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REVIEW

The association between dog ownership and physical activity in adults—a brief review

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SUMMARY
The following key messages have been found as a result of this rapid review:

1. Dog walking may be used to encourage physical activity at a population level.
2. Dog owners are not more active than non-dog owners unless they walk their dogs.
3. Currently, there is a lack of robust evidence to suggest a correlation between dog ownership and an increase in physical activity and/or weight loss.

Key Words
Dog walking; dog ownership; physical activity

ABSTRACT

Background

Dog walking has the potential to promote exercise at a population level. The research question for this rapid review was: Do dog owners have increased levels of physical activity and improved weight loss outcomes compared to non-dog owners?

Aims

This paper provides a review of the literature on the evidence for the benefit of dog ownership with respect to increased physical activity and weight loss.

Method

The following PICO format was used:

- **Population:** Dog owners aged 18 years and older
- **Intervention:** Dog walking
- **Comparison:** Non-dog owners aged 18 years and older
- **Outcome:** Physical activity or weight loss

Academic Search Premier, CINAHL Plus, Medline, and PubMed were searched for relevant articles. These articles were further scanned through manual searching of bibliographies. A total of 156 articles were found.

Conclusion

This review indicates that dog walking has the potential to be successful for promoting physical activity among adults of all ages. However, dog owners are not more active than non-dog owners unless they walk their dog. Currently, there is a lack of robust evidence to suggest a correlation between dog ownership and dog walking. Limited research was found for the effects of dog ownership on weight loss and therefore no association is reported.

BACKGROUND

"There's nothing like an exercise partner who's waiting by the door with a wagging tail to keep you motivated".[1] In Australia, two in every five (3.1 million) Australian households own a dog.[2] Dog walking has therefore the potential to promote exercise at a population level.[3]

The management of obesity in Australia is challenging for clinicians. The Australian Bureau of Statistics reports that almost 2 in 3 Australian adults are overweight or obese.[4] In addition, approximately half of the Australian adult population are physically inactive.[5] According to the Australian Department of Health, the recommended level of physical activity (PA) per week is between 150–300 minutes or more of moderate intensity or 75–150 minutes of high intensity PA.[6] Walking is recommended for reaching these levels of PA. This low-impact method of exercise is suitable for all ages and is reported as the most frequent form of PA worldwide.[7–9]

As dogs are becoming increasingly involved members of households, it is no surprise that an association between dog ownership and higher levels of PA has been found.[10] Despite this, less than 50 per cent of dog owners walk their dogs regularly.[8]

Dog walking is a purposeful task that provides social support and can act as a constant motivator all year round, including during the winter months.[11] In this paper we report a review of the literature on the evidence for the benefit of dog ownership with respect to increased physical activity and weight loss.

METHOD

The following PICO format was used to answer the research question: *Do dog owners have increased levels of physical activity and improved weight loss outcomes compared to non-dog owners?*

- **Population:** Dog owners aged 18 years and older
- **Intervention:** Dog walking
- **Comparison:** Non-dog owners aged 18 years and older
- **Outcome:** Physical activity or weight loss

The databases Academic Search Premier, CINAHL Plus, Medline and PubMed were searched using the following subject headings and text words:

((Dogs (mh) AND ownership (mh)) OR dog owners (DE) OR women dog owners (DE)) AND (Dogs (mh) AND walking (mh) OR Dog walking (DE)) OR ((“Dog owners” OR “dog ownership”) AND “dog walking”)

AND

((Weight loss (mh, DE) OR weight reduction programs (mh) OR reducing exercises (DE)) OR (Physical activity (mh, DE) OR exercise (mh)) OR (“weight loss” OR “weight-loss” OR “weightloss” OR “weight reduction” OR “physical activity”)

Mh = Medical subject headings (Mesh)
DE = Subject heading (Academic Search Premier)
“ “ = Text words

The databases combined retrieved 217 articles. After duplicates 156 articles remained and a filter was applied. The filter included articles published between 1990–2016 and adult populations >18 years. Thirty-seven articles remained for primary relevance assessment, and titles and abstracts were reviewed for the following inclusion criteria:

- The article compared dog owners to non-dog owners;
- Physical activity or weight loss was the primary outcome measure;
- Participants aged 18 years and older;
- Sample size >90
- Survey response rate: >50 per cent

If the inclusion was uncertain, the full text was read by the two reviewers and a decision was made as to whether the study was included.

