

Pet dogs and child physical activity: the role of child–dog attachment

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Summary

Background: Dog ownership has been associated with increased physical activity in children which in turn may mitigate childhood obesity.

Objective: To measure the association between child–dog attachment and child physical activity and screen time.

Methods: Cross-sectional study including 370 children (ages 4–10) who had pet dogs in the home. Parents completed the *DartScreen*, a web-based screener, before a well-child visit. Screener domains included child body mass index (BMI), physical activity, screen time and dog-related questions. The Companion Animal Bonding Scale (CABS) was used to measure child attachment to the dog. Clinic nurses weighed and measured the children. Associations between CABS, BMI z-score, screen time and physical activity were estimated.

Results: CABS was strongly associated with time spent being active with the dog ($F = 22.81$, $p < 0.0001$), but not with BMI z-score or screen time.

Conclusions: A higher level of child attachment to a pet dog is associated with increased child physical activity.

Keywords: Attachment, children, companion animal bonding scale, dog, human–animal interaction, physical activity.

Dog ownership has been associated with measured increases in physical activity among children ages 5–12 years in Australia, the UK (1–3) and adolescents in the US (4). Children, ages 9–10, who had pet dogs took 360 more steps per day compared to those without pet dogs (5). Children ages 5–6 in Australia were less likely to be obese if the family owned a dog (6), perhaps because of informal play, an often overlooked mechanism for increasing children’s physical activity (7). Obese children ages 8–12 were more active in movement games in the presence of a dog than with a friendly adult (8), suggesting that the dog may activate the child’s intrinsic motivation. A ten week, family-level dog exploratory trial in Scotland showed increased physical activity, that was objectively measured, among children ages 9–10 in the intervention compared to the control group (9). In a cross-sectional study of children ages 9–10 in the UK, attachment to the pet dog was strongly associated with self-reported dog walking (10), suggesting that the strength of the child–dog relationship may increase physical activity.

The level of attachment to a pet may be one mechanism by which the benefits of human–animal interaction (HAI) are conferred to humans, including children (11,12). The Companion Animal Bonding Scale (CABS;) (13) measures attachment using behavioural interactions between people and their pets and has good internal reliability, face validity, construct validity and intra-observer reliability for dog and cat owners (13–15). Parental report of CABS correlates well with child’s self report (13,15). When CABS was re-evaluated among 610 students ages 11–19, three subscales related to human–animal attachment emerged: emotional bond/affectional tie, physical proximity and pet caretaking (15).

We recently published a study of dog ownership and young children ages 4–10 (16) that demonstrated no difference among children with and children without pet dogs in body mass index (BMI) categories, mean BMI z-score and screen time, which has been associated with child weight (17). However attachment to the pet dog was not analysed. Because pet attachment has been

associated with dog walking among older children (10), in this study we hypothesize that dog attachment may be related to a child's physical activity, and lower body weight and less screen time among young children.

Methods

This cross-sectional study included a consecutive sample of parents of 643 children, ages 4–10, who completed the *DartScreen*, a comprehensive web-based child health screener administered using a tablet (18). Details of the overall study are reported elsewhere (16). Briefly, the study was conducted in an upstate New York paediatric clinic from July 2012 through December 2013. The clinic nurse who roomed the child measured height and weight. Parents completed the screener while waiting for a well-child visit. The screener domains included child BMI, physical activity, screen time and pet-related questions. For families with dogs, the screener included time spent with the dog being physically active and the CABS. CABS is an 8-item instrument measured on a 5-point Likert scale (13) with higher scores indicating stronger attachment. Only children with pet dogs ($n=370$) are included in this analysis.

Using SAS 9.3, the relationship between the level of attachment to the dog and several obesity-related variables was tested among children with pet dogs. The CABS score was used to measure level of attachment. Obesity-related variables included BMI class, BMI z-score (19), and screen time on a typical weekday, including TV and video games (≤ 2 h, > 2 h). Time spent being physically active with the dog was defined as time (0, 30, 60, 90, 120, > 120 min) on weekdays that the child spent being active with the dog (playing with, walking or running). The mean CABS score was compared across levels of each of these categorical variables using one-way analysis of variance (ANOVA).

