Supplemental File: Batty et al. The Truth About Cats and Dogs: Associations of Pet Ownership with Biomarkers of Ageing in the English Longitudinal Study of Ageing

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Impact of separate adjustment for confounding and mediating variables on the association of pet ownership with biomarkers of ageing

Supplemental Figure 1. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with ageing biomarkers: physical functioning (N=8785)

Part A.

Gait speed (m/sec)	Model 1 β (95% CI)	P-value	Model 1 + confounders β (95% CI)	P-value	Model 1 + mediators β (95% Cl)	P-value	All covariates		P-value
No pet	0 (ref.)	P-value	0 (ref.)	P-Value	0 (ref.)	P-value	β (95% CI) 0 (ref.)		P-Value
Dog	-0.03 (-0.05 to -0.02)	< 0.001	-0.02 (-0.04 to -0.01)	0.004	-0.03 (-0.05 to -0.02)	< 0.001	-0.02 (-0.04 to -0.01)	1	0.003
Cat (no dog)	0.004 (-0.02 to 0.02)	0.71	-0.001 (-0.02 to 0.02)	0.004	-0.001 (-0.02 to 0.02)	0.90	0 (-0.02 to 0.01)		0.75
Other pet	-0.04 (-0.08 to -0.002)	0.04	-0.02 (-0.06 to 0.01)	0.21	-0.03 (-0.07 to 0.01)	0.11	-0.02 (-0.06 to 0.02)	-	0.26
FEV1 (L/sec)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)		
Dog	-0.004 (-0.04 to 0.04)	0.87	0.04 (0.01 to 0.08)	0.02	0.01 (-0.03 to 0.05)	0.55	0.04 (0.01 to 0.08)		0.02
Cat (no dog)	0.01 (-0.03 to 0.05)	0.65	0.01 (-0.03 to 0.05)	0.61	0.01 (-0.04 to 0.05)	0.82	0.01 (-0.03 to 0.05)		0.64
Other pet	-0.06 (-0.14 to 0.03)	0.18	-0.02 (-0.10 to 0.06)	0.70	-0.03 (-0.11 to 0.05)	0.43	-0.01 (-0.09 to 0.07)	-	0.73
Chair rise (secs)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.58 (0.26 to 0.90)	< 0.001	0.27 (-0.03 to 0.57)	0.08	0.42 (0.11 to 0.72)	0.01	0.27 (-0.03 to 0.56)		0.07
Cat (no dog)	0.25 (-0.13 to 0.63)	0.19	0.30 (-0.06 to 0.66)	0.10	0.30 (-0.07 to 0.67)	0.11	0.3 (-0.06 to 0.66)		0.10
Other pet	0.75 (0.10 to 1.39)	0.02	0.35 (-0.25 to 0.96)	0.25	0.48 (-0.14 to 1.09)	0.13	0.32 (-0.28 to 0.92)	~ · · ·	0.30
Grip strength (kg)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.04 (-0.40 to 0.48)	0.87	0.36 (-0.07 to 0.79)	0.10	0.18 (-0.24 to 0.61)	0.39	0.33 (-0.09 to 0.75)		0.12
Cat (no dog)	0.43 (-0.14 to 0.99)	0.14	0.33 (-0.22 to 0.88)	0.24	0.37 (-0.18 to 0.91)	0.19	0.29 (-0.25 to 0.83)		0.28
Other pet	-1.08 (-2.00 to -0.16)	0.02	-0.59 (-1.48 to 0.30)	0.19	-0.94 (-1.84 to -0.05)	0.04	-0.67 (-1.55 to 0.22)	-0.15 -0.05 0.05 0.15	0.14
							<lower in<="" td=""><td>pet ownersHigher in p</td><td>et owners-></td></lower>	pet ownersHigher in p	et owners->

Part B.

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
Leg raise failure	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)		
Dog	1.05 (0.97 to 1.13)	0.19	1.02 (0.94 to 1.09)	0.67	1.02 (0.95 to 1.10)	0.55	1 (0.93 to 1.08)		0.94
Cat (no dog)	1.08 (1.00 to 1.16)	0.06	1.08 (1.00 to 1.17)	0.04	1.09 (1.01 to 1.17)	0.03	1.09 (1.01 to 1.17)		0.03
Other pet	1.04 (0.90 to 1.21)	0.57	0.99 (0.86 to 1.14)	0.88	1.01 (0.87 to 1.16)	0.94	0.98 (0.85 to 1.13)	+	0.79
Balance failure									
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)		
Dog	1.07 (0.96 to 1.19)	0.25	0.99 (0.88 to 1.10)	0.83	1.03 (0.92 to 1.15)	0.59	0.98 (0.88 to 1.10)		0.77
Cat (no dog)	1.01 (0.88 to 1.15)	0.90	1.01 (0.89 to 1.16)	0.84	1.03 (0.90 to 1.17)	0.66	1.03 (0.90 to 1.17)	-	0.67
Other pet	1.39 (1.11 to 1.75)	0.004	1.25 (1.00 to 1.58)	0.05	1.3 (1.04 to 1.63)	0.02	1.24 (0.99 to 1.55)	- - -	0.06
							-Lower risk in pet o	0.751 1.25 wners— —Higher risk	in pet owners>

