

# **The effects of pet ownership on the physical health of their owners.**

Master's research paper, 2012-2013



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## Abstract

Many pet owners are convinced of the beneficiary health effects animals can have on their owners, however scientific evidence still seems to be inconclusive on the matter. Do pets really make their owners more healthy or are these assertions simply wishful thinking?

This study researched the effects of pet ownership in the Netherlands by measuring physical and mental health. 466 participants were gathered through an online questionnaire and the respondents were divided in two groups: pet owners (n=255) and non pet owners (n=211). The group 'Pet owners' comprised dog owners and cat owners. The questionnaire was composed of questions such as doctor visits, drug use and sick leave to measure physical health and used the validated Mental Health Continuum: Short-Form by Lamers et al. (2011) for the measurement of mental health.

Although little significant results were found the study seemed to reveal a certain trend. In general cat owners seemed to be in worse health than dog owners, implicating that it might depend on the species of the animal whether or not an owners might benefit from it. Based on these results and an elaborate literature study suggestions were made for future research.

## Introduction

It is often suggested that pets may have beneficial effects on the health of their owners, although frequently these assertions are not backed up by scientific evidence. One of the first scientists to scientifically report on possible effects of pet ownership was Erika Friedmann. In 1980 Friedmann et al discovered that patients who owned pets had a higher one year survival rate after a heart attack than people without pets. This raised scientific interest in the phenomenon of pet ownership as social variable for disease distribution and the potential value of pets providing social support and companionship (Friedmann, 1980).

In recent years more and more research has been conducted into the possible effects of pet ownership, mostly of dogs and cats, on both physical and mental health. While effects on physical health concern factors such as physical fitness and the presence of somatic diseases, effects on mental health describe an individual's emotional, social and psychological wellbeing. Although the results found are variable and sometimes even contradictory, many positive effects have been described; including enhanced physical health and fitness as well as improved psychological and social health.

Several studies have found evidence that pet ownership may lead to better health and less illness through various mechanisms. One important mechanism is stress reduction, since stress is one of the major risk factors contributing to illness. Dogs, for example, may reduce the stress experienced by their owners in stressful situations. Petting and talking to a dog has shown to temporarily lower heart rate and blood pressure (Vormbrock & Grossberg, 1988) and even just the presence of a dog seems to lower the autonomic responses to stress (Allen et al. 2002). Another possible mechanism is more physical activity depending on the type of pet. Since dogs need to be exercised, dog owners may also show increased physical activity that may contribute to an increased physical fitness and health (Serpell, 1991).

Beside improving health by preventing disease, dog ownership has also been described to attribute to a quicker recovery of illness (Wells, 2007). As mentioned above, a well-known study by Friedmann et al. showed higher survival rates after a heart attack in pet owners than in non-owners (Friedmann, 1980). Also, some dogs may be used as an early warning system to predict certain types of ailments, such as an oncoming epileptic insult (Dalziel et al., 2003), hypoglycemia in diabetic patients (Lim et al., 1992; Chen et al., 2000) and cancerous masses (Dobson, 2003; Fraser, 2002; Church & Williams, 2001).

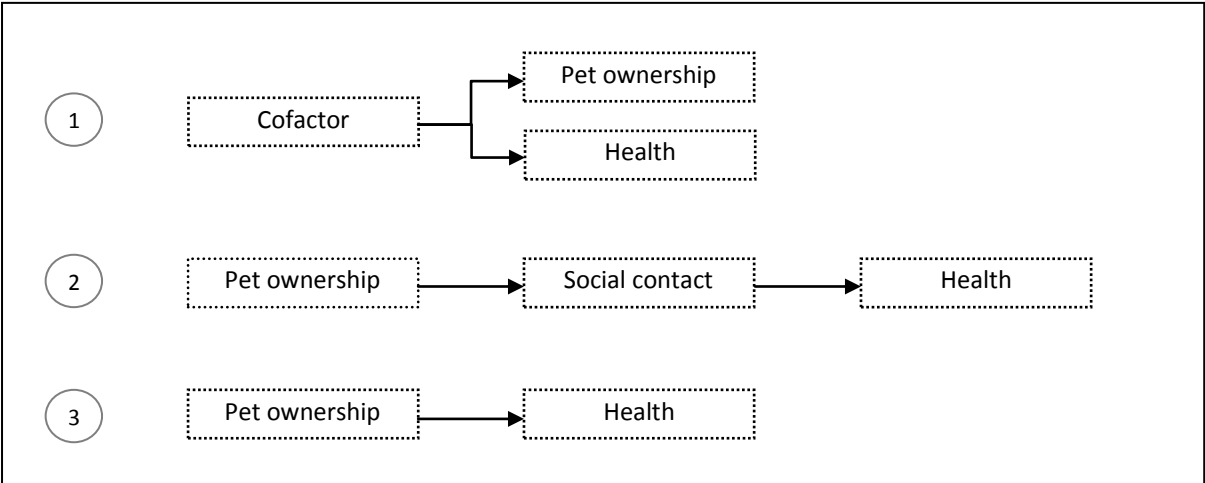
### ***Difficulties in researching these effects***

As mentioned above, the results of published studies are often controversial; while some studies find significant beneficial effects of pet ownership (Friedmann et al., 1980; Friedmann and Thomas, 1995; Siegel, 1990; Raina et al., 1998; Serpell, 1991; Headey, 1999; Heady et al., 2008; Heady & Grabka, 2004), others do not (Jorm et al., 1997; Crowley Robinson et al., 1998) and some even find negative health effects (Parslow et al., 2005). This inconsistency might be explained by the considerable variation in for instance methods of measuring, subject samples and interventions. Furthermore many studies are descriptive and gather their data by conducting interviews and surveys from convenience samples, whereas the golden standard for research requires an experimental setting with strictly controlled conditions and random assignment of subjects. The nature of the situation makes setting up an experimental study ethically rather difficult, since one can't simply force or deny pet ownership to achieve randomization.

Despite these restrictions Heady states that survey-based studies can still provide evidence of health benefits through pet relations, while controlled experimental studies can be used to search for causal links. (Headey, 2003). Many of the past studies have been cross-sectional, often concluding that there were significant health benefits compared to non-owners, but being unable to prove a causal link. Because of this the question remained: do pets make their owners healthier or are healthy people more inclined to take pets?

McNicholas et al. (2005) describes that there are three theories to explain the association found between pet ownership and improvement of human health (Figure 1). First proposal is that there isn't any association between the two, but that there is a cofactor such as age, social-economic status or personality which decides whether or not one acquires a pet. Thus far, such a cofactor hasn't been found and so it seems likely that at least some of the benefits to human health can be attributed to some facet of pet ownership. The second idea is that pets have an indirect effect on health by stimulating social contact. Social support has long been acknowledged as valuable to counter feelings of isolation and loneliness. These effects are strongest in people who are at higher risk of social isolation, for example the elderly and the disabled. The third proposal is that there is a direct effect between the two. Close relationships between humans have shown to have an important effect on wellbeing through emotional support and thereby decreasing the effects of stressful events. As a result people are less prone to anxiety related illness and may have a better recovery of certain serious illnesses including heart attacks, cancer and strokes (McNicholas, 2005).