The Critical Appraisal Skills Programme (CASP) critical appraisal tools[12] were used for the final full text review redeeming eighteen relevant articles. These articles were further scanned through manual searching of bibliographies. Refer to Figure 1 for the detailed search strategy.

RESULTS

Eighteen articles were analysed, including twelve cross-sectional studies, two longitudinal studies, two cohort studies, and two systematic reviews. Excluding systematic reviews 52,053 participants were included in this rapid review. Characteristics of these studies are described in Tables 1–4.

The studies were published between 1990 and 2016 and varied in size from 92 to 14,273 participants. These studies followed the inclusion criteria comparing dog owners to non-dog owners with PA or weight loss as the primary outcome measure. Most of the studies were conducted in the United States (US) with fewer from Australia, Japan, and the United Kingdom (UK). Measurements of PA varied significantly and only one study reported weight loss outcomes.

Prevalence of dog walking across dog owners

Excluding systematic reviews (n=2), the reported prevalence of dog ownership ranged between 11.9–60 per cent. Of these sixteen studies, eight reported the prevalence of dog walking among dog owners (mean

prevalence 55 per cent). Eight studies did not report this data.

The dog ownership group was further described as either dog owner/dog walkers (dog owners who walk their dog) or dog owner/non-dog walkers (dog owners who do not walk their dog). We therefore report our findings using the following groups; dog owner/dog walkers, dog owner/non-dog walkers, or non-dog owners.

Physical activity

All studies used self-reporting as a means for estimating PA. Walking and PA were often separately reported with descriptive measures of duration, frequency, and/or intensity. Seventeen articles reported duration and/or frequency and intensity was recorded by eight articles.

Twelve articles found an association between dog owner/dog walkers and PA compared to dog owner/non-walkers and non-dog owners. Five articles reported no association.

Intensity of physical activity

Of the eight articles measuring intensity of PA, greater than 50 per cent (n=5) reported no association between dog owner/dog walkers and reaching higher levels of intensity. Examples of high-intensity PA included running, cycling, and aerobics.

Pachana et al.,[13] Parslow et al.,[14] and Salmon et al.[15] reported no difference in intensity of PA between dog owner/dog walkers and other groups, while Thorpe et al.[16] and Utz[17] reported a decrease in intensity of PA among dog owner/dog walkers.

Weight loss

One article reported weight loss; no association between dog ownership and weight loss was found when compared to non-dog owners.[18] This article compared obese pet owners to obese non-pet owners over a one-year period (recorded at four, six, and 12 months). Weight loss was statistically different from baseline at each time-point for both groups (p=0.01). However, there were no significant differences when comparing pet owners to non-pet owners.

DISCUSSION

The results of this review indicate that dog ownership does not equate to an increase in self-reported PA unless dog owners actively walk their dog. The dog owner/dog walker group more commonly reported the highest level of PA including frequency, duration and intensity.

The majority of articles (n=12) reported a positive association between dog owner/dog walkers and PA. Soares et al.[10] reported that dog owner/dog walkers were 2.74 times more likely to achieve 150 minutes of PA than owners who do not walk their dog.

It is noted, however, that not all dog owners walk their dog. It is important to highlight this group of dog owner/non-dog walkers, as methods may be developed to determine why this group does not engage in PA.[5,19] Reasons for not walking include characteristics of the dog (age, size), individual factors (health, time constraints, lack of motivation), or environmental factors (presence of dog park/walking tracks, season).