Model 1: age and sex; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates

Supplemental Figure 2. Beta coefficients (95% confidence interval) for the relation of pet ownership with ageing biomarkers: immune functioning (N=8785)

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
C-reactive protein (log[mg/L])	<u>β (95% CI)</u>	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.09 (-0.003 to 0.18)	0.06	0.03 (-0.06 to 0.12)	0.47	0.04 (-0.04 to 0.13)	0.31	0.01 (-0.08 to 0.10)		0.82
Cat (no dog)	0.02 (-0.07 to 0.11)	0.61	0.03 (-0.06 to 0.12)	0.52	0.03 (-0.05 to 0.11)	0.46	0.02 (-0.06 to 0.11)		0.56
Other pet	0.11 (-0.08 to 0.29)	0.26	0.04 (-0.14 to 0.22)	0.66	0.04 (-0.14 to 0.21)	0.68	0.01 (-0.16 to 0.19)		0.87
WBC (log[x10^9 cells/litre])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.02 (0.001 to 0.04)	0.04	0.003 (-0.02 to 0.02)	0.75	0.01 (-0.01 to 0.03)	0.15	0.0001 (-0.02 to 0.02)	+	0.99
Cat (no dog)	0.02 (-0.01 to 0.04)	0.26	0.01 (-0.01 to 0.04)	0.34	0.02 (-0.01 to 0.04)	0.20	0.01 (-0.01 to 0.04)	+	0.33
Other pet	0.05 (-0.004 to 0.10)	0.07	0.04 (-0.01 to 0.09)	0.15	0.04 (-0.02 to 0.09)	0.16	0.03 (-0.02 to 0.09)		0.19
Fibrinogen (log[g/L])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.01 (-0.01 to 0.02)	0.48	-0.001 (-0.02 to 0.02)	0.90	0.001 (-0.02 to 0.02)	0.86	-0.003 (-0.02 to 0.01)	+	0.67
Cat (no dog)	0.01 (-0.01 to 0.02)	0.22	0.01 (-0.005 to 0.02)	0.20	0.01 (-0.003 to 0.02)	0.15	0.01 (-0.004 to 0.02)	÷	0.20
Other pet	0.02 (-0.002 to 0.05)	0.07	0.02 (-0.01 to 0.04)	0.17	0.02 (-0.01 to 0.04)	0.23	0.01 (-0.01 to 0.04)		0.26
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet owners— —Higher in p</td><td>pet owners></td></lower>	-0.15 -0.05 0.05 0.15 pet owners— —Higher in p	pet owners>

Model 1: age and sex; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates

Supplemental Figure 3. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with biomarkers of ageing: psychological functioning (N=8785)

Part A.

Memory	Model 1 β (95% Cl)	P-value	Model 1 + confounders β (95% Cl)	P-value	Model 1 + mediators β (95% Cl)	P-value	All covariates β (95% Cl)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	· · · · ·	
Dog	-0.31 (-0.52 to -0.09)	0.01	-0.15 (-0.37 to 0.06)	0.16	-0.23 (-0.45 to -0.02)	0.03	-0.16 (-0.37 to 0.06)		0.15
Cat (no dog)	0.10 (-0.15 to 0.35)	0.43	0.05 (-0.18 to 0.29)	0.66	0.08 (-0.16 to 0.32)	0.53	0.05 (-0.19 to 0.28)		0.69
Other pet	-0.28 (-0.70 to 0.14)	0.19	-0.05 (-0.46 to 0.35)	0.79	-0.18 (-0.59 to 0.23)	0.39	-0.06 (-0.46 to 0.34)	┍┯┯╸╕╼╸	0.78
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet ownersHigher in p</td><td></td></lower>	-0.15 -0.05 0.05 0.15 pet ownersHigher in p	

Part B.

Depressive symptoms	Model 1 RR (95% CI)	P-value	Model 1 + confounders RR (95% Cl)	P-value	Model 1 + mediators RR (95% CI)	P-value	All covariates RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)	0	1 (ref.)	0	1 (ref.)		
Dog	1.28 (1.14 to 1.44)	< 0.001	1.13 (1.01 to 1.27)	0.03	1.16 (1.04 to 1.30)	0.01	1.09 (0.98 to 1.22)	-	0.13
Cat (no dog)	1.05 (0.90 to 1.22)	0.54	1.06 (0.92 to 1.22)	0.43	1.05 (0.91 to 1.21)	0.47	1.05 (0.92 to 1.21)	-8-	0.47
Other pet	1.24 (0.95 to 1.60)	0.11	1.08 (0.84 to 1.39)	0.56	1.14 (0.91 to 1.44)	0.26	1.09 (0.87 to 1.37)	_ _	0.45
							<lower in="" o<="" pet="" td=""><td>0.75 11.25 wners— —Higher in p</td><td>oet owners></td></lower>	0.75 11.25 wners— —Higher in p	oet owners>

Model 1: age and sex; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates

Effect modification by gender in the association of pet ownership with biomarkers of ageing

Supplemental Figure 4. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with ageing biomarkers: physical functioning according to gender (3922 men, 4863 women)

Part A.

