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Family dog ownership and levels of physical activity in childhood: findings from the Child Heart And health Study in England (CHASE)

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Abstract

Dog ownership is associated with higher levels of physical activity in adults; whether this association occurs in children is unknown. We examined objectively assessed levels of physical activity (using accelerometry) in 2065 children aged 9-10 years. Children from dog-owning families spent more time in light, moderate-vigorous physical activity, and recorded higher levels of activity counts-per-minute (25, 95% CI 6-44), and steps (357, 95% CI 14-701) per day than those who did not. Children living with pet-dogs are slightly more active, though the precise reasons have still to be established.

Keywords

Dog ownership; physical activity; children

Introduction

Adults who own dogs are more physically active than those who do not,¹⁻⁸ taking approximately 25% more steps per day.⁸ However, the association between dog ownership and physical activity levels in children remains unknown. We therefore examined whether family dog ownership is associated with objectively measured physical activity in a population-based study of 2000 9-10 year-old children from different ethnic groups.

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Contributors All authors contributed substantially to the conception and design of this paper. PHW conceived, raised funding for and directed the CHASE Study with help from DGC; CGO led the physical activity assessment with support from UE, DGC and PHW. CMN and ARR carried out the statistical analyses. The paper was critically appraised by all authors for intellectual content; CGO drafted the paper and will act as guarantor. The guarantor accepts full responsibility for the integrity of the work as a whole. All authors had access to the data, and approved the final version to be published.

Human participant protection Ethical approval was obtained from the relevant Multi-Centre Research Ethics Committee.

Disclosures No conflicts to disclose.

Methods

The Child Heart And health Study in England (CHASE) is a school-based cross sectional survey of the cardiovascular health of children of white European, black African-Caribbean, and South Asian origin in 3 cities (London, Birmingham and Leicester).⁹ Ethical approval was obtained from the relevant Multi-Centre Research Ethics Committee. Physical activity measurements were carried out in 78 schools studied between February 2006 and February 2007.¹⁰ Children were asked to wear an Actigraph GT1M activity monitor (ActiGraph, LLC, Pensacola, FL, USA), over the left hip on an elasticised belt, during waking hours for 7 complete days. On return of the instrument ActiGraph data files were downloaded and batch processed using a dedicated programme (MAHUFFE available from http://www.mrc-epid.cam.ac.uk/Research/Programmes/Programme_5/InDepth/Programme%205_Downloads.html). Outcomes included mean daily activity counts, mean daily steps, and activity counts per minute (CPM) of registered time; days with < 600 minutes per day were excluded. Mean daily times (minutes) spent in sedentary (defined as <100 CPM), light (100 to <2000 CPM), moderate to vigorous (<2000 CPM) physical activity (MVPA) were also used (equivalent to walking at 4 km/hour or more).^{11;12} Ethnic origin of the child was based on parentally defined ethnicity, and classified as white European, South Asian, black African-Caribbean or 'other'. Child questionnaires asked 'do you have any pets at home?' and if so, 'what kinds of pets?' Children were classified as dog owners or non dog-owners. Differences in activity outcomes by dog ownership category were compared using multilevel linear regression adjusted for age, gender, ethnicity, socioeconomic position (based on self-reported parental occupation coded using the SOC2000 occupational classification),¹³ allowing for day of the week, day order of recording and month, and with school fitted as a random effect.¹⁰

Results

In all, 2065 children provided at least one complete day of Actigraph recording and questionnaire data (participation rate 69%), with similar numbers of children and participation rates by ethnic group. Overall, family dogs were present for 10% of participants; family dog ownership was more prevalent among white European children (23%), than in other ethnic groups (all <10%) (Table 1). Children with a dog spent more time in light, moderate-vigorous and vigorous physical activity, recorded more overall activity counts, counts-per-minute, and steps compared with non-dog owners (Table 2). Associations between dog ownership and physical activity did not differ significantly between weekdays and weekends, summer and winter, boys and girls or between ethnic groups (data not presented). Dog ownership did not account for the ethnic differences in physical activity levels previously described in this study.¹⁰ Although participants who provided a single day of physical activity data (5%) were included in the analysis (to optimize participation rates), most children (89%) provided three or more days of physical activity data and the exclusion of children who contributed fewer days made little difference to the results. Results were not materially affected by exclusion of the small numbers of children who reported cycling (not adequately measured by accelerometry) or swimming (when monitors were removed).

Discussion

The results of this study suggest that children from households with a pet dog have higher levels of physical activity, measured objectively by accelerometry (which provides more accurate assessment of physical activity levels in this age group).^{14;15} However, both in adults and children, the extent to which physical activity differences reflect a causal influence of dog ownership, or the self-selection of dog owning by more active individuals

and families is difficult to establish.¹⁶ Longitudinal studies in adult before and after dog ownership suggest that dog owners become more active;³ effects in children are unknown. The smaller size of effect in children (360 steps per day, 4% difference) than that observed in adults (1700 steps per day, 25% difference)⁸ is unsurprising, and suggests that children's physical activity undertaken with a dog is likely to account for a smaller proportion of total physical activity than that for an adult responsible for exercising a dog.¹⁷ The present study (in a less affluent urban population) may have underestimated the potential influence of dog ownership on physical activity in a more affluent setting, where there may be better access and proximity to higher quality public open space¹⁸⁻²⁰, though the independent mobility of children in more affluent areas is not necessarily greater²¹. Further work is needed to examine the influence of dog ownership in different social settings. In adults, the increased physical activity associated with dog ownership primarily reflects walking;¹ the increase in children could reflect active play involving the dog as well as walking. The present study cannot distinguish between these possibilities; further studies documenting the timing and nature of activities carried out with the pet dog would help to resolve this issue.

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Table 1

Dog ownership status overall and by ethnic group

		Ethnic group				Total
		White European	Black African Caribbean	South Asian	Other	
Dog owner	Number (%)	114 (23)	28 (5)	13 (3)	47 (9)	202 (10)
Non-dog owner	Number	393	546	474	450	1863
	Total	507	574	487	497	2065

Table 2

Summary of objectively measured activity outcomes by child reported pet ownership, comparing non-dog owners with dog owners

Outcome	Non dog owners (n=1606)		Dog owners (n=178)		Mean difference	95% CI	p(difference)
	Mean	95% CI	Mean	95% CI			
Time spent sedentary	573	(566, 580)	562	(546, 578)	-11.06	(-26.89, 4.78)	0.17
Time spent in light PA	176	(172, 180)	181	(175, 187)	5.29	(0.35, 10.23)	0.04
Time spent in moderate PA	47	(45, 48)	48	(46, 50)	1.27	(-0.59, 3.13)	0.18
Time spent in vigorous PA	22	(21, 23)	24	(22, 25)	1.61	(0.11, 3.12)	0.04
Time spent in mod - vig PA	69	(66, 71)	72	(68, 75)	2.87	(-0.14, 5.87)	0.06
Counts	394,257	(387,611, 400,903)	412,490	(397,264, 427,716)	18,233	(2,969, 33,497)	0.02
Counts per minute	486	(478, 495)	511	(492, 530)	24.71	(5.80, 43.62)	0.01
Steps	9,798	(9,642, 9,953)	10,155	(9,809, 10,501)	357	(14, 701)	0.04

Time in minutes throughout. PA = physical activity. Analyses adjusted for gender, age (in quartiles), ethnicity, socioeconomic position, day order of recording, day of the week, month of the year, and clustering effect of school. Socioeconomic status available for 1784 children.