This review found that greater than 50 per cent of dog owners walked their dog. However, it was not reported whether this walking met the recommended criteria of 150 minutes or more per week. Reeves et al.[20] found that 61 per cent of dog owners walked their dog for 10 minutes at a time, while only 27 per cent walked to meet 150 minutes per week. Additionally, the measure of PA is self-reported in all studies and therefore potentially unreliable. It is possible that dog walkers travel to an open space and remain stationary while their dog is exercising.

Five articles reported no association between dog ownership and an increase in PA. Utz[17] found that pet owners were more likely to have excellent or very good health, both self-reported and physician assessed, including less rates of obesity, congestive heart failure, and arthritis. However, these health benefits were largely reduced upon controlling for confounders (age, socioeconomic status, and residential location). The study therefore concluded that the need to physically care for a pet (eg, walking the dog) does not explain why dog owners have better physical health. Pachana et al.[13] also found that dog ownership was not directly related to health outcomes. Instead, dog ownership was dependent on the effects of demographics including living arrangements and income management.

Intensity of physical activity

This review indicates that dog owner/dog walkers are less likely to engage in exercise of higher intensity than dog owner/non-dog walkers or non-dog owners. Five articles reported no association between dog ownership and an increase in the intensity of PA. This may relate to the length of time dog owners spend walking their dog at a low intensity rather than higher levels of PA such as may occur in sport.[3,19] Individuals may walk shorter distances with their dogs than if they walked on their own. Further, the behavioural characteristics of dogs (eg, being distracted by sensory stimuli) may contribute to a decrease in speed when walking a dog.[11]

Conversely, three articles stated a positive association between dog owner/dog walkers and an increase in the intensity of PA. Reeves et al.[20] found that approximately 60 per cent of dog walkers met the criteria for regular moderate and/or vigorous leisure time PA compared to 45 per cent for dog owner/non-dog walkers or non-dog owners.

Weight loss

A positive association between dog ownership and PA does not necessarily correlate to weight loss. This review therefore sought after studies that included the weight loss of participants. No studies reported statistically significant effects of dog ownership on weight loss and Kushner et al.[18] was the only study included that reported weight loss data. This study compared obese people with an obese pet to obese people only, in a one-year prospective controlled weight loss study. People received dietary and PA counselling. During this time PA increased in both groups, but there was no significant difference reported between pet owners and non-pet owners.

Although BMI measurements were recorded throughout most of the cross-sectional studies, this data is not recorded longitudinally and therefore no association between dog ownership and weight loss can be implied.

Other contributing factors

Geographical location and annual variation may determine the likelihood of both dog ownership and dog walking. The majority of studies reviewed (n=9) took place in the US with a high dog ownership rate estimated at 44 per cent.[21] In addition, countries with extremely cool climates would limit a dog owner's ability to regularly walk their dog.

The location of households (metropolitan vs nonmetropolitan) is a significant confounding variable that should be recorded when measuring PA of dog owners. As mentioned by Pachana et al.[13] "the type of housing can affect opportunities for pet ownership". The type of housing can also indicate health status as health is often poorer in some areas.

Utz[17] reported that dog ownership was highest among those with larger households within non-metropolitan areas. Despite this, most studies did not record the location of housing (metropolitan vs nonmetropolitan) for the sample studied. Those that did record this information often showed a large percentage living within a metropolitan area. Richards et al.[22] reported the majority of their subjects lived in a metropolitan area. This confounder must therefore be controlled for in future studies.

The elderly population may benefit from owning a dog as older adults are likely to have improved mobility when compared to non-dog owners.[5,8,16,19] However, elderly dog owners may seek a dog as a companion rather than a walking buddy due to limitations in mobility.

The size and breed of a dog is another factor that may influence people to walk their dogs. Individuals may even choose to own a dog based on the level of physical activity it requires. Within this review only one study (Reeves et al.)[20] measured the effects of these characteristics on dog walking. This study found no overall effect of dog size on the prevalence of dog walking. However, larger dogs tended to be walked for a greater duration than smaller breeds. A study that was not included in this review, Schofield et al.[23] reported that owners of smaller dogs may be less likely to walk their dogs.