📕 Men 🔶 Women									
Gait speed (m/sec)	Men β (95% Cl)	P-value		Women β (95% CI)	P-value				
No pet	0 (ref.)		•	0 (ref.)					
Dog	-0.02 (-0.04 to 0.003)	0.08	4	-0.03 (-0.05 to -0.01)	0.001				
Cat (no dog)	-0.01 (-0.03 to 0.02)	0.52	*	-0.01 (-0.03 to 0.01)	0.35				
Other pet	-0.02 (-0.08 to 0.04)	0.59	•	-0.02 (-0.07 to 0.03)	0.34				
FEV1 (L/sec)									
No pet	0 (ref.)		*	0 (ref.)					
Dog	0.04 (-0.02 to 0.1)	0.17	*	0.04 (-0.004 to 0.09)	0.07				
Cat (no dog)	-0.002 (-0.08 to 0.07)	0.95	*	0.02 (-0.03 to 0.07)	0.55				
Other pet	-0.02 (-0.15 to 0.11)	0.78	+	-0.02 (-0.11 to 0.08)	0.75				
Chair rise (secs)									
No pet	0 (ref.)		*	0 (ref.)					
Dog	-0.05 (-0.44 to 0.34)	0.82		0.54 (0.10 to 0.98)	0.02				
Cat (no dog)	0.06 (-0.41 to 0.52)	0.81		0.48 (-0.03 to 0.99)	0.07				
Other pet	0.04 (-0.75 to 0.84)	0.91		0.58 (-0.39 to 1.56)	0.23				
Grip strength (kg)									
No pet	0 (ref.)		1	0 (ref.)					
Dog	0.91 (0.20 to 1.62)	0.01		-0.15 (-0.64 to 0.34)	0.54				
Cat (no dog)	0.35 (-0.53 to 1.23)	0.43		0.16 (-0.43 to 0.76)	0.59				
Other pet	-1.35 (-2.91 to 0.22)	0.09		-0.22 (-1.28 to 0.85)	0.69				
		<-Lower	-0.75 -0.25 0 0.25 0.75 in pet owners— —Higher in pet o	whers>					

FEV1, Forced Expiratory Volume in one second

Men 📕 Women

Part B.

	Men			Women	
Leg raise failure	RR (95% CI)	P-valu	ie	RR (95% CI)	P-value
No pet	1 (ref.)		•	1 (ref.)	
Dog	0.96 (0.85 to 1.08)	0.46		1.04 (0.96 to 1.13)	0.32
Cat (no dog)	1.05 (0.93 to 1.19)	0.39		1.12 (1.03 to 1.21)	0.01
Other pet	1.01 (0.81 to 1.25)	0.95		0.97 (0.82 to 1.14)	0.68
Balance failure					
No pet	1 (ref.)		•	1 (ref.)	
Dog	0.94 (0.78 to 1.13)	0.50		1.02 (0.88 to 1.17)	0.81
Cat (no dog)	0.88 (0.69 to 1.12)	0.31		1.12 (0.96 to 1.31)	0.14
Other pet	1.38 (0.97 to 1.96)	0.07		1.19 (0.90 to 1.56)	0.22
			0.75 1.0 1.25 1.5 -Lower risk in pet ownersHigher risk in pet own	05->	

Effect estimates are adjusted for all covariates (as in Supplemental Figure 3)

Supplemental Figure 5. Beta coefficients (95% confidence interval) for the relation of pet ownership with ageing biomarkers: immune functioning according to gender (3922 men, 4863 women)

	Men Women										
	Men			Women							
C-reactive protein (log[mg/L])	β (95% Cl)	P-value		β (95% CI)	P-value						
No pet	0 (ref.)		•	0 (ref.)							
Dog	0.01 (-0.13 to 0.16)	0.87	₩.	0.004 (-0.11 to 0.11)	0.94						
Cat (no dog)	0.06 (-0.07 to 0.20)	0.36		-0.004 (-0.10 to 0.10)	0.94						
Other pet	0.09 (-0.14 to 0.32)	0.44	*=	-0.05 (-0.31 to 0.21)	0.69						
WBC (log[x10^9 cells/litre])											
No pet	0 (ref.)		•	0 (ref.)							
Dog	-0.001 (-0.03 to 0.03)	0.95		0.001 (-0.03 to 0.03)	0.94						
Cat (no dog)	0.02 (-0.02 to 0.06)	0.28		0.01 (-0.02 to 0.04)	0.65						
Other pet	0.02 (-0.05 to 0.08)	0.59	-	0.05 (-0.02 to 0.12)	0.17						
Fibrinogen (log[g/L])											
No pet	0 (ref.)		•	0 (ref.)							
Dog	-0.002 (-0.02 to 0.02)	0.87	+	-0.005 (-0.02 to 0.01)	0.62						
Cat (no dog)	0.01 (-0.01 to 0.03)	0.16		0.004 (-0.01 to 0.02)	0.63						
Other pet	0.01 (-0.02 to 0.05)	0.49		0.02 (-0.02 to 0.05)	0.42						
		<lower in="" pet<="" td=""><td>-0.1 0 0.1 owners— —Higher in</td><td>pet owners></td><td></td></lower>	-0.1 0 0.1 owners— —Higher in	pet owners>							

Effect estimates are adjusted for all covariates (as in Supplemental Figure 3). WBC, white blood cell count

Supplemental Figure 6. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with biomarkers of ageing: psychological functioning according to gender (3922 men, 4863 women)

Men Women Men Women β (95% CI) Memory β (95% CI) P-value P-value No pet 0 (ref.) 0 (ref.) -0.08 (-0.36 to 0.20) 0.58 \$ -0.23 (-0.53 to 0.07) 0.14 Dog 0.01 (-0.31 to 0.34) 0.94 0.07 (-0.24 to 0.38) 0.64 Cat (no dog) ۵, 0.09 (-0.53 to 0.72) 0.77 -0.20 (-0.79 to 0.39) 0.51 Other pet 2 ź -0.1 0.1 0.2 -0.2 0

Part A.