Socioeconomic status was proxied for each subject using the percentage of the population living below the 2013 poverty level in the child's zip code (20). The relationship between BMI z-score and CABS was tested in a multiple linear regression equation that included poverty level and age as covariates. The mean CABS score was compared across levels of each of the categorical variables using one-way analysis of covariance (ANCOVA), including poverty level and age as covariates.

This study was approved and reviewed annually by the Bassett Hospital Institutional Review Committee.

Results

Over 18 months, the study enrolled 370 children (mean age 6.7 years) who had a pet dog and whose demographics are displayed in Table 1. Mothers most often completed the screener (80% mother, 16% father, 4% other).

Among these children with pet dogs, BMI z-score was not associated with the time the child was physically active with the dog ($p=0.15$). The total CABS score was not related to child's BMI z-score (beta coefficient=0.23; $p=0.37$) or screen time ($p=0.76$: see Table 2). Higher CABS scores (both total and subscale scores) were associated with more time spent being active with the pet dog (Table 2).

Discussion

Higher levels of child attachment to a pet dog were associated with more time spent being active with a pet dog; however, attachment was not associated with child weight status or screen time. HAI is thought

Table 1 Child demographics, weight status and screen time for children with pet dogs

	Children with pet dog ($n = 370$)
% Female children	45.14
% white	97.84
% privately insured	55.68
Mean Child Age (years) ^a	6.72 (6.50, 6.94)
Mean Poverty level ^{a,b}	0.15 (0.14, 0.16)
Time spent physically active with pet dog (%)	
0 min	7.67
30 min	40.00
60 min	27.40
90 min	8.77
120 min	5.21
Over 120 min	10.96
% Screen time ≤ 2 h/day	54.92
Mean BMI z-score ^a	0.56 (0.43, 0.68)
BMI class ^c	
% Normal BMI	65.76
% Overweight	17.66
% Obese BMI	16.58

^aMean (95% Confidence Interval).

^bProportion of the population living below the 2013 poverty level in the child's zip code.

^cCDC definitions for the three child BMI classes (normal, overweight, obese; overweight = BMI ≥ 85 th percentile and < 95 th percentile for children of the same age and sex; obesity = BMI ≥ 95 th percentile for children of the same age and sex).

Table 2 Child weight status, screen time and time physically active with the dog by level of child–dog attachment measured using the Companion Animal Bonding Scale (CABS) with subscales for 370 children, mean age 6.72 years.

CABS*	Dependent variable	Test statistics	Test used
Total score	BMI z-score	$\beta = 0.23, p = 0.37$	Linear regression controlled for poverty level and age
Proximity		$\beta = 0.20, p = 0.16$	
Caretaking		$\beta = 0.01, p = 0.87$	
Affectional tie		$\beta = 0.02, p = 0.85$	
Total score	Screen time ≤ 2 h	$F = 0.09, p = 0.76$	ANCOVA controlled for poverty level and age
Proximity		$F = 0.01, p = 0.99$	
Caretaking		$F = 1.24, p = 0.27$	
Affectional tie		$F = 0.04, p = 0.84$	
Total score	Time active w/dog	$F = 22.81, p < 0.0001$	ANCOVA controlled for poverty level and age.
Proximity		$F = 9.20, p < 0.0001$	
Caretaking		$F = 9.46, p < 0.0001$	
Affectional tie		$F = 22.82, p < 0.0001$	

*The CABS subscales are emotional bond/affectional tie, physical proximity and pet caretaking (13,15).

to be a dyadic relationship (11,12). Therefore it is not surprising that the degree of attachment between a child and dog, rather than pet ownership alone, may determine how physically active a child is with a pet dog. Strong attachment to a dog may increase a young child’s physical activity by activating a child’s intrinsic motivation to move or play indoors or outdoors with the dog, and/or inducing a response to the dog’s cues for caretaking (feeding, grooming, walking) (3,7,8). Our results do not suggest decreased screen time as a mechanism.

This study includes a large sample size, a realistic setting and multivariate analysis of pet dog and child measures. However this cross-sectional study describes associations; thus, no cause or effect is inferred. Future studies should address this limitation and measure how and to what extent child attachment to a pet dog increases physical activity.

Conflicts of interest statement

The authors declare no financial relationships with any organisations that might have an interest in the submitted work, nor any other relationships or activities that could appear to have influenced the submitted work.