Limitations and future ideas for studies

The evidence for the association between dog ownership and PA and/or weight loss is limited. Interpretation of this data is difficult due to the inconsistent use of terminology between studies. For example, PA could not be reliably interpreted. Additionally, not all dog owners walk their dogs and this must be clarified in any comparison study.

Self-reported levels of PA may be biased and therefore objective measures of PA would be critical. The use of accelerometry would be a useful tool for further studies. There are some studies on this topic that use accelerometry; however, the response rate was poor and did not meet our inclusion of criteria of 50 per cent recruitment to the study.

The majority of studies included were cross-sectional rather than an experimental design and therefore replete with confounding variables.

CONCLUSION

This review indicates that dog owners may walk their dogs as a means for encouraging physical activity at a population level. To do so clinicians need to enquire about pet ownership among people developing new weight loss habits.

Dog owners are not more active than non-dog owners unless they walk their dog. Factors associated with not walking a dog need to be explored as the majority of dog owners do not participate in dog walking. These factors include characteristics of the dog (age, size), individual factors (health, time constraints, lack of motivation), or environmental factors (presence of dog park/walking tracks, season).

Currently, there is a lack of robust evidence to suggest a correlation between dog ownership and physical activity and/or weight loss. Thus, an association between these two measures has not been demonstrated.

The addition of longitudinal studies will help to provide evidence for the temporal relationship between dog ownership and PA and/or weight loss. Future research may explore the type of dog owned, the use of accelerometry, and weight measurement. Further, a discussion of potential methods that may be implemented to prompt individuals to walk their dog (SMS/email reminders, clinician input, group activities involving dogs) would be beneficial.

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PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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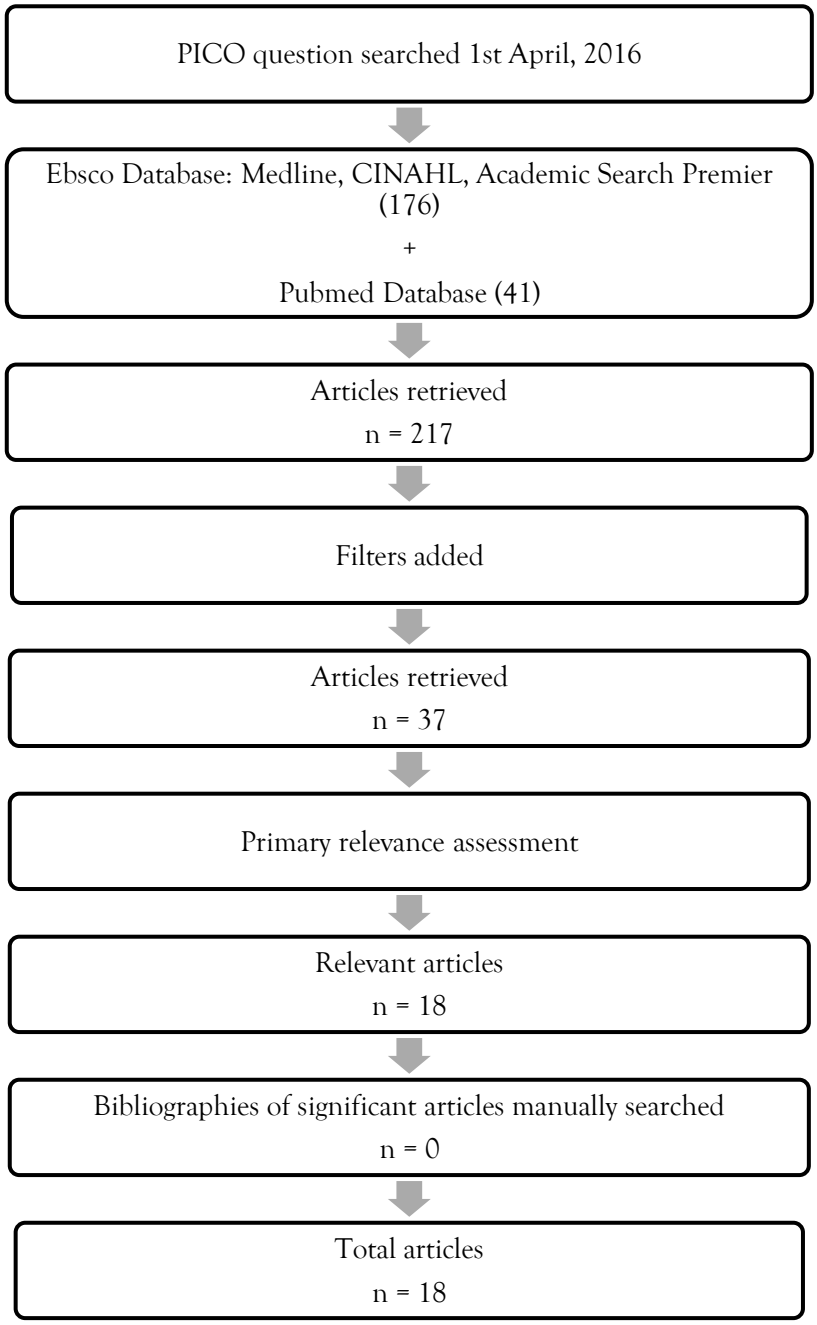
None

