Supplementary Appendix

Dog ownership and Cardiovascular Risk Factors by Mubanga *et al*.

Content

Supplementary Methods

Data Source and Parameters

Sweden has a structured population registration system that has enabled the collection of individual level information on the total population. By using an identity-protected unique code called the personal identity number (PIN), it is possible to link Swedish residents through different national registers for information such as vital status, socio-demographic data, dog ownership and health outcomes.[1]

Covariates

Covariates extracted at baseline from the Register of the Total Population included sex, birth year, region of birth separated into Sweden, other Nordic countries and non-Nordic countries; and the level of education categorized as compulsory school (≤9 years), secondary school (10-11 years) and tertiary education (≥12 years). We further included annually -updated covariates including marital status categorized as single, married/registered partnership/cohabiting, divorced or widowed; the presence of children in the home (dichotomized as yes/no), the area of residence (Norrland, Svealand and Götaland), the population density in municipality of residence (continuous variable), and annual household income (birth year-standardized quintiles). A north-south gradient was adjusted for by including the latitude of the municipality of residence. To avoid reverse effects of outcomes on covariates, we used covariate data from the preceding year to time-update information on January 1 in every year. A binary variable for home occupancy where individuals were assigned to 'living alone' if the individual lived alone or 'not alone' if they were registered as living with a partner or a child. Co-habiting partners with no children in common could not be accounted for via the registers. Another variable for living with children aged <18 was created to account for those who lived with children in the home. A second stratification variable was created for age group in decades.

From the SALT study conducted in 1998-2002, we used the following self-reported variables as covariates: age, sex, presence of children in the household, area of residence, population density, marital status, and latitude of residence and level of education as defined in the national cohort. Additionally, we adjusted for tobacco use (never, former or current user), employment status (employed, retired, sick leave or unemployed), Charlson comorbidity index and disability (categorized as yes /no). Additionally the socioeconomic index which ranks occupations by the average level of education and job earnings of job holders was also included.[2] By using National Patient Register data from the TwinGene clinic visit-date to five years prior, we created a Charlson comorbidity index. This is a widely used index for risk adjustment in health care research.[3 4]

TwinGene

The Swedish Twin Registry is a national register started in 1958 that derives information on all twin births occurring in Sweden from the National Board of Health and Welfare. It contains information on more 190,000 Swedish twin pairs born from 1886 onwards.[5] There have been several sub-studies conducted within this registry that have enabled the enhancement of the phenotypic and genetic data available on each participant. For this study, we limited ourselves to two sub-studies that comprised participants aged 45 to 80 years and who had consented to participate in both studies. Data between the two sub-studies involved was collected a minimum of 2 and a maximum of 10 years apart (**Supplementary Figure 1, Supplementary Figure 5**).

The first study, the Screening Across the Lifespan Twin study (SALT) interview was conducted as a sub-study of the Swedish Twin Register between 1998 and 2002 targeting all twin-pairs born in 1958 or earlier. Questionnaires were used to collect information on family status, occupation, education level, anthropometric measurements, alcohol intake, tobacco use, environmental exposures and irritants, medication use and health - including psychosocial /personality outcomes.[5] Information was collected from 44,821 respondents.

The second sub-study, the TwinGene study, was nested in the previous study. Between 2004 and 2008 participants from SALT were invited back as part of the TwinGene Study. TwinGene was set up to enable the collection of biological specimens to investigate gene-environment interactions in

participants. 12,614 invited participants gave consent to participate. Questionnaires were mailed and filled in for medication use and health outcomes. Blood was then collected for clinical biochemistry from a local health facility and processed centrally.[6] We used the date of clinic visit as the date of study.

Clinical information was taken during TwinGene study (2004-2008), dog ownership status on the date of clinical examination, and employment, profession and type of housing was extracted from the SALT questionnaire (1998-2002). All variables taken from SALT are described in Supplementary Table 1.

Supplementary Table 1. Description of variables derived from the SALT questionnaire study

Covariate	Questionnaire Option	Variable created	Classification and Derivative from questionnaire
Marital status	What is your civil status?	Married	Married, cohabiting
		Single	Living alone
		Divorced	Divorced, separated, living apart
		Widowed	Widow/ widower
Type of family	Living in a household with children <18 years	Yes/ No	Yes /No
Education level	Highest years of education completed	Primary education or less	9 years or less of education
		Secondary education	10 to 12 years of education
		Tertiary education or more	More than 12 years of education
Employment status	Employment status	Employed	Fully employed, part time employment, owns company, on leave from work, study leave or on military service
		Retired	Pensioner, prematurely retired, partly retired
		Retired for disability or illness	Retired for injury
		Unemployed	Unemployed, housewife/man
Socioeconomic index	Socioeconomic occupation level	Level 1	Unskilled Employees
		Level 2	Lower skilled, non-manual workers
		Level 3	Self-employed excluding independent workers
		Level 4	Intermediate non-manual employees
		Level 5	Highest tier non-manual employees
Tobacco Use	Have you ever smoked or used snuff	Never smoked	No not even tried it, yes but only tried it, smoked now and then (like at parties),
		Former smoker	Smoked regularly, snuffed regularly, smoke now and then (like at parties)
		Current smoker	Smoke regularly, smoke at parties, snuff now and then, snuff regularly
Any movement impairment	Do you have any physical handicap	Yes/no	Yes/ No
Disability	Do you need assistance with personal care/ shopping,/cooking/mobility/	Yes/No	Yes /No
Exercise	How much do you exercise; what fits your annual exercise pattern	Less than average	Almost no exercise, light exercise, much less exercise than average, less than average
		Average	Regular medium exercise, average amount of exercise
		More than average	Hard physical exercise, more exercise than average, much more exercise than normal, maximum amount of exercise