Part B.

Men	Women
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	Men			Women	
Depressive symptoms	RR (95% CI)	P-value		RR (95% CI)	P-value
No pet	1 (ref.)		-	1 (ref.)	
Dog	1.02 (0.84 to 1.24)	0.85		1.14 (1.01 to 1.30)	0.04
Cat (no dog)	1.01 (0.79 to 1.29)	0.96		1.09 (0.91 to 1.29)	0.34
Other pet	1.21 (0.85 to 1.71)	0.29	0.75 1.0 1.25 er in pet owners	1.05 (0.77 to 1.43)	0.75

Effect estimates are adjusted for all covariates (as in Supplemental Figure 3)

Association of pet ownership with other later health indices

Supplemental Figure 7. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with later risk indices (N=8785)

Part A.

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
Systolic blood pressure (mmHg)	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.84 (-0.35 to 2.02)	0.17	0.90 (-0.28 to 2.08)	0.13	0.67 (-0.5 to 1.84)	0.26	0.73 (-0.44 to 1.89)	<>	0.22
Cat (no dog)	0.04 (-1.32 to 1.4)	0.96	0.14 (-1.22 to 1.50)	0.84	0 (-1.36 to 1.36)	> 0.999	0.06 (-1.29 to 1.41)	→ → →	0.93
Other pet	-1.32 (-4 to 1.36)	0.33	-1.52 (-4.20 to 1.16)	0.26	-1.53 (-4.21 to 1.14)	0.26	-1.65 (-4.33 to 1.03)	\longleftrightarrow	0.22
BMI (kg/m^2)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.46 (0.13 to 0.79)	0.01	0.39 (0.07 to 0.71)	0.02	0.07 (-0.14 to 0.28)	0.50	0.07 (-0.14 to 0.28)		0.48
Cat (no dog)	0.06 (-0.33 to 0.45)	0.75	0.19 (-0.20 to 0.57)	0.34	0.11 (-0.11 to 0.34)	0.32	0.12 (-0.10 to 0.35)		0.28
Other pet	0.60 (-0.11 to 1.31)	0.10	0.28 (-0.41 to 0.97)	0.43	-0.02 (-0.49 to 0.46)	0.94	-0.03 (-0.51 to 0.44)		0.88
Waist circumference (cm)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	1.57 (0.81 to 2.32)	< 0.001	1.21 (0.48 to 1.93)	1E-3	0.60 (0.13 to 1.07)	0.01	0.46 (-0.01 to 0.94)		0.06
Cat (no dog)	0.76 (-0.26 to 1.78)	0.14	1.01 (0.01 to 2.01)	0.05	0.91 (0.30 to 1.51)	0.004	0.87 (0.27 to 1.47)		→ 0.01
Other pet	1.38 (-0.37 to 3.12)	0.12	0.52 (-1.19 to 2.23)	0.55	-0.13 (-1.51 to 1.25)	0.85	-0.19 (-1.59 to 1.2)		0.78
Total cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)		
Dog	0.05 (-0.03 to 0.13)	0.19	0.08 (0.004 to 0.16)	0.04	0.07 (-0.01 to 0.15)	0.07	0.09 (0.01 to 0.16)		0.03
Cat (no dog)	0.05 (-0.04 to 0.14)	0.27	0.04 (-0.05 to 0.12)	0.39	0.05 (-0.04 to 0.13)	0.29	0.04 (-0.05 to 0.13)		0.36
Other pet	-0.02 (-0.18 to 0.15)	0.83	0.02 (-0.14 to 0.18)	0.78	0.01 (-0.16 to 0.18)	0.91	0.03 (-0.14 to 0.19)	= →	0.74
HDL cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	-0.03 (-0.06 to -0.01)	0.02	-0.02 (-0.04 to 0.01)	0.21	-0.02 (-0.04 to 0.01)	0.26	-0.01 (-0.03 to 0.02)	+	0.60
Cat (no dog)	0.004 (-0.03 to 0.04)	0.83	-0.003 (-0.04 to 0.03)	0.85	0.002 (-0.03 to 0.04)	0.91	-0.0009 (-0.03 to 0.03)	+	0.96
Other pet	-0.02 (-0.09 to 0.05)	0.61	0.002 (-0.07 to 0.07)	0.95	0.01 (-0.07 to 0.08)	0.87	0.01 (-0.06 to 0.08)		0.77
LDL cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.05 (-0.03 to 0.12)	0.22	0.07 (-0.004 to 0.15)	0.06	0.06 (-0.02 to 0.14)	0.12	0.07 (0 to 0.15)		0.06
Cat (no dog)	0.03 (-0.05 to 0.11)	0.43	0.02 (-0.05 to 0.10)	0.54	0.03 (-0.05 to 0.10)	0.48	0.02 (-0.05 to 0.1)		0.53
Other pet	-0.04 (-0.19 to 0.10)	0.57	-0.01 (-0.15 to 0.14)	0.94	-0.02 (-0.17 to 0.12)	0.75	-0.01 (-0.15 to 0.14)	· • • • · · ·	0.95
Triglycerides (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.05 (0.01 to 0.09)	0.01	0.03 (-0.004 to 0.07)	0.08	0.03 (-0.005 to 0.07)	0.08	0.02 (-0.01 to 0.06)		0.21
Cat (no dog)	0.02 (-0.02 to 0.06)	0.30	0.02 (-0.01 to 0.06)	0.20	0.02 (-0.01 to 0.06)	0.21	0.02 (-0.01 to 0.06)		0.21
Other pet	0.07 (-0.01 to 0.16)	0.09	0.05 (-0.04 to 0.14)	0.24	0.05 (-0.03 to 0.14)	0.22	0.04 (-0.04 to 0.13)		0.30
HbA1c (log[mmol/mol])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	• • • • • • • • • • • • • • • • • • • •	
Dog	0.02 (0.005 to 0.03)	0.01	0.01 (0 to 0.02)	0.09	0.01 (0.0007 to 0.02)	0.04	0.01 (-0.004 to 0.02)	-	0.17
Cat (no dog)	0.02 (0.001 to 0.03)	0.04	0.02 (0 to 0.03)	0.02	0.02 (0.003 to 0.03)	0.02	0.02 (0.003 to 0.03)	-	0.02
Other pet	0.02 (-0.01 to 0.04)	0.17	0.01 (-0.01 to 0.03)	0.44	0.01 (-0.02 to 0.03)	0.49	0.01 (-0.02 to 0.03)	+	0.60
		2.11				2.10		· · · · · · · · ·	0.00
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet ownersHigher in p</td><td>et owners></td></lower>	-0.15 -0.05 0.05 0.15 pet ownersHigher in p	et owners>

