2. How often were you bothered by any illness, bodily disorder, aches or pains?

 [ ]   Every day
 [ ]   Almost every day
 [ ]   About half the time
 [ ]   Now and then, but less than half the time
 [ ]   Rarely
 [ ]   None of the time

3. Did you feel depressed?

 [ ]   Yes-to the point that I felt like taking my own life
 [ ]   Yes-to the point that I did not care about anything
 [ ]   Yes-very depressed almost every day
 [ ]   Yes-quite depressed several times
 [ ]   Yes-a little depressed now and then
 [ ]   No-never felt depressed at all

4. Have you been in firm control of your behaviour, thoughts, emotions, or feelings?

 [ ]   Yes, definitely so
 [ ]   Yes, for the most part
 [ ]   Generally so
 [ ]   Not too well
 [ ]   No, and I am somewhat disturbed
 [ ]   No, and I am very disturbed

5. Have you been bothered by nervousness or your "nerves"?

[ ]   Extremely so, to the point where I could not work or take care of things
[ ]   Very much so
[ ]   Quite a bit
[ ]   Some-enough to bother me
[ ]   A little
[ ]   Not at all

6. How much energy, pep, or vitality did you have or feel?

[ ]   Very full of energy-lots of pep
[ ]   Fairly energetic most of the time
[ ]   My energy level varied quite a bit
[ ]   Generally low in energy or pep
[ ]   Very low in energy or pep most of the time
[ ]   No energy or pep at all-I felt drained, sapped

7. I felt down hearted and blue.

[ ]   None of the time
[ ]   A little of the time
[ ]   Some of the time
[ ]   A good bit of the time
[ ]   Most of the time
[ ]   All of the time

8. Were you generally tense or did you feel any tension?

[ ]   Yes, extremely tense, most or all of the time
[ ]   Yes, very tense most of the time
[ ]   Not generally tense, but did feel fairly tense several times
[ ]   I felt a little tense a few times
[ ]   My general tension level was quite low
[ ]   I never felt tense or any tension at all

9. How happy, satisfied, or pleased have you been with your personal life?

[ ]   Extremely happy-could not have been more satisfied or pleased
[ ]   Very happy most of the time
[ ]   Generally satisfied-pleased
[ ]   Sometimes fairly happy, sometimes fairly unhappy
[ ]   Generally dissatisfied, unhappy
[ ]   Very dissatisfied or unhappy most of the time

10. Did you feel healthy enough to carry out the things you like to do or had to do?

[ ]   Yes-definitely so
[ ]   For the most part
[ ]   Health problems limited me in some mportant ways
[ ]   I was only healthy enough to take care of myself
[ ]   I needed some help in taking care of myself
[ ]   I needed someone to help me with most or all of the things I had to do

11. Have you felt so sad, discouraged, hopeless, or had so many problems
    that you wondered if anything was worthwhile?

[ ]   Extremely so-to the point that I have just about given up
[ ]   Very much so
[ ]   Quite a bit
[ ]   Some-enough to bother me
[ ]   A little bit
[ ]   Not at all

12. I woke up feeling fresh and rested.

[ ]   None of the time
[ ]   A little of the time
[ ]   Some of the time
[ ]   A good bit of the time
[ ]   Most of the time
[ ]   All of the time

13. Have you been concerned, worried, or had any fears about your health?

[ ]   Extremely so
[ ]   Very much so
[ ]   Quite a bit
[ ]   Some, but not a lot
[ ]   Practically never
[ ]   Not at all

14.   Have you had any reason to wonder if you were losing your mind, or
losing control over the way you act, talk, think, feel or loss of your memory?

[ ]   Not at all
[ ]   Only a little
[ ]   Some-but not enough to be concerned or worried about
[ ]   Some and I have been a little concerned
[ ]   Some and I am quite concerned
[ ]   Yes, very much so and I am very concerned

15. My daily life was full of things that were interesting to me.

    [ ]   None of the time
    [ ]   A little of the time
    [ ]   Some of the time
    [ ]   A good bit of the time
    [ ]   Most of the time
    [ ]   All of the time

16. Did you feel active, vigorous, or dull, sluggish?

    [ ]   Very active, vigorous every day
    [ ]   Mostly active, vigorous-never really dull sluggish
    [ ]   Fairly active, vigorous-seldom dull, sluggish
    [ ]   Fairly dull, sluggish- seldom active, vigorous
    [ ]   Mostly dull, sluggish-never really active, vigorous
    [ ]   Very dull, sluggish every day