**FIGURE 1 – Three theories to explain the association between pet ownership and improvement in human health according to McNicholas et al. (2005).**



A lack of social relationships have been described to be a major risk factor for human health comparable to other known risk factors such as high blood pressure, obesity, smoking and the lack of physical activity (House et al., 1988). Companion animals can often serve as a source of social support and relationship and thus decreasing the risks for their owners health.

Several studies have examined the physiological responses of the human body in the presence of animals, often finding a reduced autonomic response on mild stress and a decrease in blood pressure and heart rate (Allen and Blascovich, 1991; Allen et al., 2002). For example a Japanese study of Matooka et al. measured elderly people's changes in autonomic nervous activity while walking a dog and walking alone. The stress levels were considerably lower while walking with the dog compared to when they were walking alone. In fact, the mere presence of a dog in the same room showed a reduction in stress levels (Matooka et al., 2006).

Meanwhile, other researchers found no significant difference between pet owners and non-owners in for example the amount of doctor visits (Jorm et al., 1997), drug use or medical problems (Crowley Robinson et al., 1998). One large-scale Australian study even found an association between caring for a pet and negative health in older adults (Parslow et al., 2005). However the examined population samples of these studies were often small. Furthermore, they usually examined the effects of pet ownership on the elderly and the inhabitants of nursing homes, limiting the studies to a local population instead of using broad nation-wide sample.

### ***Review of previous studies***

Below several published studies will be reviewed about the effects of pet ownership, discussing both earlier research and more recent developments in this field.

As mentioned before, Friedmann et al discovered that patients who owned pets had a higher one year survival rate after a heart attack than people without pets (Friedmann et al., 1980). Wright and Moore criticized that Friedmann et al. had not properly controlled for other potential risk factors such as social-economic status and social support (Wright and Moore, 1982). In 1995 Friedmann and Thomas confirmed their previous results by repeating their research on a larger scale and measuring the cardiovascular physiology and psychosocial status. They determined the effects of pet ownership for several species discovering for instance that dog owners received more benefit than cat owners. In summary, people with dogs as pets were 8.6 times more likely to survive after a heart attack than people without a dog, while owning a cat proved to be unrelated to survival time (Friedmann and Thomas, 1995).

An American study by Siegel followed 938 Medicare enrollees for one year and examined stressful life events and the number of medical visits among the elderly. Pet owners made fewer doctor visits and were less affected by stressful life events than a matched group without pets (Siegel, 1990).

Likewise, Raina et al studied elderly people for one year and found that among them pet owners had declined less in both mental and physical health compared to those who did not own pets. Also, those who experienced more attachment to their pets showed better health than those with little attachment. However the pet owners of this study were already somewhat healthier when the study began and thus conclusions should be drawn with caution (Raina et al., 1998).

In 1991 a British study by Serpell examined the effect of acquiring a pet by having 71 individuals without pets adopt either a dog or a cat and comparing them to control group of 26 individuals who remained without pets. In the first month after acquisition pet owners showed a significant decrease in minor health problems (e.g. cold, headache, dizziness and hay fever) and an improvement of physical health and fitness, psychological wellbeing and self-confidence, while the control group showed no improvements. Dog owners maintained these benefits up until ten months and showed a considerable increase of physical exercise as well. However it's plausible that some participants might have guessed that the aim of the study was to assess health improvement and this could have influenced their responses (Serpell, 1991).

An Australian national survey by Headey et al. researched the potential health cost savings achieved by the beneficial effect of pet ownership. This resulted in a calculation of estimated health cost savings of \$988 million for the year 1994-1995. Furthermore they found that there were three gender-age groups who had the most medical contacts, that is to say: young women, elder women and elderly men. And it were these three groups who seemed to benefit the most from their pets (Headey, 1999).

A more unusual study was published by Headey et al; they researched a rather rare situation in China and described it as a 'natural experiment'. Until 1992 all pets were banned in the urban areas of China and in the years following dog ownership had grown rapidly among the citizens of major cities. This sudden introduction of dogs as companion animals presented an unique opportunity to measure the effect of dogs on the health of their owners. The dog owners were still self selected instead of randomly assigned and thus the risk of unobserved heterogeneity contamination remained present. To decrease this risk they conducted the research on a relatively homogenous group of young women and controlled for variables which could correlate with health. As results they found that dog owners exercised more and scored significantly higher in self-rated fitness and health; also owners made fewer doctor visits(48%) , took fewer sick days of works (49%) and slept better (fewer nights of bad sleep per month) compared to non-owners. In contrast to some of the abovementioned studies, Heady et al. tried to avoid any possible bias by telling respondents that the survey was about lifestyle issues (Heady et al., 2008).

In 2004 Headey and Grabka performed a longitudinal study in Germany with approximately 10.000 respondents gathered through the German Socio-Economic Panel (SOEP). This study was a continuation of a previous cross-sectional investigation performed in 1999 by Headey and Krause.

Headey and Grabka gathered information about health, doctor visits and pet ownership from the same panel of German respondents after 5 years had passed. They categorized the respondents in 4 groups according to whether they continued to own pets (PetAlways), they now owned a pet where they didn't 5 years ago (PetGain), they lost their pet (PetLoss) or they didn't own a pet at either time of questioning (PetNever). The PetNever group was used as a baseline and the other groups were compared with them. Because this was a longitudinal study, researching the changes after 5 years, they could now examine the effects of long term pet ownership, the effects of gaining or losing a pet and possibly find a causal link between pet ownership and health. As results they found that a reduction in doctor visits was only found in long term pet ownership, possibly because it takes time to build up a relationship with a pet. On the other hand the loss of a pet seemed to have immediate health costs. Since pet ownership was only measured at two occasions, it is impossible to say whether a decline in health led to the cessation of pet ownership or vice versa and whether a health improvement was the reason for gaining a pet or the other way around. However, when looking only at PetAlways and PetNever, Headey and Grabka found that the PetAlways group made 16% fewer doctor visits ( $p < 0.01$ ). As a concluding point they stated that it is possible that there are various mechanisms through which pets can bestow health benefits to their owners; it could be through the social support gained from the companionship, through stress-reduction or through improved fitness due to the daily exercise of walking the dog. Additionally, the immune system may be involved, considering the finding that it takes various years to build up the health benefits. These are all aspects that could be investigated in future studies (Heady & Grabka, 2004)

### ***Aim of this study***

Up until this moment little research has been published in the Netherlands regarding the subject of pet ownership and its potential effect on human health. Therefore this study was conducted, serving as a pilot study to inspiring future, large-scale research in this field.

In order to examine the effects of pets on the physical health of their owners the following hypotheses have been formulated for this study.

1. Dog and cat owners make fewer doctor visits than non-owners.
2. Dog and cat owners use less medication than non-owners.
3. Dog and cat owners have better self-rated health than non-owners.
4. Dog and cat owners take fewer days off from work due to illness than non-owners.
5. Dog and cat owners experience less hindrance at work or during daily activities than non-owners.
6. Dog and cat owners who are more closely attached to their pet will experience greater health benefits.