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AMG conceived the study design. AMG supervised data collection in the clinic. MBS, NK and PJ analysed data. All authors were involved in writing the paper and had final approval of the submitted and published versions.

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References

1. Salmon J, Timperio A, Chu B, Veitch J. Dog ownership, dog walking, and children’s and parent’s physical activity. *Res Q Exerc Sport* 2010; 81: 264–271.
2. Christian H, Trapp G, Lauritsen C, Wright K, Giles-Corti B. Understanding the relationship between dog ownership and children’s physical activity and sedentary behaviour. *Pediatr Obes* 2013; 8: 392–403.
3. Christian H, Trapp G, Villanueva K, Zubrick SR, Koekemoer R, Giles-Corti B. Dog walking is associated with more outdoor play and independent mobility for children. *Prev Med* 2014; 67: 259–63.
4. Sirard JR, Patnode CD, Hearst MO, Laska MN. Dog ownership and adolescent physical activity. *Am J Prev Med* 2011; 40: 334–337.
5. Owen CG, Nightingale CM, Rudnicka AR, *et al.* Family dog ownership and levels of physical activity in childhood: findings from the child heart and health study in England. *Am J Public Health* 2010; 100: 1669–1671.
6. Timperio A, Salmon J, Chu B, Andrianopoulos N. Is dog ownership or dog walking associated with weight status in children and their parents? *Health Promot J Aust* 2008; 19: 60–63.
7. Martin KE, Wood L, Christian H, Trapp GS. Not just “a walking the dog”: dog walking and pet play and their

- association with recommended physical activity among adolescents. *Amer J Health Promot* 2015; 29: 353–356.
8. Wohlfarth R, Mutschler B, Beetz A, et al. Dogs motivate obese children for physical activity: key elements of a motivational theory of animal assisted interventions. *Frontiers in Psychology* 2013; 4: 1–7.
 9. Morrison R, Reilly JJ, Penpraze V, et al. Children, parents and pets exercising together (CPET): exploratory randomized controlled trial. *BMC Public Health* 2013; 13: 1096.
 10. Westgarth C, Boddy LM, Stratton G, et al. A cross-sectional study of frequency and factors associated with dog walking in 9–10 year old children in Liverpool, UK. *BMC Public Health* 2013; 13: 822.
 11. Melson GF. Child development and the human–companion animal bond. *American Behavioral Scientist* 2003; 47: 31–39.
 12. Payne E, Bennett PC, McGreevy PD. Current perspectives on attachment and bonding in the dog–human dyad. *Psych Res Beh Manag* 2015; 8: 71–79.
 13. Poresky RH, Hendrix C, Mosier JE, Samuelson ML. The Companion Animal Bonding Scale: internal reliability and construct validity. *Psychol Rep* 1987; 60: 743–746.
 14. Angulo FJ, Siegel JM, Detels R. Pet ownership and the reliability of the companion animal bonding scale among participants of the Multicenter AIDS cohort study. *Anthrozoos* 1996; 9: 5–9.
 15. Triebenbacher SL. Re-evaluation of the Companion Animal Bonding Scale. *Anthrozoos* 1999; 12: 169–173.
 16. Gadomski AM, Scribani MB, Krupa N, Jenkins P, Zsolt N, Olson AL. Pet dogs and children's health: opportunities for chronic disease prevention? *Prev Chronic Dis* 2015; 12: 150204.
 17. Atkin AJ, Sharp SJ, Corder K, van Sluijjs EMF. Prevalence and correlates of screen time in youth. *Amer J Prev Med* 2014; 47: 803–807.
 18. Fothergill KF, Gadomski AM, Solomon B, et al. Assessing the impact of a Web-based comprehensive somatic and mental health screening tool in pediatric primary care. *Acad Pediatr* 2013; 13: 340–347.
 19. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000; 320: 1240–5. Available at <http://bmj.bmjournals.com/cgi/reprint/320/7244/1240>
 20. Small Area Income and Poverty Estimates (SAIPE) 2009, US Census. Poverty Estimates, 2009, New York: School Age Children in Poverty by School District. http://www.census.gov/did/www/saipe/data/schools/maps/sd_maps/NY_Saipe2009_SDprofile.pdf Accessed 2/16/13.