Supplementary Table 2. Description of Breed Classification of the 331 breeds included in the study based on the Nordic Kennel Union Classification

Group Number	Breed Groups	Breed Designation
1	Sheep and cattle dogs	Sheep dogs (Australian, Belgian, Catalan, German, Picardy, Polish, Portuguese, Pyrenean, Shetland, Old English); Shepherd dogs (Belgian, Bergamasco, Croatian, Dutch, German, Majorca, Polish, Romanian, South Russian); Collie (Bearded, Border, Rough, Smooth); Bouvier des Flandres, Beauceron, Briard, Chodsky Pes, Czechoslovakian Wolfdog, Komondor, Kuvasz, Mudi, Lancashire Heeler, Schipperke, Puli, Pumi, Slovakian Chuvach, Welsh Corgie, Australian kelpie, Working kelpie
2	Pinscher and schnauzer dogs	Pincher (Affenpinscher, Austrian, Dobermann, German, Miniature); Schnauzer (Giant, Miniature); Mountain Dog (Appenzeller, Bernese, Caucasian Shepherd, Entlebuch, Great Swiss, Karst, Landseer, Newfoundland, Pyrenean, Serra da Estrela, St Bernard, Uruguayan Cimarron, Yugoslavian Shepherd); Molossian (Aidi, Anatolian Shepherd, Boxer, Bull Mastiff, Broholmer, Cane Corso, Dogo Argentino, Danish-Swedish Farm dog, Dogo Canario, Dogue de Bordeux, English Bulldog, Great Dane, Hovawart, Majorca Mastiff, Mastiff, Neapolitano Mastiff, Pyrenese Mastiff, Rafeiro of Alentejo, Spanish Water Dog, Shar Pei, Tosa); Central Asia Shepherd Dog, Russian Black Terrier
3	Terriers	Airedale, American Staffordshire, Australian, Bedlington, Border, Brazilian, Bull, Cairn, Cesky, Dandie Dinmont, English Toy, Fox, German Hunting, Irish Glen of Imaal, Irish Softcoated Wheaten, Irish, Jack Russel, Kerry Blue, Lakeland, Manchester, Miniature Bull, Norfolk, Norwich, Parson Russell, Sealyham, Australian Silky, Skye, Tenterfield, Welsh, West Highland White, Yorkshire
4	Dachshunds	Miniature, Standard, Kaninchen
5	Spitz and primitive types	Alaskan Malamute, American Akita, Canaan dog, Canarian Warren, Chow Chow, Cirneco dell'Etna, East Siberian Laika, Eurasian, Finnish Lapphund, Finnish Spitz, German Spitz, Greenland dog, Hokkaido, Halleforshund, Icelandic Sheepdog, Japanese Akita, Japanese Spitz, Karelian Beardog, Keeshond, Korea Jindo, Laponian Herder Pharaoh Hound, Mexican Hairless dog, Norwegian Buhund, Norwegian Lundehund, Norwegian Elkhound, Peruvian Hairless dog, Ibizan Hound, Pomeranian, Russian European Laika, Samoyed, Shiba, Siberian Husky, Swedish Elkhound, Swedish Lapphund, Swedish White Elkhound, Swedish Vallhund, Thai Bangkaew, Thai Ridgeback, Volpino italiano, West Siberian Laika,
6	Scent hounds and related dogs	Alpine Dachsbracke, American Foxhound, Basset Artesian Normand, Basset Bleu de Gascogne, Basset fauve de Bretagne, Basset Hound, Bavarian Mountain Scent hound, Beagle, Black and Tan Coonhound, Bloodhound, Bluetick Coonhound, Bosnian Coarse-haired hound, Dalmatian, Drever, Dunker Hound, Fawn Brittany Griffon, Finnish Hound, Foxhound, German Hound, Grand Basset Griffon Vendeen, Grand Griffon Vendeen, Griffon Nivernais, Halden Hound, Hamilton Hound, Hygen Hound, Istrian Short-haired hound, Otterhound, Petit Basset Griffon Vendeen, Plott, Polish hunting dog, Porcelain, Posavaz Hound, Rhodesian Ridgeback, Russian Hound, Russian Spotted hound, Small Blue Gascony Hound, Spanish Hound, Schiller Hound, Swiss Hound, Serbian Hound, Slovakian Hound, Småland Hound
7	Pointing dogs	Blue Picardy Spaniel, Bracco Italiano, French Pointing, Brittany, Bohemian wire-haired, Drentse Patridge, English Setter, French Spaniel, Old Danish Pointer, Gordon Setter, French wire-haired Korthals Pointing Griffon, Münsterländer, Irish Red Setter, German Short/Wire-haired pointing dog, Portuguese Pointing dog, Pointer, Pudelpointer, Slovakian Wire-haired Pointing dog, Italian Spinone, Stabyhound, Hungarian Vizsla wire-/short-haired, Weimaraner short-/long-haired
8	Retrievers	American Cocker Spaniel, Barbet, Chesapeake Bay Retriever, Clumber Spaniel, Cocker Spaniel, Curly Coated Retriever, English Springer Spaniel, Field Spaniel, Flat coated Spaniel, German Spaniel, Golden retriever, Irish Water Spaniel, Labrador Retriever, Lagotto romagnolo, Nederlandse Kooikerhondje, Nova Scotia Duck Tolling Retriever, Spanish Water dog, Portuguese Water Dog, Sussex Spaniel, Welsh Springer Spaniel, Wetterhound
9	Companion and toy dogs	Havanese, Bolognese, Boston Terrier, Belgian Griffon, Brussels Griffon, Cavalier King Charles Spaniel, Chihuahua, Chinese Crested, Coton de Tulear, French Bulldog, Japanese Chin, King Charles Spaniel, Kromfohrlander, Lhasa Apso, Lowchen, Maltese, Pug, Papillon, Pekingese, Small Brabant Griffon, Phalene, Prazský krysarík, Poodle, Russian Toy, Shih Tzu, Tibetan Terrier, Tibetan Spaniel
10	Sight hounds	Afghan Hound, Azawakh, Borzoi, Polish Greyhound, Spanish Greyhound, Irish Wolfhound, Italian Greyhound, Hungarian Greyhound, Saluki, Scottish Deerhound, Sloughi, Whippet