Hypothesis 6 will be examined by measuring the correlation between the degree of human-pet bonding and the variables mentioned in the first five hypotheses.

## Materials and methods

### *Design of the study*

Since most of the scientific evidence for beneficiary health effects of pet ownership are described in studies investigating dog and cat owners, this pilot study also limits pet ownership to dog owners and cat owners. Because this study is investigating the effects of dogs and cats on the health of their owners, two main groups are examined. One group consists of pet owners who own a dog and/or a cat, while the control group consists of non-pet owners (see Table 1). Because other pets beside dogs and cats may also have an effect on their owners, the control group was not made up of people without a dog or cat, but of people who didn't own any pet at all. Furthermore, to preclude possible lingering effects in the control group, it was made up of non-pet owners who hadn't owned any pet in the previous twelve months.

**TABLE 1 – Example of the allocation of respondents**

	Dog	Cat	Other pet (e.g. rabbit, bird)	Group
Respondent #1	Yes	No	No	Dog/cat owners
Respondent #2	No	Yes	No	Dog/cat owners
Respondent #3	Yes	No	Yes	Dog/cat owners
Respondent #4	No	No	Yes	Excluded from study
Respondent #5	No	No	No	Non-pet owners (control)

### *Participants*

Participants were recruited using email, social media, online forums and posters.

554 respondents started the questionnaire and 466 met the abovementioned demands regarding pet ownership for the study. Of the respondents 31% was male and 69% was female. The distribution of living arrangements amongst male and female respondents is fairly similar in composition (Table 2), this is also the case for the age distribution among both the sexes and pet owners/non pet owners (Tables 3 and 4). Lastly a comparison was made between the age distribution amongst the participants and the age distribution in the Netherlands in 2011 according to the national Central Bureau of Statistics (Table 5).

**TABLE 2 - Living arrangements among the participants**

Living arrangements	Male	Female	Total score
Living alone	31.7%	23%	25.7%
Living with roommates	20.7%	19.3%	19.7%
Living with partner	20.7%	27%	25.1%
Living with partner and child(ren)	22.8%	22.7%	22.7%
Single parent with child(ren)	3.4%	4.7%	4.3%
Widow/widower	0.7%	3.4%	2.6%

**TABLE 3 - Age distribution among the sexes**

Age	Male	Female
≤19	5.5%	5.3%
20-29	37.9%	42.7%
30-39	15.9%	16.5%
40-49	15.2%	15.3%
50-59	15.2%	12.1%
60-69	5.5%	5.6%
≥70	4.8%	2.5%



**TABLE 4 - Age distribution among pet owners and non pet owners**

Age	Pet owners	Non pet owners
≤19	5.5%	5.2%
20-29	40.8%	41.7%
30-39	18.4%	13.7%
40-49	17.6%	12.3%
50-59	14.5%	11.4%
60-69	2%	10%
≥70	1.2%	5.7%

**TABLE 5 - Age distribution in this study compared to the Dutch register of 2011 (Central Bureau of Statistics)**

Age	This study	Dutch register
<20	5.4%	23.5
20-40	57.5%	25.0
40-65	30.7%	35.9
65-80	5.6%	11.6
>80	0.9%	4.0

### **Questionnaire**

The survey was conducted using an online questionnaire consisting mainly of multiple choice answers. Some answers were provided with commentary fields underneath for specific commentary and clarification.

The survey was divided into four sections. The first section collected socio-demographic information and contained questions concerning pet ownership. If respondents had a pet they were asked to specify which species they owned. Pet owners who didn't own a dog or a cat were excluded from the study. People who did not own a pet at the time of the survey, but did own a pet in the past twelve months were also excluded to rule out any residual effects from previous pet ownership. The participants with a dog and/or cat were then asked additional questions to get an estimation of the bond and affection between owner and pet. Examples of questions asked: 'I like petting and cuddling with my pet' and 'I consider my pet part of my family'. The answers were rated on a 5-point Likert-scale. The possible answers were: strongly disagree, disagree, neutral, agree and strongly agree.

The second part of the survey was designed to collect information about the respondents' use of healthcare in the past six months. The participants were asked to specify their visits to the general practitioner, medical specialists, homecare, company doctor, physiotherapist, psychiatrist and alternative healer. The following questions asked the participants to report their use of medication in the past six months. Medication was subdivided in three categories: prescription drugs, over the counter drugs and homeopathic drugs. Participants were asked to specify each kind of medication they took, the duration of the therapy and how many times daily the medication was taken.

Next the respondents were asked to rate their physical health on a 0 to 100 scale and to answer several questions about their physical health which were also based on the 5-point Likert scale.

In the third section people were asked whether they had a paid job and if so how many days of the past two months they had been absent due to illness. In addition they were asked whether they had experienced hindrance due to physical problems which lowered their performance on the job in various ways. If they had experienced hindrance a short questionnaire measured how much hindrance they had experienced.

In order to compare people with a paid job to people without, questions were designed to score the amount of hindrance due to health problems during (simple) household tasks, work around the house and other activities outside of the house, such as grocery shopping.

The final section consisted of the Mental Health Continuum-Short Form (MHC-SF) to estimate mental health and emotional wellbeing (Lamers et al., 2011). This is a reliable and valid self-report

questionnaire for mental health estimation, using questions to measure three important factors: emotional, social and psychological wellbeing.

### **Statistical analyses**

SPSS 20.0 was used for the data analyses in this study and the commonly used *p* value of 0.05 was applied to determine significance in all the analyses. Since there was no solid reason to assume that pet owners would score better or worse than those without pets only two-sided tests were performed.

Dependent on the level of the data the tests of difference were Chi squared, Mann Whitney ‘U’ and independent ‘T’ test for nominal, ordinal and scale data respectively. For the measuring of correlation Spearman ‘rho’ was used.

## **Results**

### **Statistics of self-designed questions**

When possible, the questionnaire was composed of valid questions obtained from scientific literature. For example the MHC-SF from Lamers et al. was used to measure mental health and emotional wellbeing. However, in order to gather certain information (e.g. experienced hindrance during daily activities) it was necessary to formulate new questions relating to these subjects. Since these questions were self-designed for this study the reliability of these questions was unknown. In order to assess the reliability further statistical analysis was performed.

#### Correlation between hindrance at work and during daily activities

People were asked to specify the amount of hindrance due to physical problems they experienced at work to get a better estimation of their physical health. However, since not everyone has a job, three more questions were asked concerning hindrance during daily activities. The correlation between hindrance at work and during daily activities was calculated to see if these questions yielded similar results (Table 6). As table 6 shows, a significant positive correlation was found. This means that if participants experienced hindrance at work they often experienced difficulties during daily activities as well, making these latter questions a valuable addition for health measurements in the unemployed.

