

# Effects of pet ownership on arterial hypertension and cardiovascular disease

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## Abstract

Preventing high blood pressure and reducing cardiovascular risk are the cornerstones of preventing and treating cardiovascular disease. Non-traditional cardiovascular risk reduction The potential applicability of methods, such as pet ownership, has attracted increasing attention. Studies have shown that pet ownership can reduce the risk of death from any cause, especially cardiovascular disease, and pet ownership can reduce the risk of high blood pressure and improve blood pressure control in people with diagnosed hypertension. This article focuses on the direct and indirect influencing factors of pet ownership on cardiovascular diseases, briefly reviews the research on the relationship between pet ownership and human coronary artery disease (CAD) in the past decade, and briefly describes the research methods, analysis models, main conclusions, and limitations. The aim is to prove whether pet ownership, especially dog ownership, is associated with a reduced risk of coronary artery disease and ultimately draw positive conclusions that provide new ideas for treating this type of disease in the future.

**Keywords:** Home pets · Pet ownership · Blood pressure · Arterial hypertension · Cardiovascular disease

## INTRODUCTION

Coronary artery disease is the leading cause of morbidity and mortality worldwide<sup>[1]</sup>. It includes coronary heart disease, heart failure, and stroke. These diseases can be life-threatening<sup>[2]</sup>, impose a substantial economic burden on healthcare systems and individuals, and have significant implications for the global public. Co-health has malignant effects<sup>[3]</sup>. Identifying potential protective factors (e.g., pet ownership) can have substantial public health implications Big impact. That's why it's especially important to study the effect of pet ownership on heart disease morbidity and mortality. Inspired by an article on the benefits of pet ownership during the novel coronavirus pandemic<sup>[4]</sup>, this paper set out to investigate the relationship between pet ownership and coronary heart disease.

According to several published studies and their data, owning a pet does reduce the risk of coronary heart disease attacks. These studies are straight. Data studies were followed without analyzing potential causes and associations. For example, one study used meta-analysis to synthesize several. As a result of the study, pet ownership was associated with a reduced risk of death and improved cardiovascular function. 958 participants in 11 years of deaths during the observation period, of which 499 deaths were related to cardiovascular disease. Owning a pet (compared to never owning a pet) versus any Lower risk of death due to cause (previous pet ownership: HR = 0.76; 95% CI: 0.63-0.91; Current pet: HR= 0.72; 95%

CI: 0.60 to 0.87) and cardiovascular causes (previous pet ownership: HR = 0.70; 95% CI: 0.55-0.89; while Former pet owners: HR = 0.60; 95% CI: 0.46-0.77) was associated with a reduced risk of death<sup>[5]</sup>. Overall, the statistical analysis methods described are appropriate for addressing research questions and testing hypotheses. The findings suggest that pet ownership may be beneficial for cardiovascular health, but further research is needed to fully understand the mechanisms underlying this relationship.

At a deeper level, pet ownership is associated with various health benefits<sup>[6]</sup>, including reduced stress<sup>[7]</sup>, improved mental health, social acceptance, increased physical activity, and socialization. These factors have a direct or indirect impact on the risk of cardiovascular disease. Based on the existing research results, the association between pets and the risk of coronary atherosclerosis has yet to be clarified. Therefore, investigating this relationship may provide valuable information about the potential health benefits of pet ownership and inform future research and public health interventions. At the same time, it affirms that this study's research methods and limitations can provide a sustainable reference for future research.

## STATISTICAL ANALYSIS METHODS

Statistical analysis methods used in the last five years of related studies include chi-square tests, independent samples t-tests, univariate and multivariate logistic regression analyses, and linear trend tests.

Table1  
Characteristics between CAD and non-CAD.