Supplementary Table 3. Association of dog ownership with initiation of medication for the treatment of hypertension. This compares the main analysis as shown in Table 2 with a modified analysis that excludes Beta-blockers which have not been recommended first line treatment for hypertension since 2006.[7] Cox regression models with hazard ratios (HR) and 95% confidence interval (CI) are reported.

	N treated	**Time at risk**	**Model 1***	**Model 2§**
With β-blockers	503,305	10,659,258	1.02 (1.01-1.03)	1.02 (1.01-1.03)
Without β-blockers	401,573	11,018,086	1.03 (1.02-1.04)	1.02 (1.01-1.03)

*Model 1. Age and sex adjusted
§Model 2. National cohort: Adjusted for sex, age, type of family, area of residence, population density, marital status, region of birth, income, education level, latitude of residence.

Supplementary Table 4. Association of dog ownership with initiation of lipid lowering medication. This compares the main analysis as shown in Table 2 with a modified analysis that censored participants at an event of angina or heart failure. Cox regression models with hazard ratios (HR) and 95% confidence interval (CI) are reported.

Lipid lowering medication	**N treated**	**Time at risk**	**Model 1***	**Model 2§**
Without censoring	276,691	11,508,349	1.03 (1.02-1.04)	1.02 (1.01-1.04)
With censoring	243,797	11,482,789	1.03 (1.02-1.04)	1.02 (1.01-1.04)

*Model 1. Age and sex adjusted
§Model 2. National cohort: Adjusted for sex, age, type of family, area of residence, population density, marital status, region of birth, income, education level, latitude of residence.

Supplementary Table 5. Additional baseline characteristics of 10,110 Swedish adults in the Swedish Twin Register. Information is based on persons who participated in the TwinGene project designed to enhance the Screening Across the Lifespan Twin (SALT) questionnaire-based sub-study in the Swedish Twin Register with biologic specimens. Numbers and % are reported unless stated otherwise. Clinical information was taken during TwinGene study (2004-2008), dog ownership status on the date of clinical examination and other non-clinical details extracted from the SALT questionnaire (1998-2002).

Participant characteristics	n		All n=10,110 (100%)	Non-dog owners n=9,626 (95.0%)	Dog owners n=484 (5.0%)	Mixed pedigree dog owners n=141 (1.4%)*	Active dog breed owners n=143 (1.4%)*
Employment status	10,110	Employed	6,875 (68.0)	6,541 (68.0)	334 (69.0)	97 (68.8)	93 (65.0)
		Retired	2,066 (20.4)	1,992 (20.7)	74 (15.3)	18 (12.8)	29 (20.3)
		Sick leave or illness	875 (8.7)	818 (8.5)	57 (11.8)	18 (12.8)	16 (11.2)
		Unemployed	294 (2.90)	275 (2.9)	19 (3.9)	8 (5.7)	5 (3.5)
Profession†	10,110	Unskilled labor	2,458 (24.3)	2,351 (24.4)	107 (22.1)	32 (22.7)	27 (18.9)
		Lower non-manual labor	3,373 (33.4)	3,205 (33.3)	168 (34.7)	57 (40.4)	43 (30.1)
		Self-employed	430 (4.3)	404 (4.2)	26 (5.4)	6 (4.3)	6 (4.2)
		Intermediate non-manual labor	2,539 (25.1)	2,411 (25.0)	128 (26.4)	32 (22.7)	46 (32.2)
		Higher non-manual employee	1,310 (13.0)	1,255 (13.0)	55 (11.4)	14 (9.9)	21 (14.7)
Type of housing or accommodation	10,110	Independent	10,100 (99.9)	9,616 (99.9)	484 (100.0)	141 (100.0)	143 (100.0)
		Assisted living[2]	6 (0.1)	6 (0.1)	0 (0.0)	0 (0.0)	0 (0.0)
		Other	4 (<0.0)	4 (<0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Biochemical Variables							
C-Reactive Protein	9,553	Median (IQR)	1.7 (0.8-3.4)	1.7 (0.8-3.4)	1.8 (0.8-3.2)	2.0 (0.9-3.5)	1.6 (0.7-3.1)
LDL-Cholesterol	9,727	Mean (SE)	3.9 (0.9)	3.9 (0.9)	3.8 (0.9)	3.8 (0.9)	3.9 (0.9)
HDL-Cholesterol	10,109	Mean	1.4 (0.4)	1.4 (0.4)	1.4 (0.4)	1.4 (0.4)	1.4 (0.4)
Triglyceride (Fasting)	9,261	Median	1.1 (0.8-1.6)	1.1 (0.8-1.6)	1.1 (0.9-1.6)	1.2 (0.9-1.6)	1.2 (0.9-1.5)
Glucose (Non-Diabetic)	9,256	Median	5.3 (5.0-5.7)	5.3 (5.0-5.7)	5.2 (5.0-5.7)	5.3 (5.0-5.8)	5.3 (5.0-5.7)
HbA1c	10,097	Mean	4.8 (0.6)	4.8 (0.6)	4.8 (0.6)	4.8 (0.6)	4.7 (0.5)
Body Mass Index	9,618	Mean	25.9 (4.0)	25.9 (4.0)	26.0 (4.0)	26.3 (4.4)	26.0 (3.8)
Waist-Hip ratio	9,937	Mean	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)
Blood pressure measurements							
Mean systolic BP (all participants)	8010	Mean	138.1 (19.5)	138.2 (19.5)	136.0 (19.2)	139.4 (20.3)	136.2 (18.1)
Mean diastolic BP (all participants)		Mean	82.2 (10.5)	82.2 (10.4)	82.6 (10.9)	84.8 (11.4)	82.7 (10.4)
Pulse pressure (all participants)		Mean	55.9 (15.4)	56.0 (15.4)	53.4 (13.6)	54.6 (13.9)	53.5 (12.5)