**TABLE 6 – Correlation between hindrance at work and during daily activities**

Experienced hindrance	Household tasks (cooking, cleaning, etc)	Outdoor activities (groceries, shopping, etc)	Work around the house ( car, garden)
Work - correlation	0.306	0.286	0.396
- significance	0.022	0.032	0.003

#### Correlations of self-assessed health

In the survey the participants were asked to rate their own health on a scale of 0 to 100 (with zero meaning very poor health and 100 excellent health). In order to test whether or not this subjective question would give reliable information, the self-assessment of health was correlated with their personal drug use and doctor visits (Table 7 and 8).

#### Correlation between self-assessed health and use of medication

Self-assessed health and use of medication were negatively correlated (Table 7). This correlation was found to be significant for prescription drugs, over the counter drugs and total drug use, but not for homeopathic remedies. In general this means that respondents who claim to be in better health also seem to use less medication, specifically prescription drugs and over-the-counter-drugs.

**TABLE 7 – Correlation between self-assessed health and use of medication**

	Drug use:	Prescription drugs	Over-the-counter drugs	Homeopathic remedies	Total
Self-rated health	- correlation	-0.193	-0.149	-0.090	-0.260
	- significance	0.000	0.01	0.52	0.000

*Correlation between self-assessed health and doctor visits*

Overall, an increase in self-rated health seemed to correlate with fewer doctor visits (Table 8). Visits to the general practitioner and the physiotherapist as well as the total of doctor visits showed a significant negative correlation with the self-rated health of the participants. This means that if the respondents claimed to feel healthier they also made fewer doctor visits; especially to the general practitioner and the physiotherapist.

Only the visits to the psychiatrist and the alternative medicine physician seemed to be positively correlated with self-rated health, but not significantly, Furthermore these correlations were very low (0.029 and 0.084 respectively).

**TABLE 8 – Correlation between self-assessed health and number of doctor visits.**

	Self-rated health:	Correlation	Significance
Doctor visits:	- General practitioner	- 0.265	0.000
	- Medical specialist	- 0.008	0.933
	- Psychiatrist	0.029	0.862
	- Home care	- 0.233	0.546
	- Company doctor	- 0.177	0.378
	- Physiotherapist	- 0.369	0.001
	- Alternative medicine physician	0.084	0.588
	- Total doctor visits	- 0.270	0.000

*Coherence of the 'assessment of the pet-owner-bond' questions*

The 'assessment of the bond' questions were purposefully designed for this study and Cronbach's Alpha was calculated to validate the reliability and coherence of the questions. The calculated value was 0.733, which is a fairly high score and therefore indicates a considerable coherence. The second part of table 9 shows the recalculated Cronbach's Alpha, should one of the questions be deleted. An increase in Cronbach's Alpha means that the deleted question did not match the other question and this may lead to rejection of the question. Deletion of question number 3 would have resulted in a somewhat higher Cronbach's Alpha, but the increase was considered too small to reject the question.

**TABLE 9 – Cronbach's Alpha calculated for the 'assessment of the pet-owner-bond' questions**

Cronbach's Alpha for all six items:	0.733
Statements	Cronbach's Alpha if item deleted
I like petting/cuddling with my pet	0.705
I find comfort in my pet when I am upset.	0.628
My pet facilitates making new contacts.	0.775
I consider my pet a part of my family	0.653
I do not love my pet	0.716
I would rather do other things than spend time with my pet	0.683

## Statistics of the survey

### Doctor visits

In order to get a broad view on their use of health care, participants were asked to report their visits to various departments of health care. Pet owners on average made more visit to the general practitioner, psychiatrist, company doctor, medical specialists and alternative medicine physician than non pet owners. However only the visits to psychiatrist were significantly more frequent.

On the other hand pet owners made less use of physiotherapists and home care, although this didn't differ significantly. Overall pet owners seemed to make somewhat more use of health care than those without pets, however when comparing only the dog owners to non pet owners a lower use of health care was found. Neither of these differences was significant (Table 10).

### Medication

When looking at the average use of medication pet owners seem to use fewer drugs than people without pets, however pet owners did show a higher use of prescription drugs and homeopathic remedies. Dog owners showed a lower use of prescription drugs, over-the-counter drugs and a lower average of total use of medication, while cat owners on the other hand showed a higher use of prescription drugs and a higher total drug use compared to non pet owners. Still, no significant difference was found between the groups concerning the use of medication (Table 10).

TABLE 10 – Average doctor visits and drug use of pet owners compared to people without pets.

	Pet owners			Non-pet owners (n=211)
	In general (n=255)	Dog owners (n=124)	Cat owners (n=171)	
<i>Average doctor visits</i>				
<b>-general practitioner</b>	<b>2.22</b>	<b>2.26</b>	<b>2.14</b>	<b>2.21</b>
<i>SIGNIFICANCE</i>	0.960	0.874	0.699	
<b>-medical specialists</b>	<b>2.53</b>	<b>2.33</b>	<b>2.45</b>	<b>2.28</b>
<i>SIGNIFICANCE</i>	0.530	0.913	0.668	
<b>- psychiatrist</b>	<b>10.05</b>	<b>8.67</b>	<b>10.80</b>	<b>4.55</b>
<i>SIGNIFICANCE</i>	0.049	0.163	0.067	
<b>-home care</b>	<b>15.83</b>	<b>13.25</b>	<b>14.33</b>	<b>20.33</b>
<i>SIGNIFICANCE</i>	0.556	0.404	0.514	
<b>-company doctor</b>	<b>2.19</b>	<b>2.71</b>	<b>2.29</b>	<b>1.91</b>
<i>SIGNIFICANCE</i>	0.602	0.259	0.505	
<b>-physiotherapist</b>	<b>9.40</b>	<b>7.39</b>	<b>9.62</b>	<b>10.72</b>
<i>SIGNIFICANCE</i>	0.640	0.312	0.722	
<b>-alternative medicine phys.</b>	<b>3.55</b>	<b>3.08</b>	<b>4.43</b>	<b>3.05</b>
<i>SIGNIFICANCE</i>	0.448	0.952	0.113	
<b>-total doctor visits</b>	<b>4.81</b>	<b>4.26</b>	<b>5.13</b>	<b>4.73</b>
<i>SIGNIFICANCE</i>	0.930	0.633	0.681	
<i>Average drug use</i>				
<b>-prescription drugs</b>	<b>0.84</b>	<b>0.67</b>	<b>0.94</b>	<b>0.76</b>
<i>SIGNIFICANCE</i>	0.451	0.405	0.143	
<b>-over-the-counter drugs</b>	<b>0.51</b>	<b>0.54</b>	<b>0.53</b>	<b>0.62</b>
<i>SIGNIFICANCE</i>	0.074	0.284	0.163	
<b>-homeopathic remedies</b>	<b>0.18</b>	<b>0.17</b>	<b>0.18</b>	<b>0.16</b>
<i>SIGNIFICANCE</i>	0.694	0.846	0.743	
<b>-total drugs use</b>	<b>1.53</b>	<b>1.38</b>	<b>1.64</b>	<b>1.54</b>
<i>SIGNIFICANCE</i>	0.938	0.247	0.482	

The 'Dog owners' and 'Cat owners' categories show overlap, since several respondents owned both a dog and a cat, while the 'In general' category covers all participants who owned dogs and/or cats.

