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The association between dog ownership or dog walking and fitness or weight status in childhood

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Summary

Background: Health benefits of dog walking are established in adults: dog owners are on average more physically active, and those walking their dogs regularly have lower weight status than those who do not. However, there has been little research on children.

Objectives: This study aimed to examine the association between dog ownership or dog walking and childhood fitness or weight status.

Methods: A survey of pet ownership and involvement in dog walking was combined with fitness and weight status measurements of 1021 9 to 10-year-old children in the Liverpool SportsLinx study.

Results: We found little evidence to support that children who live with, or walk with, dogs are any fitter or less likely to be obese than those who do not.

Conclusions: This is an important finding, as it suggests that the activity that children currently do with dogs is not sufficient enough to impact weight status or fitness.

Keywords: Dogs, paediatric obesity, physical fitness.

Introduction

Dog-owning adults are on average more physically active than non-owners (1), and there is some evidence that owners who walk their dogs are less likely to be obese than both owners who do not walk with their dogs and non-dog owners (2). A few studies show that children who own dogs are marginally more physically active (3–5), although others do not (6), but there has been little research into other health outcomes, especially regarding actual involvement in dog walking, as opposed to simply dog ownership (4,6–8). This study examined the association of dog ownership and involvement in dog walking with childhood obesity and overweight. It also examined, for the first time, the association between dog ownership and involvement in dog walking with fitness measures.

Methods

Data collection has been described previously (9–14). Briefly, over 10 weekdays in October–November 2010, 1021 9 to 10-year-old children, from 31 schools, were sampled during attendance at *Sports*Linx Fitness Fun Days in Wavertree, Liverpool, UK. The children completed the Child Lifestyle and Pets Questionnaire as part of their rotation of activities. Participation in *Sports*Linx is subsequent to granted informed parental consent and participant assent and after the completion of medical screening forms. Ethical approval for the addition of the Child Lifestyle and Pets Questionnaire to a sample of the 2010–2011 *Sports*Linx data collection was obtained from the North West 3 Research Ethics Committee – Liverpool East.

The children were asked about the pets they currently owned and how often they walked with any

dog (theirs or someone else's) and walked with their own dog. Frequency was recorded as never, once a week or less, several times a week or once a day or more. To ensure sufficient numbers for analyses, this was further collapsed into a two-level variable of 'once a week or less' vs. 'several times a week or more'. Parental consent forms collected information such as gender, age and home postcode (used to assign Index of Multiple Deprivation 2007). Developmental age was estimated via years to peak height velocity by using the equation developed by Mirwald (15). Outcomes measured during EUROFIT fitness testing included 20-m multi-stage shuttle runs test, 10 × 5 agility, sit and reach, standing broad jump and grip strength (16). Height and weight (Seca, Bodycare, Birmingham, UK), both measured by instructors, were used to calculate BMI. Age- and sex-specific cut-off points (International Obesity Task Force; 17) were used to classify the participants in binary terms as being 'overweight or obese' or 'obese'.

Predictive variables tested were lives with a dog, frequency of walks with any dog and frequency of walks with own dog. Univariable analysis was conducted by using *t*-test or Kruskal–Wallis tests, followed by adjustment for confounders by using regression modelling in MLWIN. For continuous measures, non-normally distributed data were transformed (log10). Multivariable two-level models were developed initially by using a residual iterative generalized least-square algorithm, and then for binary outcomes, a second-order penalized quasi-likelihood (18). The variables 'school' and 'child' were set as levels 2 and 1 respectively, to account for non-independence of the data (children clustered in schools). All models were adjusted for gender, developmental age and Index of Multiple Deprivation 2007. Analyses were also conducted stratified by gender in case there was evidence of effects in boys but not girls (or vice versa), but we did not find anything of interest (data not shown). Fitness outcome models were also adjusted for BMI standard deviation score, and weight status models are presented both with and without additional adjustment for positive and negative food score intake (19). Sample size calculations estimated that to detect a 50% reduction in risk of overweight (comparable to published interventions; 20) with expected 25% dog ownership (21) or 65% dog-owning children walking with their dog several times a week or more (14), it would require 600 and 100 participants respectively (95% confidence level, 80% power).