Mean systolic BP (On BP treatment)	1,970	Mean	144.9 (18.8)	144.9 (18.9)	144.9 (17.3)	149.4 (14.9)	142.0 (15.8)
Mean diastolic BP (On BP treatment)		Mean	83.9 (10.7)	83.8 (10.8)	85.0 (9.2)	84.5 (8.4)	85.6 (9.3)
Pulse pressure (On BP treatment)		Mean	61.0 (16.0)	61.1 (16.1)	60.0 (13.8)	65.0 (10.1)	56.4 (12.2)
Self-reported health status	10,110	Excellent	3,501 (34.9)	3,330 (34.9)	171 (35.7)	33 (23.6)	58 (40.8)
		Good	5,330 (53.2)	5,085 (53.3)	245 (51.1)	79 (56.4)	73 (51.4)
		Average	963 (9.6)	914 (9.6)	49 (10.2)	19 (13.6)	8 (5.6)
		Not so good	227 (2.3)	213 (2.3)	14 (2.9)	7 (5.0)	3 (2.1)
Blood Pressure Medication	10,110	Number on treatment (%)	2,099 (20.8)	2,010 (20.9)	89 (18.4)	31 (22.0)	22 (15.4)
Lipid Modifying Medication	10,110	Number on treatment (%)	918 (9.1)	880 (9.1)	38 (7.9)	14 (9.5)	13 (8.3)
Diabetes Medication	10,110	Number on treatment (%)	305 (3.0)	293 (3.0)	12 (2.5)	5 (3.5)	5 (3.5)

*-Proportion of this breed of total population
†-Defined according to Budoki et al.[8]
‡-Assisted living which includes living in
BP- Blood Pressure

Supplementary Table 6: Association of dog ownership with initiation of medication for hypertension, dyslipidaemia and diabetes. Shown for assuming 10-year life-span of dog and a sensitivity analyses at 8-year and 12-year life-span of dog.

Medication	Assuming 10-year life-span of dog		Assuming 8-year life-span of dog		Assuming 12-year life-span of dog	
	Sex-age adjusted model	Fully-adjusted model	Sex-age adjusted model	Fully-adjusted model	Sex-age adjusted model	Fully-adjusted model
Hypertension	1.02 (1.01-1.03)	1.02 (1.01-1.03)	1.02 (1.01-1.03)	1.01 (1.00-1.02)	1.03 (1.02-1.04)	1.02 (1.01-1.03)
Dyslipidemia	1.03 (1.02-1.04)	1.02 (1.01-1.04)	1.02 (1.01-1.04)	1.02 (1.00-1.03)	1.03 (1.02-1.04)	1.02 (1.01-1.04)
Diabetes	0.91 (0.89-0.94)	0.98 (0.95-1.01)	0.90 (0.88-0.93)	0.97 (0.94-1.00)	0.92 (0.90-0.94)	0.99 (0.96-1.02)

§Fully-adjusted models adjusted for sex, age, type of family, area of residence, population density, marital status, education level and latitude of residence

Supplementary Table 7. Stepwise addition of covariates into TwinGene model. Odds ratios (OR) and confidence intervals (CI) for associations of dog ownership and prevalent drug prescriptions for hypertension, dyslipidemia and type 2 diabetes (n=10,110). *

Prescription Medication	N on treatment	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Anti-hypertensive drugs	2,223	0.96 (0.75-1.21)	0.94 (0.74-1.20)	0.95 (0.74-1.20)	0.92 (0.72-1.18)	0.90 (0.70-1.15)	0.90 (0.71-1.15)	0.90 (0.70-1.15)
Lipid lowering drugs	963	0.92 (0.65-1.29)	0.92 (0.65-1.29)	0.92 (0.66-1.29)	0.90 (0.64-1.26)	0.87 (0.62-1.22)	0.87 (0.62-1.22)	0.87 (0.62-1.22)
Glucose lowering drugs	318	0.89 (0.49-1.61)	0.90 (0.50-1.63)	0.91 (0.50-1.65)	0.90 (0.50-1.63)	0.80 (0.44-1.46)	0.80 (0.44-1.46)	0.78 (0.43-1.43)

*Model 1, 2 and 7 were reported in the main manuscript Table 2
Model 1. Adjusted for age and sex
Model 2. Adjusted for sex, age, type of family, area of residence, population density, marital status, education level and latitude of residence
Model 3. Model 2 plus professional level
Model 4. Model 3 plus employment status
Model 5. Model 4 plus Charlson comorbidity index
Model 6. Model 5 plus disability
Model 7. Full twin model - Model 6 plus tobacco use

Supplementary Table 8: Output from fully adjusted Cox regression models for the association of dog ownership with initiation of medication for hypertension.