**TABLE 11 – Self-rated health, sick leave and ‘hindrance at work’ of pet owners compared to those without a pet.**

	Pet owners			Non-pet owners (n=211)
	In general (n=255)	Dog owners (n=124)	Cat owners (n=171)	
<b>Self-reported health</b>	<b>77.80</b>	<b>79.44</b>	<b>77.32</b>	<b>77.2</b>
<i>SIGNIFICANCE</i>	0.700	0.223	0.946	
<i>Leave of absence</i>				
<b>- days (percentage)</b>	<b>12.3317</b>	<b>10.9375</b>	<b>13.1563</b>	<b>13.0794</b>
<i>SIGNIFICANCE</i>	0.858	0.693	0.987	
<b>- days (number)</b>	<b>4.04</b>	<b>3.38</b>	<b>4.30</b>	<b>7.19</b>
<i>SIGNIFICANCE</i>	0.296	0.462	0.400	
<i>Hindrance at work</i>				
<b>-days (percentage)</b>	<b>25.0521</b>	<b>19.6667</b>	<b>26.6171</b>	<b>27.8114</b>
<i>SIGNIFICANCE</i>	0.775	0.562	0.914	
<b>-amount of hindrance</b>	<b>14.0645</b>	<b>14.4167</b>	<b>14.0833</b>	<b>15.0714</b>
<i>SIGNIFICANCE</i>	0.426	0.720	0.474	
<b>-days(%) x amount</b>	<b>362.6935</b>	<b>290.1667</b>	<b>376.5675</b>	<b>553.3312</b>
<i>SIGNIFICANCE</i>	0.461	0.525	0.553	

#### *Self-reported health*

When asking the respondents to rate their health on a scale of 0 to 100, with 0 meaning very poor health and 100 excellent health, dog owners scored the highest of all groups, but not significantly higher. Pet owners in general, cat owners and individuals without pets all scored roughly the same (77.80, 77.32 and 77.20 respectively, see table 11).

#### *Leave of absence due to illness*

Leave of absence was calculated as a percentage of the contract days to rule out over- or underestimation. Pet owners scored lower than non pet owners on the percentage of days they took off from work, but not significantly. Cat owners however, took more days off due to illness compared to dog owners and non pet owners, but also not significantly.

When looking at the days taken off from work from a quantitative point of view, pet owners scored lower than non pet owners, but again not significantly. Of all groups, dog owners took the least days off work (Table 11).

#### *Experienced hindrance*

Participants were asked to report the amount of days they went to work while suffering from health problems and to rate the amount of hindrance they experienced on these days. Pet owners experienced less hindrance on their job than non pet owners, but not significantly less. Overall, dog owners experienced less health difficulties than cat owners or non pet owners. The number of days the hindrance was experienced was lower in pet owners, but not significantly. Again, dog owners experienced the fewest days with hindrance.

When multiplying ‘the percentage of work days with experienced health problems’ by ‘the amount of hindrance experienced’, pet owners scored lower than non pet owners, with dog owners scoring the lowest of all. However, once again both differences found were not significant (Table 11).

To estimate the amount of hindrance experienced by people without a paid job, questions regarding simple household tasks and other activities, such as grocery shopping were added to the questionnaire. Pet owners experienced more hindrance during household task and daily outdoor activities than non pet owners, but not significantly more. Work around the house offered less hindrance to pet owners in general than non pet, even though cat owners experienced more hindrance than non pet owners (Table 12). Neither of these differences were significant.

### Physical health

Using a short questionnaire to measure physical health respondents without pets scored lower, but not significantly lower, compared to pet owners in general and dog owners in specific. However the participants without pets showed better health than people with cats as pets (Table 12).

**TABLE 12 – Physical health and ‘hindrance during daily activities’ of pet owners compared to non-pet owners.**

	Pet owners			Non-pet owners (n=211)	
	In general (n=255)	Dog owners (n=124)	Cat owners (n=171)		
<b>Physical health</b>	<b>239.69</b>	<b>180.10</b>	<b>188.80</b>	In general	<b>226.02</b>
<i>SIGNIFICANCE</i>	0.273	0.078	0.594	Dog owners	<b>160.89</b>
				Cat owners	<b>194.83</b>
<i>Hindrance during daily act.</i>					
<b>-household tasks</b>	<b>205.29</b>	<b>145.39</b>	<b>177.52</b>	In general	<b>192.77</b>
<i>SIGNIFICANCE</i>	0.130	0.398	0.056	Dog owners	<b>139.43</b>
				Cat owners	<b>162.79</b>
<b>-outdoor activities</b>	<b>211.55</b>	<b>152.77</b>	<b>177.84</b>	In general	<b>203.84</b>
<i>SIGNIFICANCE</i>	0.312	0.320	0.316	Dog owners	<b>146.15</b>
				Cat owners	<b>170.89</b>
<b>-work around the house</b>				In general	<b>172.52</b>
<i>SIGNIFICANCE</i>	<b>170.72</b>	<b>119.69</b>	<b>142.40</b>	Dog owners	<b>121.82</b>
	0.809	0.738	0.911	Cat owners	<b>141.64</b>

Since the Mann-Whitney U test calculates a unique ranking score for every comparison, the ‘Non-pet owners’ class has different values for each category of ‘Pet owners’. A higher score in physical health equals better physical health and a higher score in hindrance means that respondents experienced more hindrance.

### Mental Health

Using the Mental Health Continuum-Short Form (Lamers et al. 2011) pet owners scored significantly higher on emotional wellbeing (P=0.012), which is part of the mental health. However, on social and psychological wellbeing and total mental health they scored lower, but not significantly lower. Dog owners scored a little higher on emotional wellbeing than both cat owners and non pet owners, but scored lower on social and psychical wellbeing and mental health (Table 12).

**TABLE 12 – MHC-SF results of pet owners compared to non-pet owners.**

	Pet owners			Non-pet owners (n=211)	
	In general (n=255)	Dog owners (n=124)	Cat owners (n=171)		
<i>MHC-SF results</i>					
<b>-emotional wellbeing</b>	<b>4.05</b>	<b>4.10</b>	<b>4.06</b>		<b>3.78</b>
<i>SIGNIFICANCE</i>	0.012	0.019	0.016		
<b>-social wellbeing</b>	<b>11.28</b>	<b>11.21</b>	<b>11.28</b>		<b>12.14</b>
<i>SIGNIFICANCE</i>	0.085	0.119	0.121		
<b>-psychological wellbeing</b>	<b>19.76</b>	<b>19.77</b>	<b>19.87</b>		<b>20.34</b>
<i>SIGNIFICANCE</i>	0.317	0.439	0.478		
<b>-mental health</b>	<b>42.62</b>	<b>42.50</b>	<b>42.82</b>		<b>43.78</b>
<i>SIGNIFICANCE</i>	0.324	0.366	0.468		

### BMI

Non pet owners had the highest percentage of people with an optimal BMI (18.5-25), while cat owners showed the lowest percentage. In the overweight category individuals without pets had the lowest percentage and cat owners the highest. The obese category follows the same trend, with non pet owners scoring the lowest and cat owners the highest. On the whole, the mean scores are roughly the same and don't differ significantly, neither do any of the other abovementioned differences when compared as percentages (Table 13).