Part B.

Type 2 diabetes	Model 1 RR (95% Cl)	P-value	Model 1 + confounders RR (95% CI)	P-value	Model 1 + mediators RR (95% CI)	P-value	All covariates RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)		
Dog	0.95 (0.81 to 1.11)	0.52	0.87 (0.74 to 1.02)	0.08	0.89 (0.76 to 1.04)	0.13	0.84 (0.72 to 0.98)	-	0.02
Cat (no dog)	1.13 (0.94 to 1.34)	0.19	1.17 (0.98 to 1.39)	0.07	1.16 (0.98 to 1.37)	0.09	1.18 (1.00 to 1.39)		0.05
Other pet	1.07 (0.76 to 1.52)	0.70	0.96 (0.68 to 1.35)	0.81	0.95 (0.67 to 1.34)	0.76	0.91 (0.64 to 1.28)		0.58
							<lower in="" pet<="" risk="" td=""><td>0.75 1 1.25 owners— —Higher risk</td><td>in pet owners></td></lower>	0.75 1 1.25 owners— —Higher risk	in pet owners>

Model 1: age and sex; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates. BMI, body mass index; HDL, High-density lipoprotein; LDL, Low-density lipoprotein; HbA1c, Glycated haemoglobin

Impact of adjustment of baseline assessment of each ageing biomarker on the association of pet ownership with biomarkers of ageing

Supplemental Figure 8. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with ageing biomarkers: physical functioning (N=8785)

Part A.

Gait speed (m/sec)	Model 1 β (95% CI)	P-value	Model 1 + confounders β (95% CI)	P-value	Model 1 + mediators β (95% CI)	P-value	All covariates β (95% CI)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	-0.03 (-0.05 to -0.02)	< 0.001	-0.02 (-0.04 to -0.01)	0.004	-0.03 (-0.05 to -0.02)	< 0.001	-0.02 (-0.04 to -0.01)	-	0.003
Cat (no dog)	0.004 (-0.02 to 0.02)	0.71	-0.001 (-0.02 to 0.02)	0.91	-0.001 (-0.02 to 0.02)	0.90	0 (-0.02 to 0.01)	+	0.75
Other pet	-0.04 (-0.08 to -0.002)	0.04	-0.02 (-0.06 to 0.01)	0.21	-0.03 (-0.07 to 0.01)	0.11	-0.02 (-0.06 to 0.02)	-	0.26
FEV1 (L/sec)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)		
Dog	-0.004 (-0.04 to 0.04)	0.87	0.04 (0.01 to 0.08)	0.02	0.01 (-0.03 to 0.05)	0.55	0.04 (0.01 to 0.08)		0.02
Cat (no dog)	0.01 (-0.03 to 0.05)	0.65	0.01 (-0.03 to 0.05)	0.61	0.01 (-0.04 to 0.05)	0.82	0.01 (-0.03 to 0.05)		0.64
Other pet	-0.06 (-0.14 to 0.03)	0.18	-0.02 (-0.10 to 0.06)	0.70	-0.03 (-0.11 to 0.05)	0.43	-0.01 (-0.09 to 0.07)	-	0.73
Chair rise (secs)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.58 (0.26 to 0.90)	< 0.001	0.27 (-0.03 to 0.57)	0.08	0.42 (0.11 to 0.72)	0.01	0.27 (-0.03 to 0.56)		0.07
Cat (no dog)	0.25 (-0.13 to 0.63)	0.19	0.30 (-0.06 to 0.66)	0.10	0.30 (-0.07 to 0.67)	0.11	0.3 (-0.06 to 0.66)		0.10
Other pet	0.75 (0.10 to 1.39)	0.02	0.35 (-0.25 to 0.96)	0.25	0.48 (-0.14 to 1.09)	0.13	0.32 (-0.28 to 0.92)		0.30
Grip strength (kg)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.04 (-0.40 to 0.48)	0.87	0.36 (-0.07 to 0.79)	0.10	0.18 (-0.24 to 0.61)	0.39	0.33 (-0.09 to 0.75)		0.12
Cat (no dog)	0.43 (-0.14 to 0.99)	0.14	0.33 (-0.22 to 0.88)	0.24	0.37 (-0.18 to 0.91)	0.19	0.29 (-0.25 to 0.83)		0.28
Other pet	-1.08 (-2.00 to -0.16)	0.02	-0.59 (-1.48 to 0.30)	0.19	-0.94 (-1.84 to -0.05)	0.04	-0.67 (-1.55 to 0.22)	÷++++	0.14
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet ownersHigher in</td><td></td></lower>	-0.15 -0.05 0.05 0.15 pet ownersHigher in	