	Haz. Ratio	P>z	[95% Confidence Interval]	
Dog owner	1.018	0.000	1.009	1.028
Sex				
Male	**Ref**			
Female	0.945	0.000	0.939	0.950
Marital status				
Married/ cohabiting	**Ref**			
Never Married	0.904	0.000	0.895	0.912
Divorced	0.993	0.091	0.986	1.001
Widowed	1.064	0.000	1.053	1.076
Children in home				
No	**Ref**			
Yes	0.922	0.000	0.915	0.930
Area of Residence				
Norrland	**Ref**			
Svealand	0.959	0.000	0.946	0.972
Götaland	0.912	0.000	0.895	0.929
Population density	1.000	0.203	0.998	1.001
Education				
Primary level	**Ref**			
Secondary level	0.955	0.000	0.949	0.962
Tertiary level	0.832	0.000	0.826	0.839
Country of birth				
Sweden	**Ref**			
Other Nordic countries	1.143	0.000	1.128	1.157
Non-Nordic countries	1.010	0.114	0.998	1.022
Income				
Income level 1 (lowest tier)	**Ref**			
Income level 2	0.994	0.195	0.985	1.003
Income level 3	0.995	0.297	0.986	1.004
Income level 4	0.991	0.056	0.982	1.000
Income level 5 (highest tier)	0.986	0.004	0.977	0.995
Latitude of residence	1.000	0.000	1.000	1.000

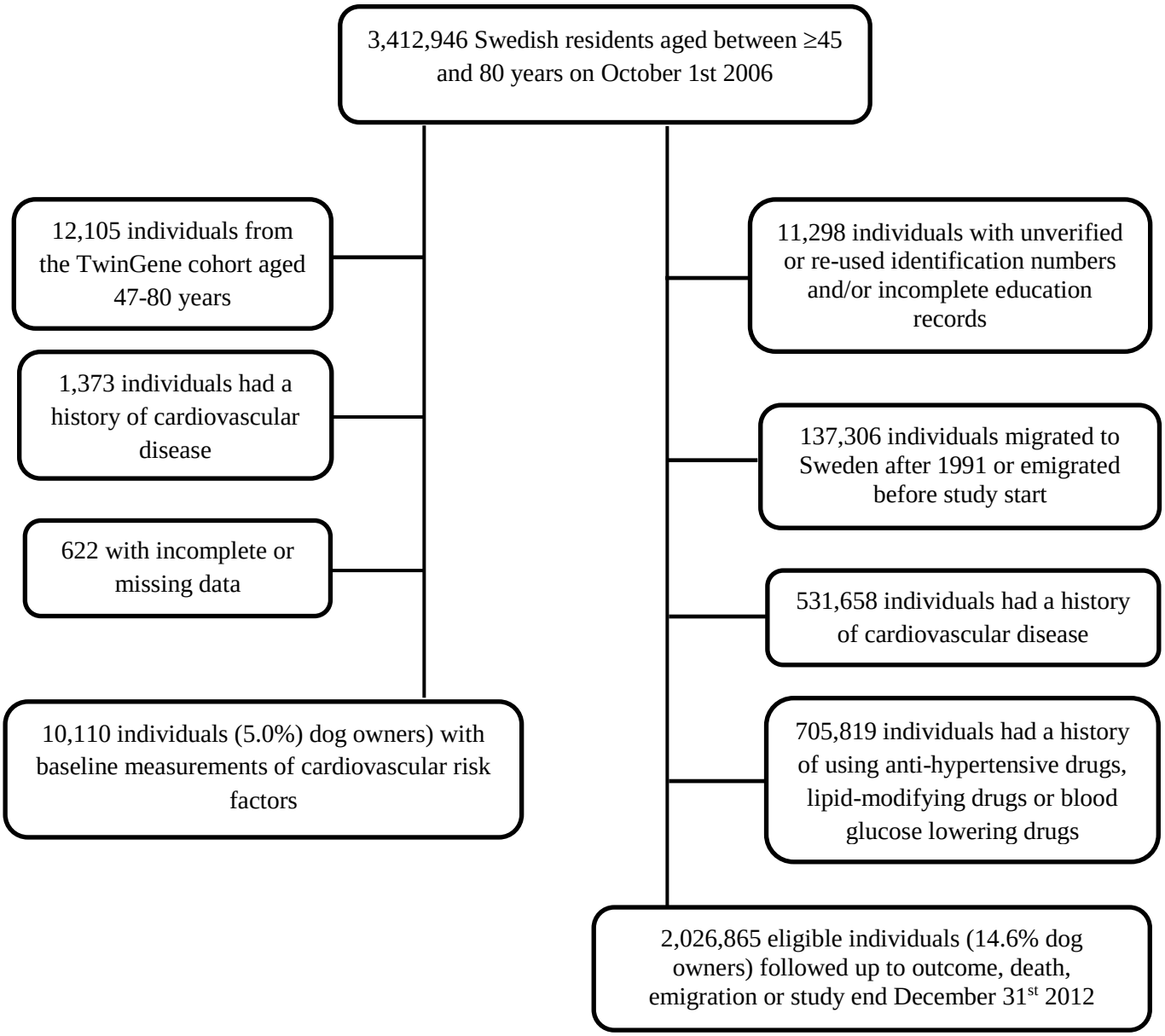
Supplementary Table 9: Output from fully adjusted Cox regression models for the association of dog ownership with initiation of medication for dyslipidaemia