Results

Table 1 shows evidence that dog ownership, but not dog walking, may be associated with lower flexibility ($P = 0.01$) and explosive leg strength (standing broad jump: $P = 0.003$). More frequent dog walking of own or any dog was weakly associated with greater grip strength ($P = 0.03$–0.05). There was no evidence of an association between dog ownership or dog walking and obesity or overweight (Table 2). In model 2 of Table 2, we further adjusted for a measure of nutrition, using 'positive' (healthy) and 'negative' food intake by food types indicated (19). Interestingly, this reversed the direction of effect for dog walking variables to protective but remained insignificant.

Discussion

These analyses offer a small amount of evidence to support the premise that children who live with dogs are fitter, and no evidence that they are at less risk of obesity. The potential association between involvement in dog walking and improved grip strength is feasible, considering that children of this age walking with a dog may at some point hold the leash. Our other tentative findings may be due to confounders associated with both dog ownership and health. For an association between health outcomes and dog walking to be biologically plausible, we would expect to find a positive association between involvement in dog walking and child health rather than a negative association with ownership alone. We found no evidence of an association between dog ownership or dog walking and obesity or overweight. We may lack statistical power to detect a difference; however, this is unlikely, at least regarding weight given exceeding our sample size estimations. Furthermore, we did adjust for nutrition quality as well as social deprivation, as dog ownership is associated with socio-demographic factors related to poor health (13,21). Other studies have also found no association between dog ownership and child weight status (4,6,8) or a negative association only in some age groups (7). Overall, this suggests that the intensity of physical activity performed when walking a dog might not be vigorous or sustained enough to noticeably impact weight status. Further research is required into the intensity and contexts of physical activity during interactions between children and pet dogs.

Conflicts of interest statement

Prof Dawson, Prof Gaskell, Prof Bundred, Dr German, Dr Coyne and Dr Westgarth report grant funding from WALTHAM and MARS Petcare during conduct of the study. Dr German reports grants, personal fees, non-financial support and others from

Table 1 Multi-level multivariable regression models of association between living with a dog and walking a dog, with childhood fitness

Outcome				Crude*			Adjusted†		
Variable	*n*	Median	Kruskal Wallis test	Coef	SE coef	*P*	Coef	SE coef	*P*
20-m SRT		*(Runs)*							
Lives with a dog									
No	566	30.00	0.38						
Yes	333	29.00		−0.01	0.02	0.44	−0.01	0.02	0.75
Frequency walks with any dog									
Once a week or less	575	29.00	0.91						
Several times a week or more	238	32.00		−0.00	0.02	0.82	0.01	0.02	0.44
Frequency walks with own dog									
Once a week or less	101	28.00	0.42						
Several times a week or more	186	29.50		0.03	0.03	0.35	0.04	0.03	0.15
10 × 5 agility		*(s)*							
Lives with a dog									
No	576	22.54	0.40						
Yes	333	22.59		0.00	0.00	0.50	0.00	0.00	0.50
Frequency walks with any dog									
Once a week or less	580	22.66	0.74						
Several times a week or more	241	22.48		0.00	0.00	0.50	−0.00	0.00	0.32
Frequency walks with own dog									
Once a week or less	101	22.64	0.93						
Several times a week or more	186	22.56		0.00	0.01	0.84	−0.00	0.01	0.69
				Crude			Adjusted†		
	n	Mean	SD	*t*-test	Coef	SE coef	*P*	Coef	SE coef	*P*
Sit and reach (flexibility)		*(cm)*							
Lives with a dog									
No	574	16.83	6.48	0.22					
Yes	337	16.32	5.94		−0.51	0.44	0.25	−1.26	0.49	**0.01**
Frequency walks with any dog									
Once a week or less	576	16.47	6.39	0.34					
Several times a week or more	246	16.91	5.92		0.37	0.48	0.44	0.28	0.53	0.60

Table 1 (Continued)