17. Have you been anxious, worried, or upset?

    [ ]   Extremely so-to the point of being sick or almost sick
    [ ]   Very much so
    [ ]   Quite a bit
    [ ]   Some-enough to bother me
    [ ]   A little bit
    [ ]   Not at all

18. I was emotionally stable and sure of myself.

    [ ]   None of the time
    [ ]   A little of the time
    [ ]   Some of the time
    [ ]   A good bit of the time
    [ ]   Most of the time
    [ ]   All of the time

19. Did you feel relaxed, at ease or high strung, tight, or keyed-up?

    [ ]   Felt relaxed and at ease for the whole month
    [ ]   Felt relaxed and at ease most of the time
    [ ]   Generally felt relaxed but at times felt fairly highly strung
    [ ]   Generally felt high strung but at times felt fairly relaxed
    [ ]   Felt high strung, tight, or keyed-up most of the time
    [ ]   Felt high strung, tight keyed up the whole month

20. I felt cheerful, light-hearted.

       [ ]   None of the time
       [ ]   A little of the time
       [ ]   Some of the time
       [ ]   A good bit of the time
       [ ]   Most of the time
       [ ]   All of the time

21. I felt tired, worn out, used up, or exhausted.

       [ ]   None of the time
       [ ]   A little of the time
       [ ]   Some of the time
       [ ]   A good bit of the time
       [ ]   Most of the time
       [ ]   All of the time

22. Have you been under or felt you were under any strain, stress, or pressure?

       [ ]   Yes-almost more than I could bear or stand
       [ ]   Yes-quite a bit of pressure
       [ ]   Yes, some-more than usual
       [ ]   Yes, some-but about usual
       [ ]   Yes, a little
       [ ]   Not at all

The Life Orientation Test (Scheir & Carver, 1985)

	I disagree a lot	I disagree a little	I neither agree nor disagree	I agree a little	I agree a lot
In uncertain times, I usually expect the best.	☐				☐
It's easy for me to relax.	☐				☐
If something can go wrong for me, it will.	☐	☐	☐	☐	☐
I always look on the bright side.	☐	☐	☐	☐	☐
I'm always optimistic about my future.	☐	☐	☐	☐	☐
I enjoy my friends a lot.	☐	☐	☐	☐	☐
It's important for me to keep busy.	☐	☐	☐	☐	☐
I hardly ever expect things to go my way.	☐	☐	☐	☐	☐
Things never work out the way I want them to.	☐	☐	☐	☐	☐
I don't get upset easily.	☐	☐	☐	☐	☐
I'm a believer in the idea that 'every cloud has a silver lining'.	☐				☐
I rarely count on good things happening to me.	☐	☐	☐	☐	☐

Dispositional Resilience Scale (DRS-30)
(Bartone, Ursano, Wright & Ingram, 1989).

Instructions: Tick the box that best describes how you feel about each of the following statements. Please tick only one answer per line.

	Not at all true	A little true	Quite true	Completely true
Most of my life gets spent doing things that are worthwhile.	☐	☐	☐	☐
Planning ahead can help avoid most future problems.	☐	☐	☐	☐
No matter how hard I try, my efforts usually accomplish nothing.	☐	☐	☐	☐
I don't like to make changes in my everyday schedule.	☐	☐	☐	☐
The 'tried and true' ways are always the best.	☐	☐	☐	☐
Working hard doesn't matter since only the bosses profit by it.	☐	☐	☐	☐
By working hard you can always achieve your goals.	☐	☐	☐	☐
Most of what happens in life is just meant to be.	☐	☐	☐	☐
When I make plans, I'm certain I can make them work.	☐	☐	☐	☐
It's exciting to learn something about myself	☐	☐	☐	☐
I really look forward to my work.	☐	☐	☐	☐
If I'm working on a difficult task, I know when to seek help.	☐	☐	☐	☐
I won't answer a question until I'm really sure I understand.	☐	☐	☐	☐
I like a lot of variety in my work.	☐	☐	☐	☐
Most of the time people listen carefully to what I say.	☐	☐	☐	☐
Thinking of yourself as a free person just leads to frustration.	☐	☐	☐	☐
Trying your best at work really pays off in the end.	☐	☐	☐	☐
My mistakes are usually very difficult to correct.	☐	☐	☐	☐
It bothers me when my daily routine gets interrupted.	☐	☐	☐	☐
Most good athletes and leaders are born, not made.	☐	☐	☐	☐
I often wake up eager to take up my life wherever it left off.	☐	☐	☐	☐
Lots of times, I don't really know my own mind.	☐	☐	☐	☐
I respect rules because they guide me.	☐	☐	☐	☐
I like it when things are uncertain or unpredictable.	☐	☐	☐	☐
I can't do much to prevent it if someone wants to harm me.	☐	☐	☐	☐
Changes in routine are interesting to me.	☐	☐	☐	☐
Most days life is really interesting and exciting for me.	☐	☐	☐	☐
It's hard to imagine anyone getting excited about working.	☐	☐	☐	☐
What happens to me tomorrow depends on what I do today.	☐	☐	☐	☐
Ordinary work is just too boring to be worth doing.	☐	☐	☐	☐