Characteristics	CAD (n = 378)	Non-CAD (n = 183)	P
Age, y	63.07 ±9.89	59.91 ±10.78	0.001
Gender (M/F)	266/112	110/73	0.015
BMI, kg/m <sup>2</sup>	25.42 ±3.35	24.81 ±3.63	0.030
Hypertension	288 (76.2)	114 (62.3)	0.001
Diabetes	98 (25.9)	21 (11.5)	<0.001
Hyperlipidemia	82 (21.7)	26 (14.2)	0.035
Smoke			0.003
Never	175 (46.3)	113 (61.7)	
Former	58 (15.3)	22 (12.0)	
Current	145 (38.4)	48 (26.2)	
Drink			0.171
Never	199 (52.6)	111 (60.7)	
Former	87 (23.0)	32 (17.5)	
Current	92 (24.3)	40 (21.9)	
Physical activity	51 (13.5)	47 (25.7)	<0.001
Family history of CAD	85 (22.5)	22 (12.0)	0.003
Education			0.354
Illiteracy	40 (10.6)	23 (12.6)	
Primary	66 (17.5)	24 (13.1)	
Middle	98 (25.9)	59 (32.2)	
High	97 (25.7)	46 (25.1)	
College	77 (20.4)	31 (16.9)	
Pet owners	65 (17.2)	45 (24.6)	0.039

Values expressed as mean±SD or n (%). BMI=body mass index, CAD=coronary artery disease.

Table 1

(1)The chi-square test is suitable for comparing categorical variables and determining significant differences between groups. For example, in the article Association between

pet ownership and coronary artery disease in a Chinese Population<sup>[8]</sup> by Zhi-Yong Xie etc (hereafter referred to as “Article 1”), Table 1 shows the association between pet ownership and coronary artery disease in a Chinese population (hereafter referred to as “Article 2”).

(2)Independent samples t-tests were used to compare continuous variables such as age and body mass index between groups. For example, the previously mentioned Table 1<sup>[8]</sup> shows the characteristics of CAD and non-CAD patients, and an independent samples t-test was used to determine significant differences in age and body mass index between the two groups. This approach is suitable for comparing continuous variables and identifying substantial differences between groups.

(3)Univariate and multivariate logistic regression analyses were used to assess and rule out the interference of various influences, such as the effect of pet ownership on CAD, after adjusting for other variables. For example, logistic regression analyses were used to assess the association between pet ownership and CAD after adjusting for age, sex, body mass index, hypertension, diabetes, hyperlipidemia, smoking status, drinking status, physical activity, and family history of CAD. This approach is suitable for assessing associations between variables while controlling for potential confounders.

(4)A linear trend test was used to analyze the duration of pet ownership and its association with CAD risk. For example, Article 1<sup>[8]</sup> states that the variable of pet ownership was set at multiple levels compared to non-pet owners, and a linear trend test was used to analyze the duration of pet ownership. This approach is suitable for analyzing the relationship between a continuous variable (duration of pet ownership) and a binary outcome (CAD). It is worth noting that some of the studies did not describe in detail the statistical methods used to analyze the data but instead cited several examples of studies investigating the relationship between pet ownership and cardiovascular health. Still, these studies also used various statistical methods to analyze the data, including regression, multivariate, and meta-analysis. For example, a study cited in Pet Ownership and the Risk of Arterial Hypertension and Cardiovascular Disease<sup>[9]</sup>, published by Stanisław Surma and other researchers, used multivariate analyses to examine the relationship between pet ownership and cardiovascular risk factors such as blood pressure and cholesterol levels).

## DIRECT AND INDIRECT INFLUENCING FACTORS

Based on available research data, pet ownership has the following advantages that would have a benign effect on

coronary heart disease:

### **1. Reduce stress and lower blood pressure.**

A 2018 meta-analysis using a random-effects model [10] showed that exposure to pet therapy (PT) reduced physiological and subjective stress and anxiety levels. The report confirms the effectiveness of PT as a method of lowering physiological stress levels (blood pressure and heart rate) as well as subjective stress and anxiety scores (self-reported stress/anxiety). In another 2020 clinical trial [11], through controlled experiments, the evaluation concluded that ACE inhibitors alone could reduce resting blood pressure while increasing social support through pet ownership can reduce blood pressure response to mental stress. Interacting with pets, such as petting dogs and cats, releases oxytocin, a hormone linked to affection and stress reduction. This helps lower an individual's blood pressure and heart rate. Blood pressure is strongly correlated with overall cardiovascular risk. Increased blood pressure leads to cardiovascular and cerebrovascular endpoints such as myocardial infarction, heart failure, cardiovascular death, and stroke [12]. Reducing psychological stress and lowering blood pressure can significantly reduce the risk of arterial hypertension and cardiovascular disease.