ETHICS COMMITTEE APPROVAL

Not required.

Figure 1: Literature search flowchart



- **Filters**
  - Published 1990-2016
  - Participants aged 18 years and older
  - Duplicates removed

- **Primary relevance search**
  - Titles and abstracts screened

- **Selection criteria**
  - The article compared dog owners to non dog owners;
  - Weight loss or physical activity was the primary outcome measure;
  - Sample size >90
  - Survey response rate: >50%

Table 1: Cross-sectional studies

Author, Year	Survey location	Sample characteristics	Study sample, characteristics (N, age, male status, % dog owners)	Dog owner characteristics (N, age and male status)	PA measure and instrument	Summary of Results
Bauman et al, 2001	New South Wales, Australia	Telephone survey - random selection from the Electronic White Pages in 1998. (Response rate: 74%)	N = 894 Age: 25-64 Male status: 45.6% % dog owners: 46%	N = 410 Age: 25-64 Male status: not specified	Self-reported PA measured via questionnaire. • Walking & total PA duration • Achievement of 150mins/week	Dog owners walked more than non-dog owners. However, more than half of dog owners did not walk their dogs and were less likely than non-owners to meet recommended levels of PA.
Giles-Corti et al, 2003	Perth, Australia	Participants selected from the Australian Bureau of Statistics. (Response rate: 52.9%)	N= 1803 Age: 18-59 Male Status: 31.3% % dog owners: not specified	N= 1.58 OR of 1688 Age: 18-59 Male status: not specified	Self-reported PA measured via questionnaire. • Walking frequency	The odds of walking at recommended levels were higher among those who owned dogs than non-owners. However, the vast majority of dog owners do not engage in levels classified as recommended levels of walking.
Gretebeck et al, 2013	Wisconsin, USA	Staff members and/or spouses recruited from a database of retirees from a large Midwestern university to complete a postal survey. (Response rate: 98%)	N = 1091 Age: 65-95 Male status: not specified % dog owners: 14.7%	N = 160 Age: mean 73.3 Male status: 41.3%	Self-reported PA via a written questionnaire. • Walking frequency & duration • Total PA	Dog owner/dog walkers reported significantly higher rates of PA than their non-dog walker counterparts.
Thorpe et al, 2006	Memphis, Tennessee and Pittsburgh, Pennsylvania, USA	Random participants selected from a sample of White Medicare beneficiaries and all age-eligible black community-dwelling residents in predetermined ZIP code areas from the Health, Aging and body Composition study. (Response rate: 82%)	N = 2533 Age: 70-79 Male status: 51.7% % dog owners: 15.6%	N = 396 Age: mean 75.3 Male status: 54%	Self-reported PA questions via face-face interview. • Walking frequency & duration • Non-exercise related walking frequency & duration • Vigorous activity	Dog owners were more likely to engage in non-exercise-related walking than non–pet owners. Dog owners reported a greater frequency and duration of walks.
Lentino et al, 2012	USA	Recruited online via selected classifieds, social networking group forums, and dog-related blogs. Dog owners were asked to nominate 2 or 3 people without dogs to participate. (Response rate 95%)	N= 916 Age: 18-85 Male Status: 22% % dog owners: 60%	N= 536 Age: 40±13 Male status: 16%	Self-reported PA via IPAQ Short Form. • PA intensity	Dog walkers reported greater levels of total PA and intensity of PA compared with those who did not own or did not walk a dog.