**TABLE 13 – Comparison of the distribution among BMI-classes and the average BMI scores of pet owners in general, dog owners, cat owners and people without pets.**

	Pet owners			Non-pet owners (n=211)
	In general (n=255)	Dog owners (n=124)	Cat owners (n=171)	
<i>BMI classes</i>				
-underweight (<18.5)	3.5%	2.4%	4.1%	3.8%
-optimal weight (18.5 - 25)	53.3%	56.5%	52.0%	60.2%
-overweight (25 - 30)	32.2%	29.8%	32.2%	28.0%
-obese (≥30)	11.0%	11.3%	11.7%	8.1%
<i>SIGNIFICANCE</i>	0.444	0.657	0.395	
<b>Average BMI score</b>	<b>24.713</b>	<b>24.632</b>	<b>24.818</b>	<b>24.241</b>
<i>SIGNIFICANCE</i>	0.230	0.389	0.193	

BMI scores were obtained by dividing a person's bodyweight by the square of their height.

### ***Effects of the degree of human-pet bonding***

As has been mentioned before, the questions regarding the bonding between owner and pet showed a high Cronbach's Alpha. Therefore all aforementioned health variables were also tested in correlation to the bond between pets and their owners to see if the degree of pet attachment had any effect on the health of owners and their use of health care.

#### *Doctor visits*

People who felt more closely attached to their pet showed less frequent use of psychiatrists, home care, company doctors and physiotherapists. This also applied when looking solely at cat owners, except they seemed to make more use of the company doctor. Cat owners also seemed to make fewer visits to medical specialists. For dog owners an increase in pet-owner bonding resulted in a decrease in home care use and a decrease in visits to the company doctor and alternative medicine physician, however none of these correlations proved to be significantly correlated. When looking at the total use of health care a positive correlation was found for all three groups, but none of these correlations were significant (Table 14).

#### *Medication*

An increase in bonding revealed a significant, positive correlation with total drug use in both cat owners and pet owners in general. The use of prescription drugs was positively correlated for all of the three groups, but was only significant for the group of pet owners taken as a whole. In dog owners closer attachment to their pets resulted in a decrease in use of over-the-counter medication, homeopathic remedies and total drug use, however none of these decreases was significantly correlated (Table 14).

**TABLE 14 – Calculated correlation between the degree of owner-pet bonding and the variables used to evaluate the use of health care (average doctor visits and average drug use).**

	Degree of human-pet bonding		
	Pet owners in general (n=255)	Dog owners (n=124)	Cat owners (n=171)
<i>Average doctor visits</i>			
<b>-general practitioner</b>	<b>0.123</b>	<b>0.009</b>	<b>0.106</b>
<i>SIGNIFICANCE</i>	0.163	0.945	0.308
<b>-medical specialists</b>	<b>0.080</b>	<b>0.174</b>	<b>- 0.102</b>
<i>SIGNIFICANCE</i>	0.552	0.358	0.532
<b>- psychiatrist</b>	<b>- 0.079</b>	<b>0.344</b>	<b>- 0.303</b>
<i>SIGNIFICANCE</i>	0.749	0.365	0.241
<b>-home care</b>	<b>- 0.348</b>	<b>- 0.800</b>	<b>- 0.866</b>
<i>SIGNIFICANCE</i>	0.499	0.200	0.333
<b>-company doctor</b>	<b>- 0.792</b>	<b>- 0.183</b>	<b>0.040</b>
<i>SIGNIFICANCE</i>	0.790	0.696	0.891
<b>-physiotherapist</b>	<b>- 0.100</b>	<b>0.257</b>	<b>- 0.305</b>
<i>SIGNIFICANCE</i>	0.527	0.303	0.108
<b>-alternative medicine phys.</b>	<b>0.063</b>	<b>-0.027</b>	<b>0.125</b>
<i>SIGNIFICANCE</i>	0.780	0.935	0.669
<b>-total doctor visits</b>	<b>0.089</b>	<b>0.032</b>	<b>0.105</b>
<i>SIGNIFICANCE</i>	0.158	0.720	0.170
<i>Average drug use</i>			
<b>-prescription drugs</b>	<b>0.135</b>	<b>0.074</b>	<b>0.143</b>
<i>SIGNIFICANCE</i>	0.031	0.409	0.062
<b>-over-the-counter drugs</b>	<b>0.051</b>	<b>- 0.015</b>	<b>0.075</b>
<i>SIGNIFICANCE</i>	0.413	0.870	0.329
<b>-homeopathic remedies</b>	<b>- 0.495</b>	<b>- 0.204</b>	<b>0.018</b>
<i>SIGNIFICANCE</i>	0.433	0.203	0.815
<b>-total drugs use</b>	<b>0.130</b>	<b>-0.107</b>	<b>0.175</b>
<i>SIGNIFICANCE</i>	0.038	0.085	0.022

A positive value signifies that an increase in attachment would result in an increase of that variable (more doctor visits or higher drug use) and a negative correlation means an decrease of that variable (fewer doctor visits or lower drug use).

#### *Self-reported health*

Only dog owners displayed a slightly higher self-rated health when they were more closely attached to their pet. Nevertheless none of the correlations was significant (Table 15).

#### *Physical health*

Although no significant correlation was found, all three groups showed a lower physical health when pet-owner bond increased (Table 15).

**TABLE 15 – Calculated correlation between the degree of owner-pet bonding and the participants health.**

	Degree of human-pet bonding		
	Pet owners in general (n=255)	Dog owners (n=124)	Cat owners (n=171)
<b>Self-reported health</b>	<b>- 0.065</b>	<b>0.005</b>	<b>- 0.144</b>
<i>SIGNIFICANCE</i>	0.299	0.956	0.137
<b>Physical health</b>	<b>- 0.103</b>	<b>- 0.044</b>	<b>- 0.142</b>
<i>SIGNIFICANCE</i>	0.102	0.626	0.105

A positive value signifies that an increase in attachment would result in an increase of that variable (better health) and a negative correlation means an decrease of that variable (worse health).