The Health Symptom Checklist (McNicholas & Collis, 1995).

Instructions: Place a tick in whichever column best describes how often you experience the symptom. Please tick only one answer per line.

	Never	Almost never	Rarely	Sometimes	Often	Almost always
Headaches.	☐	☐	☐	☐	☐	☐
Trouble concentrating or remembering things.	☐	☐	☐	☐	☐	☐
Feeling easily annoyed or irritated.	☐	☐	☐	☐	☐	☐
Sore throat/coughs/colds/flu.	☐	☐	☐	☐	☐	☐
Experiencing mood swings.	☐	☐	☐	☐	☐	☐
Trembling/feeling 'jittery'.	☐	☐	☐	☐	☐	☐
Allergies (e.g., asthma, excema, hayfever…).	☐	☐	☐	☐	☐	☐
Feeling miserable/unhappy or downhearted.	☐	☐	☐	☐	☐	☐
Feeling panicky about the future.	☐	☐	☐	☐	☐	☐
Feelings of impatience and intolerance.	☐	☐	☐	☐	☐	☐
Worrying too much about things.	☐	☐	☐	☐	☐	☐
Appetite problems (e.g., eating too much/too little).	☐	☐	☐	☐	☐	☐
Crying/feeling tearful.	☐	☐	☐	☐	☐	☐
Nausea/upset stomach/indigestion/heartburn.	☐	☐	☐	☐	☐	☐
Sleep problems (e.g., getting to sleep/staying asleep).	☐	☐	☐	☐	☐	☐
A lump in your throat.	☐	☐	☐	☐	☐	☐
Bowel problems (e.g., constipation/diarrhoea).	☐	☐	☐	☐	☐	☐
Feeling tense/keyed up.	☐	☐	☐	☐	☐	☐
Skin rashes.	☐	☐	☐	☐	☐	☐
Feeling everything is an effort.	☐	☐	☐	☐	☐	☐
Dental problems (e.g., toothache, gum pain).	☐	☐	☐	☐	☐	☐
Feeling you are worthless.	☐	☐	☐	☐	☐	☐
Wanting to shout or throw, smash or hit things.	☐	☐	☐	☐	☐	☐
Feeling run down.	☐	☐	☐	☐	☐	☐
Hands sweat, feel clammy.	☐	☐	☐	☐	☐	☐
Wanting to be alone/not bother with people.	☐	☐	☐	☐	☐	☐
Having disturbing dreams.	☐	☐	☐	☐	☐	☐
Feeling weak/lethargic.	☐	☐	☐	☐	☐	☐
Ear/eye infections.	☐	☐	☐	☐	☐	☐
Finding it very difficult to relax.	☐	☐	☐	☐	☐	☐

The eighteen additional questions in the open format used to explore who participants perceived as providing them with the kinds of support that might help to alleviate loneliness. One question is illustrated in the closed format.

Participants were given the following instructions:

The statements on the following pages explore what you do, and whom you prefer to do it with. After each statement simply write in the people, pastimes, etc that you feel are most relevant, and rate each answer 1 - 3 according to how important it is to you **(Ratings:** *1* **= a little,** *2* **= reasonably,** *3* **= a lot).**

Your answers needn't be exhaustive - just include those you feel are most important. So for some statements you may want to include only one possibility, whilst for others perhaps six are applicable. Three examples follow:

Example 1:

I'm particularly relaxed when [with]

	Your rating
Best friend(s)	*3*
Family dog	*2*
Parents	*2*
Alone	*1*
Cat	*2*
Playing tennis	*3*

Example 2:

For a shoulder to cry on I'd turn to

	Your rating
Girl friend	*3*
Family dog	*2*
Best friends	*2*
....	
....	
....	