	Haz. Ratio	P>z	[95% Confidence Interval]	
Dog owner	1.024	0.000	1.011	1.036
Sex				
Male	**Ref**			
Female	0.773	0.000	0.767	0.779
Marital status				
Married/ cohabiting	**Ref**			
Never Married	0.835	0.000	0.825	0.846
Divorced	0.992	0.117	0.982	1.002
Widowed	1.022	0.004	1.007	1.038
Children in home				
No	**Ref**			
Yes	0.891	0.000	0.881	0.901
Area of Residence				
Norrland	**Ref**			
Svealand	1.005	0.597	0.987	1.024
Götaland	0.928	0.000	0.905	0.952
Population density	1.000	0.000	0.999	1.001
Education				
Primary level	**Ref**			
Secondary level	0.963	0.000	0.954	0.972
Tertiary level	0.796	0.000	0.787	0.804
Country of birth				
Sweden	**Ref**			
Other Nordic countries	1.169	0.000	1.150	1.189
Non-Nordic countries	1.195	0.000	1.177	1.213
Income				
Income level 1 (lowest tier)	**Ref**			
Income level 2	1.000	0.962	0.988	1.012
Income level 3	1.004	0.504	0.992	1.016
Income level 4	1.010	0.104	0.998	1.022
Income level 5 (highest tier)	1.005	0.450	0.992	1.018
Latitude of residence	1.000	0.813	1.000	1.000

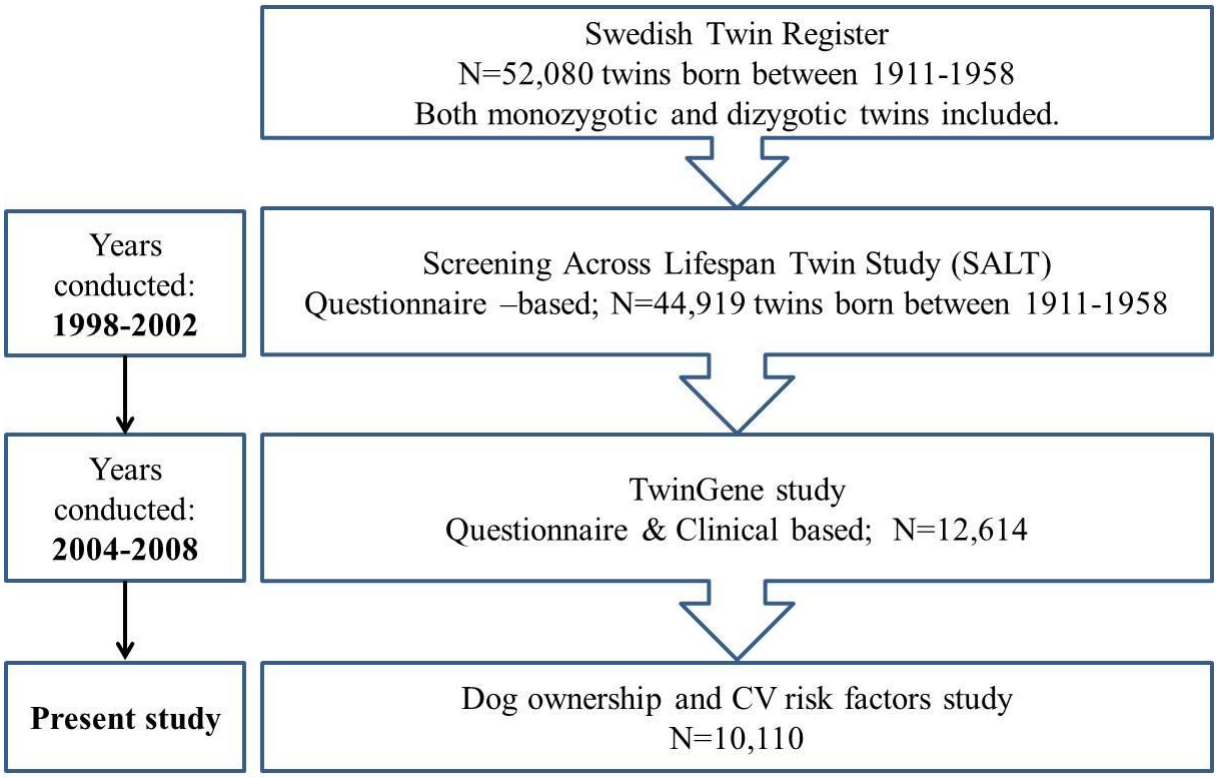
Supplementary Table 10: Output from fully adjusted Cox regression models for the association of dog ownership with initiation of medication for diabetes.