**TABLE 16 – Calculated correlation between the degree of owner-pet bonding and leave**

	Degree of human-pet bonding		
	Pet owners in general (n=255)	Dog owners (n=124)	Cat owners (n=171)
<i>Leave of absence</i>			
<b>- days (percentage)</b>	<b>- 0.042</b>	<b>0.215</b>	<b>- 0.109</b>
<i>SIGNIFICANCE</i>	0.840	0.610	0.646
<i>Hindrance at work</i>			
<b>-days (percentage)</b>	<b>0.119</b>	<b>- 0.388</b>	<b>0.238</b>
<i>SIGNIFICANCE</i>	0.548	0.268	0.299
<b>-amount of hindrance</b>	<b>0.027</b>	<b>- 0.023</b>	<b>0.032</b>
<i>SIGNIFICANCE</i>	0.886	0.943	0.882
<b>-days(%) x amount</b>	<b>0.117</b>	<b>- 0.350</b>	<b>0.246</b>
<i>SIGNIFICANCE</i>	0.554	0.321	0.282
<i>Hindrance during daily act.</i>			
<b>-household tasks</b>	<b>0.191</b>	<b>0.120</b>	<b>0.234</b>
<i>SIGNIFICANCE</i>	0.005	0.236	0.003
<b>-outdoor activities</b>	<b>0.167</b>	<b>0.147</b>	<b>0.179</b>
<i>SIGNIFICANCE</i>	0.012	0.133	0.025
<b>-work around the house</b>	<b>0.165</b>	<b>0.106</b>	<b>0.188</b>
<i>SIGNIFICANCE</i>	0.021	0.309	0.029

A positive value signifies that an increase in attachment would result in an increase of that variable (higher percentage of sick leave or more experienced hindrance) and a negative correlation means an decrease of that variable (lower percentage of sick leave or less experienced hindrance).

#### *Leave of absence due to sickness*

A better bond with one's pet was negatively correlated to the percentage of days of sick leave. Meaning that people who felt more closely attached to their pet took fewer days off from work due to illness. This was however not the case for dog owners. They showed a positive correlation between bonding and amount of sick days. Again, none of these results were significant (Table 16).

#### *Experienced hindrance*

Employed participants were asked how many days a week they had to work and how many days in the last two months they had experienced hindrance at work due to physical problems. Using this information the percentage of days on which hindrance was experienced was calculated. The percentage of days, the amount of hindrance, and the percentage of days multiplied by the amount of hindrance were all positively correlated for pet ownership in general and cat ownership in specific, but negatively correlated for dog ownership. None of the correlations showed any significance.

Hindrance during household tasks was positively correlated with an increase in the bonding. This correlation was significant in overall pet ownership and cat ownership, but not in dog ownership. The same applies for activities out of the house. An increase in the attachment of pet owners in general and of cat owners in specific was significantly related to increased experienced hindrance during activities out of the house. The increase in the bond between owner and dog was also positively related to the amount of hindrance experienced, but not significantly. Hindrance during tasks around the house was positively correlated to the degree of bonding in all three categories, but only significant for pet owners in general and cat owners (Table 16).

#### *Mental health*

A better bond with one's pet resulted in a slight decrease of emotional and social wellbeing for both dog and cat owners. Furthermore an increase in the owner-pet bond resulted in a decrease of psychological wellbeing in cat owners, while in dog owners a slight increase in psychological

wellbeing was found. Mental health appears to be negatively correlated to an increase in the pet-owner bond of cat owners, however these findings weren't significantly correlated (Table 17).

**TABLE 17 – Correlation between the degree of pet attachment and the results of the MHC-SF, measuring the various aspects of mental health.**

	Degree of human-pet bonding		
	Pet owners in general (n=255)	Dog owners (n=124)	Cat owners (n=171)
<i>MHC-SF results</i>			
<b>-emotional wellbeing</b>	<b>-0.109</b>	<b>-0.095</b>	<b>-0.093</b>
<i>SIGNIFICANCE</i>	<i>0.083</i>	<i>0.292</i>	<i>0.226</i>
<b>-social wellbeing</b>	<b>-0.046</b>	<b>-0.043</b>	<b>-0.052</b>
<i>SIGNIFICANCE</i>	<i>0.464</i>	<i>0.630</i>	<i>0.494</i>
<b>-psychological wellbeing</b>	<b>-0.011</b>	<b>0.055</b>	<b>-0.015</b>
<i>SIGNIFICANCE</i>	<i>0.857</i>	<i>0.546</i>	<i>0.841</i>
<b>-mental health</b>	<b>-0.041</b>	<b>0.001</b>	<b>-0.052</b>
<i>SIGNIFICANCE</i>	<i>0.510</i>	<i>0.995</i>	<i>0.500</i>

## Discussion

### Strengths

The study was able to meet the prerequisite number of participants, which was set at 200 respondents for both pet owners and non-pet owners. Furthermore the age distribution among males and females was very similar, as was the age distribution among pet owners and non-pet owners. The living arrangements among males and females didn't differ significantly either.

The section in the survey which measured mental health was based on an accredited short form (MSC-SF, Lamers et al 2011) which is proven to be an effective way of measuring mental health, while questions about physical health were divided in multiple categories in order to collect specific and reliable data. By measuring these different physical health variables (self-assessed health, use of health care, use of medication, sick leave from work and hindrance during work and daily activities) it was possible to evaluate and compare the participants health in various ways. Participants were asked to rate their own health, which gives a good indication of how they perceive their own health and well being independent of their use of medication or health care. Pet owners in general rated themselves higher than those without pets, while in contrast pet owners seemed to use more prescription drugs and make more visits to the general practitioner and medical specialists than non pet owners. Although these differences were not significant, this could imply that despite worse health scores, pet owners still felt fitter than non pet owners.

By asking participants to report their use of medication and health care in a quantitative manner it was possible not only to compare the responses on severity, but also on quantity.

The 'assessment of the human-pet bond' questions had a fairly high Cronbach's Alpha which indicates a considerable coherence and reliability. Only one question led to an increase of Cronbach's Alpha if deleted, but this increase was not considered to be high enough to reject the question. Because of this high coherence, the correlation between owner-pet bonding and various health aspects was calculated to evaluate the effect of the bond on these variables. This gave the study an extra dimension.

As mentioned before this study limited pet ownership to dog owners and cat owners. This is in accordance with the majority of the studies researching the health effects of pet ownership. Additionally, most of the scientific evidence for beneficiary health effects of pet ownership is also described in studies investigating dog and cat ownership. If there is a positive effect to be found, the limiting of pet ownership to those species who have proved to show beneficial effects on their owners in previous studies, will make it more likely to find significant results in this study.

## **Challenges**

The age distribution of this study does not resemble the age distribution in the Netherlands as reported by the Dutch Central Bureau of Statistics (CBS, 2011). The decision was made to examine the effect of pet ownership on adults exclusively and therefore an age limit of 18 years and older was set when asking for respondents. People younger than 20 years account for a high percentage of the Dutch population (23.5%). This gap was filled by using a larger group of participants in the 20-40 years category (this study: 57.5%). At the same time it was rather challenging to contact and acquire a sufficient number of older people, because not many elderly are active on modern social media, such as online forums.

The sample for this study consisted mainly of self-chosen participants. A point of critique could be that the investigated respondents are mostly gathered through convenience sampling. A major portion of the participants was acquired by sending out e-mail and contacting people through social networks, which means that people who don't make use of modern social networks were less likely to be part of the study. Furthermore, by using the internet as one of the main tools to contact potential respondents, it is likely this study targeted and collected a specific group of people. It could be possible that those who filled out the questionnaire are people who spend a lot of time at home on the internet, for instance because they are socially isolated or are in poorer health. This could mean for example that people who are chronically ill or who are unemployed because of physical problems could have been more likely to be contacted and enter the survey than those who spend little time online due to work.