Outcome					Crude*			Adjusted†		
Variable	*n*	Median		Kruskal Wallis test	Coef	SE coef	*P*	Coef	SE coef	*P*
Frequency walks with own dog										
Once a week or less	101	16.49	3.63	0.63						
Several times a week or more	189	16.12	5.85		−0.39	0.75	0.68	0.34	0.79	0.67
Standing broad jump		*(m)*								
Lives with a dog										
No	584	1.24	0.21	**0.02**						
Yes	339	1.21	0.20		−0.03	0.01	**0.02**	−0.04	0.01	**0.003**
Frequency walks with any dog										
Once a week or less	590	1.24	0.21	0.52						
Several times a week or more	250	1.23	0.21		−0.01	0.02	0.50	−0.00	0.02	0.95
Frequency walks with own dog										
Once a week or less	100	1.20	0.20	0.73						
Several times a week or more	192	1.21	0.21		0.01	0.03	0.84	0.02	0.02	0.46
Grip strength		*(kg)*								
Lives with a dog										
No	562	15.85	3.75	0.72						
Yes	337	15.76	3.26		−0.03	0.25	0.89	0.06	0.27	0.82
Frequency walks with any dog										
Once a week or less	574	15.60	3.57	0.29						
Several times a week or more	242	15.87	3.32		0.38	0.27	0.26	0.57	0.29	**0.05**
Frequency walks with own dog										
Once a week or less	101	15.05	3.16	**0.03**						
Several times a week or more	190	15.95	3.34		0.93	0.41	**0.02**	0.98	0.44	**0.03**

*Outcome is log10.
†Regression adjusted for gender, developmental age, Index of Multiple Deprivation 2007, BMI Standard Deviation Score.
Bold = $P < 0.05$.

Table 2 Multi-level multivariable regression models of association between living with a dog and walking a dog, with childhood weight status (International Obesity Task Force cut off for overweight or obese and obese)

Outcome				Crude			Model 1			Model 2 (+ nutrition)		
Variable	No, *n* (%)	Yes, *n* (%)	Chi-squared	OR	95% CI	*P*	OR	95% CI	*P*	OR	95% CI	*P*
Overweight or obese												
Lives with a dog												
No	367 (73.0)	136 (27.0)	0.90									
Yes	214 (73.0)	81 (27.0)		0.96	0.68–1.35	0.81	1.04	0.67–1.60	0.86	1.05	0.62–1.77	0.86
Frequency walks with any dog												
Once a week or less	373 (74.0)	131 (26.0)	0.93									
Several times a week or more	162 (74.3)	56 (25.7)		1.10	0.74–1.63	0.63	0.84	0.53–1.35	0.48	0.95	0.31–2.93	0.92
Frequency walks with own dog												
Once a week or less	64 (73.6)	23 (26.4)	0.53									
Several times a week or more	118 (69.8)	51 (30.2)		1.27	0.70–2.31	0.44	1.14	0.49–2.67	0.76	1.40	0.43–4.63	0.51
Obese												
Lives with a dog												
No	470 (93.4)	33 (6.6)	0.24									
Yes	269 (91.2)	26 (8.8)		1.37	0.79–2.37	0.27	1.60	0.80–3.20	0.19	1.09	0.43–2.79	0.85
Frequency walks with any dog												
Once a week or less	474 (94.1)	30 (5.9)	0.11									
Several times a week or more	198 (90.8)	20 (9.2)		1.57	0.86–2.88	0.14	1.66	0.79–3.48	0.18	0.94	0.32–2.77	0.92
Frequency walks with own dog												
Once a week or less	81 (93.1)	6 (6.9)	0.27									
Several times a week or more	150 (88.8)	19 (11.2)		1.44	0.54–3.86	0.47	1.21	0.36–4.06	0.75	0.60	0.09–3.99	0.60

Model 1 – logistic regression adjusted for gender, developmental age and Index of Multiple Deprivation 2007.
Model 2 – logistic regression adjusted for gender, developmental age, Index of Multiple Deprivation 2007, positive food score and negative food score (19).
Bold = $P < 0.05$.

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CW conceived and designed the study, collected the data survey, performed the data analysis and drafted the paper. LMB and GS provided access to data collection and advised on study design and data analysis. SD, PB, AJG, RMG and KPC were involved in conception of the study, study design and interpretation of findings. AJG and KPC also assisted with data collection, and SD was also principal investigator. SMcC assisted in study design and interpretation of findings. All authors read and approved the final manuscript. We are very grateful to the project partners: LJMU, Liverpool City Council in particular Liz Lamb principal health and physical activity officer, Glen Groves senior fitness officer, Liverpool PCT and the schools, parents and children involved in the project. The funding source (WALTHAM® and Mars Petcare, divisions of Mars Inc.) had input during study design, interpretation of results and writing of the manuscript but did not influence study findings.

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