Parslow et al, 2003	ACT & NSW, Australia	Participants drawn from the electoral rolls for Canberra and Queanbeyan in 2000 and 2001. (Response rate: 64.5% - 40-44 age group, 58.3% - 60-64 age group)	N= 5079 Age: 40-44 & 60-64 Male Status: not specified % dog owners: 57%	N= 2895 Age: 40-44 & 60-64 Male status: not specified	Self-reported PA measured via questionnaire. • Walking frequency & duration • PA intensity	Pet owners undertook higher levels of mild PA compared to non-pet owners.
Reeves et al, 2011	Michigan, USA	Recruited via 2005 Michigan Behavioural Risk Factor Survey. (Response rate: 51.5%)	N= 5819 Age: ≥18- ≥65 Male Status: 38.4% % dog owners: 37.3%	N= 2170 Age: ≥18-≥65 Male status: 14.2%	Self-reported PA measured via questionnaire. • Walking frequency & duration • PA intensity	Dog walking was associated with an increase in walking, PA and intensity.
Richards, 2016	USA	Consumer Styles surveys were completed by a nationally balanced sample of American adults who belonged to a consumer mail panel. (Response rate: 78%)	N= 4010 Age: ≥18- ≥65 Male Status: 41.1% % dog owners: 43.6%	N= 1748 Age: ≥18-≥65 Male status: 56.8%	Self-reported PA measured via questionnaire. • Walking frequency & duration • Duration of PA	Dog owner/dog walkers show higher levels of PA.
Salmon et al, 2010	Melbourne, Australia	Data obtained from the Children's Leisure Activities Study (CLASS) in 2001, including objective measures of children's and parent's PA a questionnaire completed by a parent/carer/guardian. (Response rate: 51%)	N= 2109 Age: 39.8 (mean) Male Status: 16% % dog owners: 53%	N= 1117 Age: 39.8 (mean) Male status: not specified	Self-reported PA measured via questionnaire. • Walking frequency & duration • PA intensity	Dog ownership was not significantly associated with the odds of mothers or fathers meeting PA recommendations.
Shibata et al, 2012	Bunkyo, Fuchu, and Oyama; Japan	Participants were community-dwelling residents, randomly selected from the registry of residential addresses and stratified by gender, age and city of residence. (Response rate: 72.8%)	N= 1926 Age: 65-74 Male Status: 51% % dog owners: 14%	N= 270 Age: 65-74 Male status: 49.6%	Self-reported PA measured via questionnaire. • Walking duration & intensity • Total PA	Dog owners reported increased duration of walking, total PA & intensity of PA than non–dog owners.

Utz, 2010	USA	Participants selected from the National Health and Nutrition Examination Survey III. (Response rate 86%)	N= 2474 Age: 58.3 (average) Male Status: 43 % % dog owners: 11.9%	N= 291 Age: 53.1 (average) Male status: 13%	Self-reported PA measured via questionnaire. • Frequency of walking or other types of PA • Intensity of PA	Dog ownership is not associated with increased PA or intensity of PA compared with non-dog owners.
Westgarth et al, 2012	Avon, UK	Participants selected via The Avon Longitudinal Study of Parents and Children. (Response rate: 79%)	N= 14273 Age: Not specified Male Status: 0% % dog owners: 25%	N= 3568 Age: Not specified Male status: 0%	Self-reported PA measured via questionnaire. • Frequency & duration of PA	Dog owners were more likely to participate in brisk walking than those who did not have a dog.