However, beside the internet, various other methods were used to gather respondents. For example, in hospitals, universities, students flats and supermarkets, posters were hung up from which people could tear off a piece of paper containing the hyperlink of the survey. In theory supermarkets could have been a good source for gathering participants, however they often limit advertising to a small standardized card, thus disabling the use of those easy to take home pieces of paper. Because of this, shoppers would have to copy the hyperlink manually, raising the threshold to participate in the study.

In retrospect, the questionnaire could have been more extensive, but on the other hand questionnaires with a lot of questions suffer from item non response or a low response in general. Socio-economic questions such as income and education were not included in the survey. These questions would have provided additional data regarding the participants, but the answers to these questions might have been considered too private by some participants. Already several participants expressed their reluctance to fill in their weight and length and some even discontinued the questionnaire because they refused to give out this information. So hypothetically, the addition of more personal questions could have caused more participants to quit the questionnaire prematurely, even though it was repeatedly noted that the questionnaire was strictly anonymous.

Other participants expressed their need for an opportunity to report their chronic illness. Adding the option of reporting chronic illness could have been an interesting option, which could have been examined separately and might have explained some of the findings.

The measurement of physical health could have been expanded with several questions. The survey contained questions about the use of health care and medication, hindrance, sick leave and self-rated health, but didn't ask about some other aspects which may contribute to health status. Respondents could have been asked about the occurrence of sleeping problems and questions regarding physical fitness could have been added to the survey. Inquiring about sports and other forms of exercise could have given extra information about the physical fitness of the participants.

As is the case in most previous studies, the cross-sectional design of this study only allows detection of differences between people with and without pets, whereas a longitudinal study would have been able to investigate possible causal links between health and pet ownership. Because of the timeframe that was set for this study, it was impossible to organize follow-ups with sufficient time in-between the measuring points.

Lastly, the survey was set up in such a way that people could easily guess the goal of the study and therefore a certain degree of response bias is to be expected.

### ***Discussion of the results***

Although little significant results were found, a trend was observed between the two groups of pet owners. Cat owners almost consistently showed poorer health than dog owners and non pet owners. The question remains: do cats make their owners less healthy? Or: are people who are less healthy more inclined to choose a cat as companion?

Cats, when compared to dogs, are low maintenance animals that don't require the owners to exercise them or even walk them. They can however still give social and emotional support and make good pets for disabled or bedridden people. Since the questionnaire didn't allow participants to report their chronic illness or disability, it is at this point impossible to control for these factors. At the same time it is impossible to predict whether these people would have better health or wellbeing with or without pets.

The finding that cat owners were more likely to make use of mental health care professionals is consistent with the findings of Rijken et al. (2011). However, they found that there was no difference in mental health status, while this study shows a significant increase in emotional wellbeing in pet owners.

In the study of Friedmann and Thomas cat ownership was unrelated to survival time after a heart attack while dog owners were 8.6 times more likely to survive. This also shows a difference between the effects of dog ownership and cat ownership (Friedmann and Thomas, 1995).

### ***Hypotheses***

When comparing the results of this study with the findings of previously discussed studies it seems it failed to replicate the desirable result that dogs and cats have beneficiary effects on the health of their owners. But, as mentioned before, results in this field of study are not rarely inconsistent.

Although unfortunately none of the results was in line with the preconceived hypotheses, often comparable results can be found in other published studies. For example concerning the first two hypotheses; a number of studies were also unable to report any significant difference in doctor visits and drug use between pet owners and non-owners (Jorm et al., 1997; Parslow and Jorm, 2003; Crowley Robinson and Blackshaw, 1998).

When looking at the effects of pet attachment, tested for hypothesis 6, Budge et al. reported a positive correlation between physical symptoms and attachment, which is in line with the significant increase in drug use found in this study (Budge et al., 1998). Headey et al. however found positive correlations between pet attachment and five of the six variables they used to estimate health, reporting that closer human-pet relationships do result in health benefits (Headey et al., 2008).

The correlated increase in drug use that was found in this study, again especially in cat owners, can be explained in two ways. One possibility is that when people are more closely attached to their pet they will probably interact more intimately with their pet. If these people are suffering from certain illnesses, such as asthma or allergies, their physical symptoms might be aggravated thus resulting in a higher drug use to control the symptoms. The second explanation is that people are using more drugs because of (chronic) illnesses and because of this are involved in fewer social activities. These people may keep pets as a form of social compensation and may become more closely attached to them as a result.

### ***Importance of the study and future research***

The fact that this pilot study didn't yield the anticipated results does not mean the research should be discarded. A recent article by Herzog discussed the conflicting results that are prevalent in this area of science and emphasized the importance of publishing negative results (Herzog, 2011).

It also described various possible reasons for the difficulties in replication and the inconclusiveness about the effects of animals on their owners health, some of which are already discussed earlier in this article (Table 18).

**TABLE 18 – Reasons for inconclusiveness about the effects of pets on the health of their owners (Herzog, 2011).**

Reason	Explanation
Prone to replication problems	The great variation in methods of measuring and interventions, the small and often homogeneous samples and the small effect sizes are all criteria which are associated with low reliability (Ioannidis, 2005)
Not true experiments	No random allocation of participants but self-chosen pet owners. This makes it difficult to determine the cause of found effects. E.g. do pets make their owners healthier or are healthier people more inclined to take pets?
Self-reports	The perception of participants about themselves is often not objective and can lead to false results and conclusions.
'File drawer effect'	Negative results are less likely to be published in a scientific journal and more likely to end up in the lower drawer of the researcher's cabinet.
Erroneous positive results	Researchers who study pet-owner relationships are often convinced of the beneficiary effects of animals on their owners and may inadvertently lead to unconsciously biasing their results.

It is necessary that further research into the effects of human-animal relationships is performed, however it is very important to keep the abovementioned difficulties in mind when designing a study. This pilot research studied several physical health and mental health variables and might have been too broad in its scope. Instead of researching *if* pet ownership has beneficiary health effects it could perhaps be more valuable to research *under which circumstances* people experience positive health effects from owner-pet relationships.

Because this study's questionnaire didn't differentiate between healthy participants and those who were chronically ill the effects of chronic illness could not be examined. A future study could concentrate on this group of people specifically and research whether or not pet ownership has an effect on their health and wellbeing.

It appears that cat owners don't experience the same effects as dog owners and therefore it might be unwise to simply research the effects of pet ownership. Instead it might be better to research the effects of the animals of interest separately. Splitting the pet owners group into two separate groups for cat owners and dog owners might give more insights into the differences between the two. For example, if it would have been applied to this study it would have meant that three separate groups would have been studied which were all equal in size: n=200 for dog owners, cat owners and non pet owners.

Furthermore cross-sectional research will only be able to prove that there are significant differences in health between pet owners and non pet owners and longitudinal research is required to determine a causal link. Regular follow-up and researching motivation for acquiring or losing a pet may lead to finding evidence for health effects due to pet ownership.

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