### **2. Increase physical activity.**

Having a pet, especially a dog, usually promotes physical activity. From the perspective of life, it is worth affirming that the relatively fixed outdoor exercise time every day can make dog owners gain good exercise habits. Regular walks and playing with pets can help people maintain a healthier weight and cardiovascular fitness [13]. Even for people who already have cardiovascular diseases such as coronary heart disease, moderate physical exercise and outdoor activities are good means of rehabilitation [14]. For example, physical exercise is a treatment tool for diseases such as atherosclerosis [15], which can bring benign promotion to cardiovascular disease.

### **3. Improve emotional and mental health.**

The company of a pet can provide emotional support and reduce feelings of loneliness and depression. Qualitative data suggest that pets give their owners a sense of purpose and meaning in life [16]. Some pet owners often describe that since being diagnosed with poor mental health, pets have helped them overcome some of their feelings of emptiness and motivated them to continue living [17]. This sense of meaning and purpose includes pets giving owners a reason to live, promoting a sense of control and empowerment, and giving individuals hope for the future. This is considered especially important when people

feel consumed by disease or feel out of control of their self-management. This positive effect on mental health indirectly affects heart health [18].

### **4. Social interaction.**

Having a pet increases social interaction and promotes connection with other pet owners. Other dog owners who meet while walking their dogs are likely to become friends with no conflict of interest in some people's lives. Chatting easily with friends while walking the dog, without the blessing of work worries, this social model looks very green and healthy. At the same time, the likes, comments, and attention brought by pet cats and dogs (or other pets, especially niche pets) posted to social media can give pet owners a better sense of social identity and greatly improve the happiness index of life. Previous studies have shown that social isolation and loneliness have become important risk factors for cardiovascular disease [19], and these social attributes have a benign effect on heart health.

### **FACTORS LIMITING THE INTERPRETATION OF RESEARCH**

However, several limitations of these studies need to be considered. Several confounding factors may explain the discrepancy in the results of studies analyzing the effects of pet owners' CVs.

- (1)The vast majority of the studies used a cross-sectional design, meaning it is impossible to determine causality. Pet ownership was not the direct cause of the reduced risk of CAD. Still, other factors (such as increased physical activity or reduced stress) contributed to the association.
- (2)Some studies rely on self-reported data, which may be subject to recall bias or social desirability bias. Participants may have overreported their level of physical activity or underreported their CAD or pet ownership status.
- (3)In addition, some studies were conducted in specific populations, such as the Chinese, which may limit the generalizability of the findings to other populations. Cultural differences in attitudes toward pet ownership or physical activity may influence the association between pet ownership and the risk of CAD.
- (4)Some studies did not consider other potential confounders, such as diet or medication use, which may influence the association between pet ownership and the risk of developing CAD.
- (5)There are also confounding factors that can interfere with the conclusions drawn from an experiment. Pet owners tend to be wealthier, better educated, and married [20].

(6)The association between dog ownership and physical health may not be causal, as physically fit adults are likelier to own a dog than those too ill or frail to own a pet<sup>[20]</sup>.

In conclusion, although this study provides valuable insights into the potential association between pet ownership and the risk of coronary atherosclerosis, these limitations should be considered when interpreting the study results. Further research is needed to determine causality and examine the underlying mechanisms of this association.

## CONCLUSION

In conclusion, the advantages of pet ownership in reducing psychological stress, lowering blood pressure, increasing socialization, promoting social acceptance, and improving exercise are indeed substantial contributors to the incidence of coronary heart disease and its treatment success. The holistic benefits of pet companionship encompass physiological, emotional, and social dimensions of heart health. This dissertation highlights the potential for integrating pet-related interventions into CAD prevention and management strategies, emphasizing the importance of recognizing pets as valuable allies in the pursuit of heart health. As research in this field continues to evolve, further exploration of the mechanisms and nuances of the pet-heart health connection will yield valuable insights for healthcare practitioners, policymakers, and pet owners. Ultimately, the synergy between pet companionship and heart health has the potential to positively transform lives and contribute to a healthier, more heart-healthy society.

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