	Haz. Ratio	**P>z**	**[95% Confidence Interval]**	
Dog owner	0.982	0.193	0.954	1.009
Sex				
Male	**Ref**			
Female	0.546	0.000	0.536	0.556
Marital status				
Married/ cohabiting	**Ref**			
Never Married	1.244	0.000	1.215	1.274
Divorced	1.196	0.000	1.171	1.223
Widowed	1.290	0.000	1.248	1.334
Children in home				
No	**Ref**			
Yes	0.965	0.002	0.944	0.988
Area of Residence				
Norrland	**Ref**			
Svealand	0.909	0.000	0.8741825	0.946
Götaland	0.883	0.000	0.8366307	0.932
Population density	0.999	0.000	0.998	1.001
Education				
Primary level	**Ref**			
Secondary level	0.877	0.000	0.861	0.894
Tertiary level	0.635	0.000	0.620	0.650
Country of birth				
Sweden	**Ref**			
Other Nordic countries	1.116	0.000	1.076	1.159
Non-Nordic countries	1.952	0.000	1.900	2.004
Income				
Income level 1 (lowest tier)	**Ref**			
Income level 2	0.919	0.000	0.896	0.941
Income level 3	0.845	0.000	0.824	0.866
Income level 4	0.777	0.000	0.757	0.797
Income level 5 (highest tier)	0.702	0.000	0.683	0.722
Latitude of residence	1.000	0.001	1.000	1.000

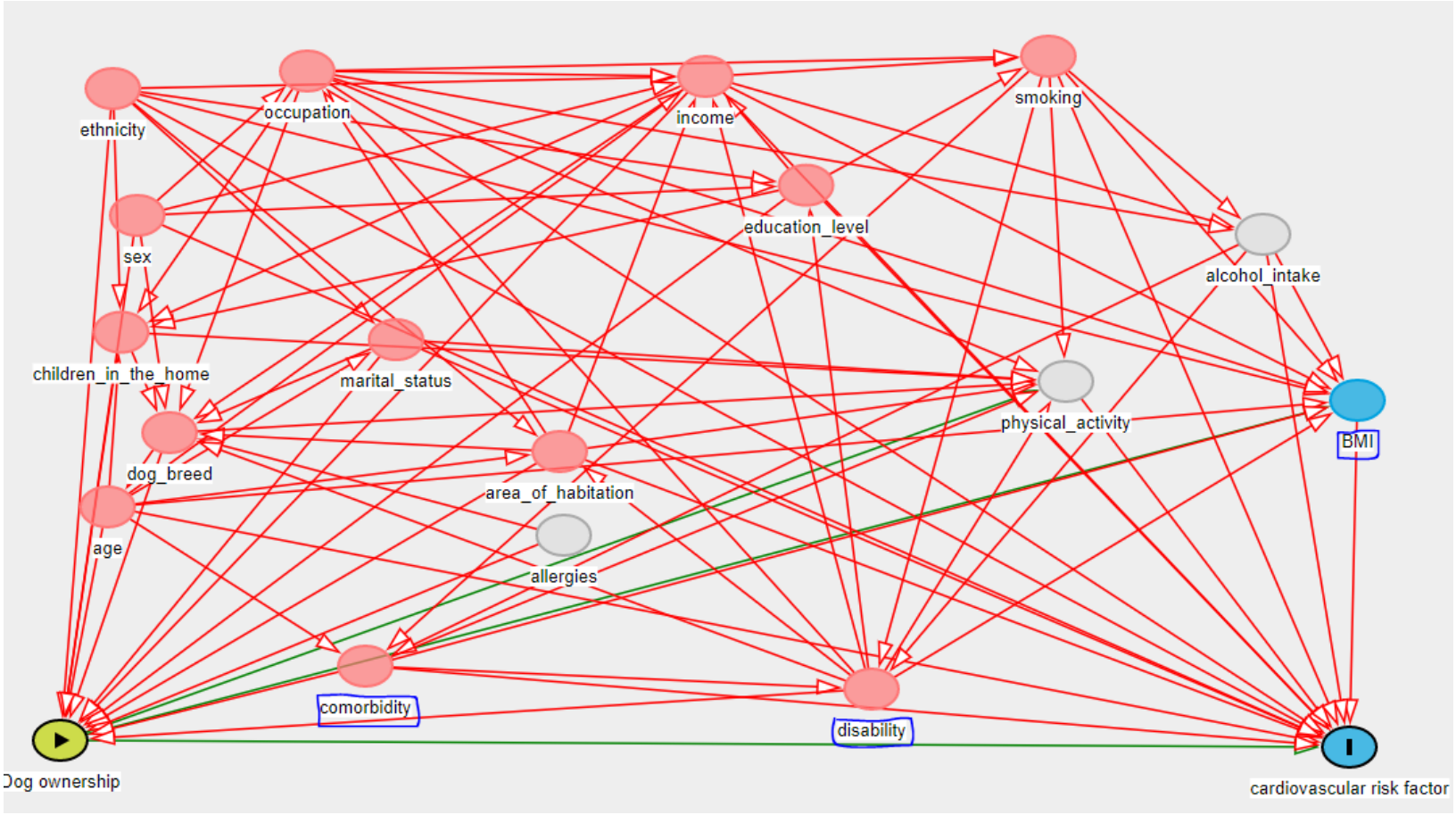
Supplementary Figure 1: Study population