FEV1, Forced Expiratory Volume in one second

Part B.

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
Leg raise failure	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)	10 A 10	
Dog	1.05 (0.97 to 1.13)	0.19	1.02 (0.94 to 1.09)	0.67	1.02 (0.95 to 1.10)	0.55	1 (0.93 to 1.08)		0.94
Cat (no dog)	1.08 (1.00 to 1.16)	0.06	1.08 (1.00 to 1.17)	0.04	1.09 (1.01 to 1.17)	0.03	1.09 (1.01 to 1.17)		0.03
Other pet	1.04 (0.90 to 1.21)	0.57	0.99 (0.86 to 1.14)	0.88	1.01 (0.87 to 1.16)	0.94	0.98 (0.85 to 1.13)	+	0.79
Balance failure									
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)		
Dog	1.07 (0.96 to 1.19)	0.25	0.99 (0.88 to 1.10)	0.83	1.03 (0.92 to 1.15)	0.59	0.98 (0.88 to 1.10)		0.77
Cat (no dog)	1.01 (0.88 to 1.15)	0.90	1.01 (0.89 to 1.16)	0.84	1.03 (0.90 to 1.17)	0.66	1.03 (0.90 to 1.17)	-	0.67
Other pet	1.39 (1.11 to 1.75)	0.004	1.25 (1.00 to 1.58)	0.05	1.3 (1.04 to 1.63)	0.02	1.24 (0.99 to 1.55)		0.06
								0.751 1.25	
							<-Lower risk in pet (ownersHigher risk	in pet owners>

Model 1: age, sex, and baseline (wave 4) assessment of biomarker outcome; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates.

Supplemental Figure 9. Beta coefficients (95% confidence interval) for the relation of pet ownership with ageing biomarkers: immune functioning (N=8785)

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
C-reactive protein (log[mg/L])	β (95% CI)	P-value	β (95% CI)	P-value	<u>β (95% CI)</u>	P-value	β (95% CI)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.09 (-0.003 to 0.18)	0.06	0.03 (-0.06 to 0.12)	0.47	0.04 (-0.04 to 0.13)	0.31	0.01 (-0.08 to 0.10)		0.82
Cat (no dog)	0.02 (-0.07 to 0.11)	0.61	0.03 (-0.06 to 0.12)	0.52	0.03 (-0.05 to 0.11)	0.46	0.02 (-0.06 to 0.11)		0.56
Other pet	0.11 (-0.08 to 0.29)	0.26	0.04 (-0.14 to 0.22)	0.66	0.04 (-0.14 to 0.21)	0.68	0.01 (-0.16 to 0.19)		0.87
WBC (log[x10^9 cells/litre])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.02 (0.001 to 0.04)	0.04	0.003 (-0.02 to 0.02)	0.75	0.01 (-0.01 to 0.03)	0.15	0.0001 (-0.02 to 0.02)	+	0.99
Cat (no dog)	0.02 (-0.01 to 0.04)	0.26	0.01 (-0.01 to 0.04)	0.34	0.02 (-0.01 to 0.04)	0.20	0.01 (-0.01 to 0.04)	-	0.33
Other pet	0.05 (-0.004 to 0.10)	0.07	0.04 (-0.01 to 0.09)	0.15	0.04 (-0.02 to 0.09)	0.16	0.03 (-0.02 to 0.09)		0.19
Fibrinogen (log[g/L])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.01 (-0.01 to 0.02)	0.48	-0.001 (-0.02 to 0.02)	0.90	0.001 (-0.02 to 0.02)	0.86	-0.003 (-0.02 to 0.01)	+	0.67
Cat (no dog)	0.01 (-0.01 to 0.02)	0.22	0.01 (-0.005 to 0.02)	0.20	0.01 (-0.003 to 0.02)	0.15	0.01 (-0.004 to 0.02)		0.20
Other pet	0.02 (-0.002 to 0.05)	0.07	0.02 (-0.01 to 0.04)	0.17	0.02 (-0.01 to 0.04)	0.23	0.01 (-0.01 to 0.04)		0.26
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet ownersHigher in p</td><td>et owners></td></lower>	-0.15 -0.05 0.05 0.15 pet ownersHigher in p	et owners>

Model 1: age, sex, and baseline (wave 4) assessment of biomarker outcome; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates.