Example 3:

If I was bored I'd seek out

	Your rating
Friend(s)	*3*
Family dog	*2*
T.V.	*1*
....	
....	
....	

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(Ratings: 1 = a little,   2 = reasonably,   3 = a lot).

Your rating

1).   I look approachable when I'm with   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]

Your

rating
2).   I wouldn't feel self-conscious when with   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]

Your

rating
3).   For leisure or recreation I like to be with   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]

Your

rating
4).   I feel valued, needed and loved by   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]

Your rating

5).   I feel able to confide in   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]
        "   "   .... [ ]

6). I feel close to: Your rating
      "   "   .... ┌──────┐
                                                     ├──────┤
      "   "   .... ├──────┤
                                                     ├──────┤
      "   "   .... ├──────┤
                                                     ├──────┤
      "   "   .... ├──────┤
                                                     ├──────┤
      "   "   .... ├──────┤
                                                     └──────┘
      "   "   ....

7). I receive affection from: Your rating
      "   "   .... ┌──────┐
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      └──────┘
      "   "   ....

8). I enjoy physical contact (e.g., hugging etc,   Your rating
comforting)with: .... ┌──────┐
      "   "   ├──────┤
      "   "   ....   ├──────┤
                                                         ├──────┤
      "   "   ....   ├──────┤
                                                         ├──────┤
      "   "   ....   ├──────┤
                                                         ├──────┤
      "   "   ....   ├──────┤
                                                         └──────┘
      "   "   ....

9). I feel free to show affection to: Your rating
      "   "   .... ┌──────┐
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      └──────┘
      "   "   ....

10).   My help is often needed by   Your rating
      "   "   .... ┌──────┐
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      ├──────┤
      "   "   .... ├──────┤
                                                      └──────┘
      "   "   ....

11). I'm unlikely to be at a 'loose end' when [with]:

Your rating

"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .

12).   I wish I could do more for:

Your rating

. . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .

13).   I'm unlikely to get bored when [with]

Your rating

. . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .

14).   I enjoying helping:

Your rating

. . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .

15).   I like part of my day to be spent with

Your rating

. . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .
"   "   . . . .

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16). It's helpful to share my feelings .... Your rating

      "   " ....

      "   " ....

      "   " ....

      "   " ....

      "   " ....

17). When I'm sad I would want to be with: .... Your rating

      "   " ....

      "   " ....

      "   " ....

      "   " ....

      "   " ....

18). When I'm happy I would want to be with: .... Your rating

      "   " ....

      "   " ....

      "   " ....

      "   " ....

      "   " ....

In the closed format, the 18 questions were presented as follows (only question 1 is shown

1). I look approachable when: alone   Your rating

      "   "   with my family

      "   "   with friend(s)

      "   "   with Partner

      "   "   with pet

      "   "   Other (state)............

Positive and Negative Affect (PANAS) (Watson, Clark, & Tellegen, 1988)

The following words describe different feelings or emotions.

Using the 1-5 scale below, use the appropriate number to indicate the extent you have felt this way during the past few weeks.

1	=	Very slightly, or not at all
2	=	A little
3	=	Moderately
4	=	Quite a bit
5	=	Extremely

_____	Interested	_____	Irritable
_____	Distressed	_____	Alert
_____	Excited	_____	Ashamed
_____	Upset	_____	Inspired
_____	Strong	_____	Nervous
_____	Guilty	_____	Determined
_____	Scared	_____	Attentive
_____	Hostile	_____	Jittery
_____	Enthusiastic	_____	Active
_____	Proud	_____	Afraid

The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffen, 1985).

Below are five statements with which you may agree or disagree.

Using the 1-7 scale below, indicate how much you agree with each item by placing the appropriate number on the line in front of that statement.

Please be open and honest in your responding.

1 = strongly disagree

2 = disagree

3 = slightly disagree

4 = neither agree nor disagree

5 = slightly agree

6 = agree

7 = strongly agree

_____ In most ways my life is close to my ideal.

_____ The conditions of my life are excellent.

_____ I am satisfied with my life.

_____ So far I have got the important things I want in life.

_____ If I could live my life over, I would change almost nothing.