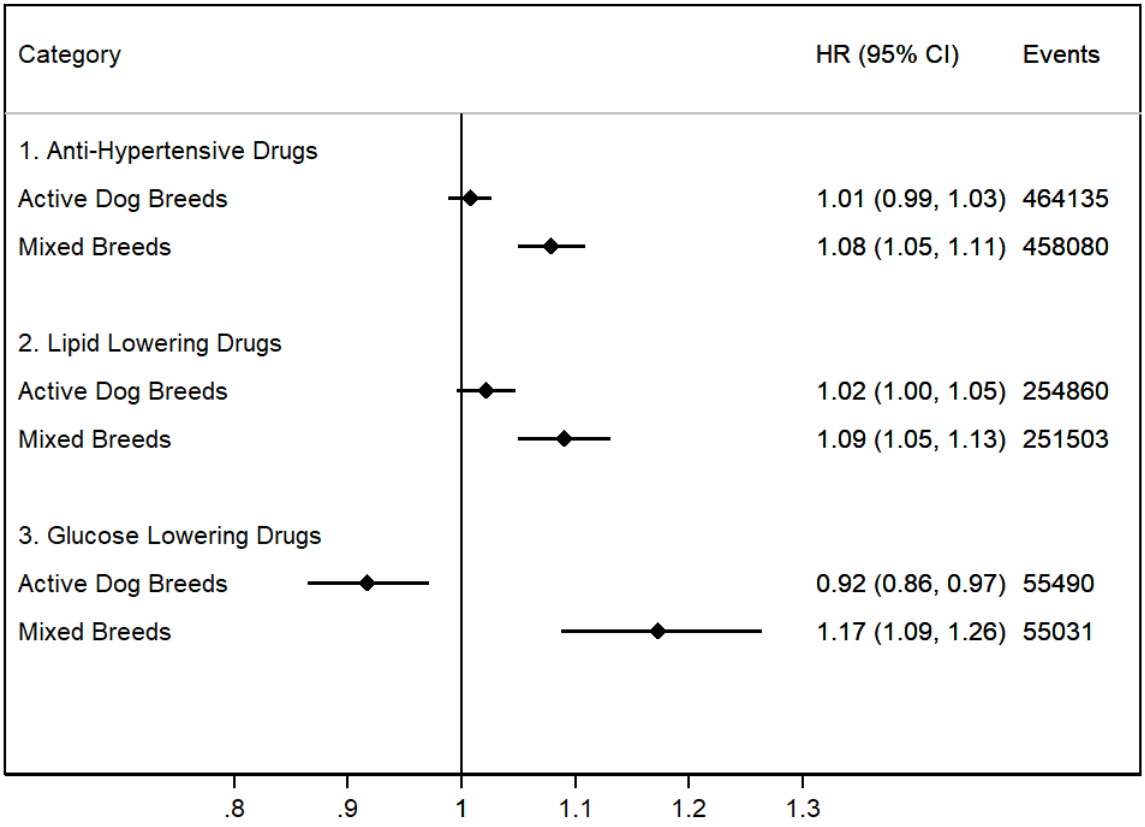
Supplementary Fig 2: Overview of Twin Cohort study recruitment and data collection.



Supplementary Figure 3: Direct Acyclic Graph for dog ownership and cardiovascular risk. The highlighted variables (comorbidity, disability and body mass index) were only available in the TwinGene cohort.



Supplementary Figure 4. Hazard ratios (HR) and 95% confidence intervals (CI) for the association of dog ownership and time to initiation of medication for hypertension, dyslipidaemia and type 2 diabetes examining associations in breeds previously identified to be associated with 'active dog breeds' (combining Terriers, Scent Hounds, Pointing dogs and Retrievers)[9] and mixed pedigree dogs and adjusted for age, sex, marital status, presence of children in the home, population density, area of residence, education level, region of birth, income and a correction for latitude of residence.



References

1. Ludvigsson JF, Otterblad-Olausson P, Pettersson BU, et al. The Swedish personal identity number: possibilities and pitfalls in healthcare and medical research. *Eur J Epidemiol* 2009;24(11):659-67. doi: 10.1007/s10654-009-9350-y [published Online First: 2009/06/09]
2. Ganzeboom HB, De Graaf PM, Treiman DJ. A standard international socio-economic index of occupational status. *Social science research* 1992;21(1):1-56.
3. Charlson ME, Pompei P, Ales KL, et al. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis* 1987;40(5):373-83. [published Online First: 1987/01/01]
4. Quan H, Li B, Couris CM, et al. Updating and validating the Charlson comorbidity index and score for risk adjustment in hospital discharge abstracts using data from 6 countries. *American journal of epidemiology* 2011;173(6):676-82.
5. Lichtenstein P, De Faire U, Floderus B, et al. The Swedish Twin Registry: a unique resource for clinical, epidemiological and genetic studies. *J Intern Med* 2002;252(3):184-205. [published Online First: 2002/09/25]
6. Magnusson PK, Almqvist C, Rahman I, et al. The Swedish Twin Registry: establishment of a biobank and other recent developments. *Twin Res Hum Genet* 2013;16(1):317-29. doi: 10.1017/thg.2012.104 [published Online First: 2012/11/10]
7. Lakemedelsverket. Prevention of atherosclerotic cardiovascular disease - Treatment recommendation. *https://lakemedelsverketse/upload/halso-och-sjukvard/behandlingsrekommendationer/080313_primarpreventionpdf* 2006
8. Bukodi E, Erikson R, Goldthorpe JH. The effects of social origins and cognitive ability on educational attainment. *Acta Sociologica* 2014;57(4):293-310. doi: doi:10.1177/0001699314543803
9. Mubanga M, Byberg L, Nowak C, et al. Dog ownership and the risk of cardiovascular disease and death - a nationwide cohort study. *Sci Rep* 2017;7(1):15821. doi: 10.1038/s41598-017-16118-6 [published Online First: 2017/11/19]