Supplemental Figure 10. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with biomarkers of ageing: psychological functioning (N=8785)

Part A.

Memory	Model 1 β (95% Cl)	P-value	Model 1 + confounders β (95% Cl)	P-value	Model 1 + mediators β (95% Cl)	P-value	All covariates β (95% Cl)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)		
Dog	-0.31 (-0.52 to -0.09)	0.01	-0.15 (-0.37 to 0.06)	0.16	-0.23 (-0.45 to -0.02)	0.03	-0.16 (-0.37 to 0.06)		0.15
Cat (no dog)	0.10 (-0.15 to 0.35)	0.43	0.05 (-0.18 to 0.29)	0.66	0.08 (-0.16 to 0.32)	0.53	0.05 (-0.19 to 0.28)		0.69
Other pet	-0.28 (-0.70 to 0.14)	0.19	-0.05 (-0.46 to 0.35)	0.79	-0.18 (-0.59 to 0.23)	0.39	-0.06 (-0.46 to 0.34)	─ ── ─────────────────────────────────	0.78
							<lower in<="" td=""><td>-0.15 -0.05 0.05 0.15 pet ownersHigher in p</td><td>et owners-></td></lower>	-0.15 -0.05 0.05 0.15 pet ownersHigher in p	et owners->

Part B.

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
Depressive symptoms	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)	0	1 (ref.)	0	1 (ref.)		
Dog	1.28 (1.14 to 1.44)	< 0.001	1.13 (1.01 to 1.27)	0.03	1.16 (1.04 to 1.30)	0.01	1.09 (0.98 to 1.22)	-	0.13
Cat (no dog)	1.05 (0.90 to 1.22)	0.54	1.06 (0.92 to 1.22)	0.43	1.05 (0.91 to 1.21)	0.47	1.05 (0.92 to 1.21)		0.47
Other pet	1.24 (0.95 to 1.60)	0.11	1.08 (0.84 to 1.39)	0.56	1.14 (0.91 to 1.44)	0.26	1.09 (0.87 to 1.37)		0.45
								0.75 11.25	
							 Lowerin estow 	U.ru Tilzu	at an and a second

Model 1: age, sex, and baseline (wave 4) assessment of biomarker outcome; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates.

Supplemental Figure 11. Beta coefficients (part A) and relative risks (part B) for the relation of pet ownership with later risk indices (N=8785)

Part A.