Table 2: Longitudinal studies

Author, Year	Survey location	Sample characteristics	Study sample, characteristics (N, age, male status, % dog owners)	Dog owner characteristics (N, age and male status)	PA measure and instrument	Summary of Results
Thorpe et al, 2006	Memphis, Tennessee, and Pittsburgh, Pennsylvania, USA	Random participants selected from a sample of White Medicare beneficaries and all age-eligible black residents of 2 US cities from the Health, Aging and Body Composition Study. (Response rate: 82%)	N = 2533 Age: 71-82 Male status: 48% % dog owners: 15.6%	N = 394 Age: mean 75.3 Male status: 54%	Self reported PA questions via face-face interview at baseline + at three year follow up. • Walking frequency & duration • Non-exercise related walking frequency & duration	Three years later, dog walkers at baseline were approximately two times as likely as any other dog-ownership or walking-status group to meet the recommended levels of walking.
Serpell, 1991	Cambridge, USA	Random participants selected from pet acquisition at local animal shelters. (Response rate 100%)	N = 97 Age: Not Specified Male Status: Not Specified % Dog Owners: 48.5%	N = 47 Age: Not Specified Male Status: not specified	Self reported PA questions via survey at baseline, six months & ten months • Walking frequency & duration	At each period, there was a positive association between dog ownership and walking frequency and duration, compared to non-dog owners.

Table 3: Cohort studies

Author, Year	Survey location	Sample characteristics	Study sample, characteristics (N, age, male status, % dog owners)	Dog owner characteristics (N, age and male status)	PA measure and instrument	Summary of Results
Pachana et al, 2005 Retrospective Cohort	Australia	Women selected from the Australian National Health insurance database (Medicare). Stratified random sampling was used with intentional oversampling of women from rural and remote areas. (Response rate: 51.5%)	N= 6404 Age: 73-81 Male Status: 0% % dog owners: 21% Duration: Data collected in 1996 & recruited longitudinally for 20yrs	N= 536 Age: 40±13 Male status: 0%	Self reported PA via a questionnaire: • Intensity of PA	No statistical difference in intensity of PA between dog owners and non-dog owners.
Kushner et al, 2006 Prospective Cohort	Chicago, USA	Overweight and obese adults who owned an obese dog or did not own a dog were recruited through flyers, newspaper advertisements, and veterinary clinics. (Response rate: 61% dog owners & 58% non-dog owners)	N= 92 Age: 22-65 Male Status: 16.23% % dog owners: 39.13 BMI >25 kg/m2 Duration: 1 year	N= 36 Age= 31-62 Male status: 14% BMI kg/m2: 25.9-56.5	Self reported weight loss & PA: • BMI measurement weekly (during treatment phase) and once a month (during maintenance phase) measured as a % loss or gain from baseline • Duration of PA	No statistical difference in both weight loss & PA between dog owners and non-dog owners.

Table 4: Systematic reviews

Author, Year	Survey location	Sample characteristics	Study sample, characteristics (N, age, male status, % dog owners)	Dog owner characteristics (N, age and male status)	PA measure and instrument	Summary of Results
Christian et al, 2013	Australia (n=7), United States (n=6), Canada (n=1), Japan (n=1) & United Kingdom (n=2).	14 cross sectional studies, 3 longitudinal studies	N = 17 articles Age: median 45 Male status: 32%–60% % dog owners: median 24%	N = 37% Age: NR Male status: NR	Meta-analysis of articles including: • Achievement of 150mins/week • Duration of PA • Duration of walking	Adult dog owners reported more minutes per week of PA and/or walking than non-dog owners.
Soares et al, 2015	United States (n=3), Australia (n=5) & Japan (n=1)	8 cross-sectional studies; 1 prospective cohort study	N = 9 articles	N = 6980 Age: 18-81 Male status: 41%	Meta-analysis of articles including: • Duration of PA	Dog owners achieved a greater duration of PA compared to non-dog owners