	Model 1		Model 1 + confounders		Model 1 + mediators		All covariates		
Systolic blood pressure (mmHg)	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)	P-value	β (95% CI)		P-value
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.84 (-0.35 to 2.02)	0.17	0.90 (-0.28 to 2.08)	0.13	0.67 (-0.5 to 1.84)	0.26	0.73 (-0.44 to 1.89)	~>	0.22
Cat (no dog)	0.04 (-1.32 to 1.4)	0.96	0.14 (-1.22 to 1.50)	0.84	0 (-1.36 to 1.36)	> 0.999	0.06 (-1.29 to 1.41)	· · · · · · · · · · · · · · · · · · ·	0.93
Other pet	-1.32 (-4 to 1.36)	0.33	-1.52 (-4.20 to 1.16)	0.26	-1.53 (-4.21 to 1.14)	0.26	-1.65 (-4.33 to 1.03)		0.22
BMI (kg/m^2)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.46 (0.13 to 0.79)	0.01	0.39 (0.07 to 0.71)	0.02	0.07 (-0.14 to 0.28)	0.50	0.07 (-0.14 to 0.28)	_	0.48
Cat (no dog)	0.06 (-0.33 to 0.45)	0.75	0.19 (-0.20 to 0.57)	0.34	0.11 (-0.11 to 0.34)	0.32	0.12 (-0.10 to 0.35)		0.28
Other pet	0.60 (-0.11 to 1.31)	0.10	0.28 (-0.41 to 0.97)	0.43	-0.02 (-0.49 to 0.46)	0.94	-0.03 (-0.51 to 0.44)	· • • • •	0.88
Waist circumference (cm)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	1.57 (0.81 to 2.32)	< 0.001	1.21 (0.48 to 1.93)	1E-3	0.60 (0.13 to 1.07)	0.01	0.46 (-0.01 to 0.94)		0.06
Cat (no dog)	0.76 (-0.26 to 1.78)	0.14	1.01 (0.01 to 2.01)	0.05	0.91 (0.30 to 1.51)	0.004	0.87 (0.27 to 1.47)		→ 0.01
Other pet	1.38 (-0.37 to 3.12)	0.12	0.52 (-1.19 to 2.23)	0.55	-0.13 (-1.51 to 1.25)	0.85	-0.19 (-1.59 to 1.2)	·	0.78
Total cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.05 (-0.03 to 0.13)	0.19	0.08 (0.004 to 0.16)	0.04	0.07 (-0.01 to 0.15)	0.07	0.09 (0.01 to 0.16)	→■ →	0.03
Cat (no dog)	0.05 (-0.04 to 0.14)	0.27	0.04 (-0.05 to 0.12)	0.39	0.05 (-0.04 to 0.13)	0.29	0.04 (-0.05 to 0.13)		0.36
Other pet	-0.02 (-0.18 to 0.15)	0.83	0.02 (-0.14 to 0.18)	0.78	0.01 (-0.16 to 0.18)	0.91	0.03 (-0.14 to 0.19)	→	0.74
HDL cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	· · · ·	
Dog	-0.03 (-0.06 to -0.01)	0.02	-0.02 (-0.04 to 0.01)	0.21	-0.02 (-0.04 to 0.01)	0.26	-0.01 (-0.03 to 0.02)	+	0.60
Cat (no dog)	0.004 (-0.03 to 0.04)	0.83	-0.003 (-0.04 to 0.03)	0.85	0.002 (-0.03 to 0.04)	0.91	-0.0009 (-0.03 to 0.03)	+	0.96
Other pet	-0.02 (-0.09 to 0.05)	0.61	0.002 (-0.07 to 0.07)	0.95	0.01 (-0.07 to 0.08)	0.87	0.01 (-0.06 to 0.08)	-	0.77
LDL cholesterol (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.05 (-0.03 to 0.12)	0.22	0.07 (-0.004 to 0.15)	0.06	0.06 (-0.02 to 0.14)	0.12	0.07 (0 to 0.15)		0.06
Cat (no dog)	0.03 (-0.05 to 0.11)	0.43	0.02 (-0.05 to 0.10)	0.54	0.03 (-0.05 to 0.10)	0.48	0.02 (-0.05 to 0.1)		0.53
Other pet	-0.04 (-0.19 to 0.10)	0.57	-0.01 (-0.15 to 0.14)	0.94	-0.02 (-0.17 to 0.12)	0.75	-0.01 (-0.15 to 0.14)		0.95
Triglycerides (mmol/L)									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)		
Dog	0.05 (0.01 to 0.09)	0.01	0.03 (-0.004 to 0.07)	80.0	0.03 (-0.005 to 0.07)	0.08	0.02 (-0.01 to 0.06)	-	0.21
Cat (no dog)	0.02 (-0.02 to 0.06)	0.30	0.02 (-0.01 to 0.06)	0.20	0.02 (-0.01 to 0.06)	0.21	0.02 (-0.01 to 0.06)	-	0.21
Other pet	0.07 (-0.01 to 0.16)	0.09	0.05 (-0.04 to 0.14)	0.24	0.05 (-0.03 to 0.14)	0.22	0.04 (-0.04 to 0.13)		0.30
HbA1c (log[mmol/mol])									
No pet	0 (ref.)		0 (ref.)		0 (ref.)		0 (ref.)	•	
Dog	0.02 (0.005 to 0.03)	0.01	0.01 (0 to 0.02)	0.09	0.01 (0.0007 to 0.02)	0.04	0.01 (-0.004 to 0.02)	+	0.17
Cat (no dog)	0.02 (0.001 to 0.03)	0.04	0.02 (0 to 0.03)	0.02	0.02 (0.003 to 0.03)	0.02	0.02 (0.003 to 0.03)		0.02
Other pet	0.02 (-0.01 to 0.04)	0.17	0.01 (-0.01 to 0.03)	0.44	0.01 (-0.02 to 0.03)	0.49	0.01 (-0.02 to 0.03)	+	0.60
								-0.15 -0.05 0.05 0.15	
							<lower in<="" td=""><td>pet ownersHigher in p</td><td>et owners></td></lower>	pet ownersHigher in p	et owners>

Part B.

Turne Daliahadaa	Model 1	Durahua	Model 1 + confounders	Durahua	Model 1 + mediators	Durahua	All covariates		Duratura
Type 2 diabetes	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)	P-value	RR (95% CI)		P-value
No pet	1 (ref.)		1 (ref.)		1 (ref.)		1 (ref.)		
Dog	0.95 (0.81 to 1.11)	0.52	0.87 (0.74 to 1.02)	0.08	0.89 (0.76 to 1.04)	0.13	0.84 (0.72 to 0.98)	+	0.02
Cat (no dog)	1.13 (0.94 to 1.34)	0.19	1.17 (0.98 to 1.39)	0.07	1.16 (0.98 to 1.37)	0.09	1.18 (1.00 to 1.39)		0.05
Other pet	1.07 (0.76 to 1.52)	0.70	0.96 (0.68 to 1.35)	0.81	0.95 (0.67 to 1.34)	0.76	0.91 (0.64 to 1.28)		0.58
								0.7511.25	
							<lower in="" o<="" pet="" risk="" td=""><td>whersHigher risk</td><td>in pet owners></td></lower>	whersHigher risk	in pet owners>

Model 1: age, sex, and baseline (wave 4) assessment of biomarker outcome; Confounders: wealth, self-reported health, smoking status, and alcohol consumption; Mediators: social isolation, loneliness, physical activity, and body mass index; All covariates: all above covariates. BMI, body mass index; HDL, High-density lipoprotein; LDL, Low-density lipoprotein; HbA1c, Glycated haemoglobin