Environmental and social impacts of domestic dog waste in the UK: investigating barriers to behavioural change in dog walkers

Christopher N. Lowe* and Karl S. Williams

School of Built and Natural Environment,
University of Central Lancashire,
Preston, PR1 2HE, UK
E-mail: cnlowe@uclan.ac.uk
E-mail: kswilliams@uclan.ac.uk
*Corresponding author

Stephen Jenkinson

Access and Countryside Management,
Curlews, Deerness, Orkney, KW17 2QJ, UK
E-mail: steve@sjacm.co.uk

Mark Toogood

School of Built and Natural Environment,
University of Central Lancashire,
Preston, PR1 2HE, UK
E-mail: mtoogood@uclan.ac.uk

Abstract: This study sought to investigate the behaviour and attitudes of dog walkers to picking up and disposing of dog foul, with a specific focus on bagged dog waste. Two research methods were utilised. The first explores locational and social factors influencing dog walkers' behaviour in picking up and disposing of dog faeces. Dog waste audits were conducted on popular dog walking paths in Lancashire. Secondly, the results were used to deliver an online national dog walking survey. Results of the audits suggested that availability of bins, path morphology, visibility, and path location are key factors in determining the occurrence of dog faeces. In the survey a key factor influencing behaviour was the belief that clearing up after dogs is the 'right thing to do' and this was associated with an awareness of health risks. Dog walker typologies are also proposed heuristically, ranging from those dog walkers that are 'proud to pick up' who will pick up in any location, through those who make contextual judgements about where and when it could be permissible to leave dog waste, to the 'disengaged' who will not pick up even if they are aware of the health and environmental consequences. The study advocates active engagement of dog walkers in tackling this contested, potentially environmentally damaging issue.

Keywords: dogs; dog walkers; environment; fouling; pro-environmental behaviour.

Reference to this paper should be made as follows: Lowe, C.N., Williams, K.S., Jenkinson, S. and Toogood, M. (2014) 'Environmental and social impacts of domestic dog waste in the UK: investigating barriers to behavioural change in dog walkers', *Int. J. Environment and Waste Management*, Vol. 13, No. 4, pp.331–347.

Biographical notes: Christopher N. Lowe is a Senior Lecturer in Waste and Environmental Management in the School of Built and Natural Environment, University of Central Lancashire. His broad research and teaching interests are in applied ecology and waste management.

Karl S Williams is the Director for the Centre for Waste Management in the School of Built and Natural Environment, University of Central Lancashire. His research and teaching areas are in waste, resource use, and technology solutions.

Stephen Jenkinson is an independent specialist on managing access to the countryside and urban green space for walkers with dogs. He works across the UK and internationally, with clients including The Kennel Club, local councils, state forest agencies, national parks and wildlife charities.

Mark Toogood is a Senior Lecturer in Human Geography in the School of Built and Natural Environment, University of Central Lancashire. His research interests are in public understanding of science.

1 Introduction

There are approximately 8 million dogs in the UK, with 23% of households owning at least one dog (PFMA, 2012). It has been estimated that dogs produce more than 1,000 tons of faeces every day in the UK (Campbell, 2007) and much of this waste is deposited in public areas (Wells, 2006).

Environmental and human health risks (e.g., zoonosis toxocariasis) associated with dog waste are well established (e.g., Wells, 2006, 2007). There is also evidence suggesting a link between the spread of diseases in livestock (e.g., bovine neosporosis) and the presence of faeces from infected dogs on agricultural land (Innes et al., 2007). Atenstaedt and Jones (2011) have also recognised that "dog excrement can have a significant economic impact in terms of deterring inward investment and tourism" to an area. Furthermore, activities associated with dog waste collection and disposal can be financially restrictive for local authorities. The Waste Improvement Network (WIN, 2011) estimated that individual authorities spend up to £100,000 per year on dog waste collection and disposal with further expenditure related to provision of dedicated dog waste bins, street cleansing, enforcement activities, signage and public communications with an estimated total cost to local authorities in England and Wales of £22 million per year (Atenstaedt and Jones, 2011). Furthermore, 56% of local authorities have acknowledged that collection and disposal of dog waste is an area with potential for identifying cost savings and efficiencies (WIN, 2011). Dog waste is an emotive subject and complaints made by the public to local authorities are often dominated by dog waste issues. A three-year study by ENCAMS (2005) reported that there were more than 200,000 recorded dog waste complaints to local authorities in England.

In the last decade there has been a perceived reduction in the presence of dog faeces in public places in the UK. This reduction may be attributed to widely publicised national campaigns by action groups such as Keep Britain Tidy (formerly ENCAMS) (e.g., 'GRAB IT, BAG IT and BIN IT') as well as local initiatives and the implementation of legislative powers by local authorities. Under the Clean Neighbourhoods and Environment Act (Sections 55 and 56), that came into force in 2006 and replaced the Dogs (Fouling of Land) Act 1996, local authorities in England and Wales can implement Dog Control Orders in designated areas of land (Defra, n.d.). This includes requiring dog owners to remove dog faeces. Committing a dog control order offence may result in an on-the-spot fixed penalty notice of £50 to £80 or prosecution and a fine of up to £1,000. Many local authorities have enacted legislation to make dog fouling illegal and encourage behavioural change by providing dedicated dog waste bins, and free 'doggy bags' and/or 'pooper scoopers'. In Scotland, the Dog Fouling (Scotland) Act 2003 designated most 'public open places' as areas where not removing faeces creates an offence; agricultural land is currently exempt from the Act's provisions.

It is becoming socially unacceptable for dog owners in the UK not to clean up after their dogs. This behavioural change may also be partly associated with the construction of 'the responsible dog owner' that has developed in the context of increased media exposure of dog attacks (as described by Podberscek, 1994) as well as the presence of dog waste. However, whilst some dog walkers clean up after their dog(s) they then discard the 'bagged' waste in the local environment. It is suggested that this bagged dog waste has potentially a greater environmental and aesthetic impact than uncollected dog waste. Webley and Siviter (2000) suggested that dog owners are presented with a choice between cooperative (pro-environmental) behaviour (removing dog faeces) or defective behaviour (just walking on), and that the observed behaviour is a result of the interaction between internalised constraints held by the individual, the particular situation and context in which they are making a decision to pick up. Situational constraints, argue Webley and Siviter (2000), include the threat of being fined, while personal constraints include the perceived risk of punishment and attitudes and moral beliefs about dog fouling. For example, it is suggested that legislative measures may not be a solution for dog walkers who regard dog fouling regulations to be illegitimate (Webley and Siviter, 2000). In addition individuals differ in the extent to which they are individualistic or community orientated (Webley and Siviter, 2000), and this may influence compliance with rules if this conflicts with individual interest (e.g., the unpleasant action of cleaning up dog faeces). The factors that determine pro-environmental behaviour have been the subject of many studies and a meta-analysis of the psycho-social factors from research in this area is provided by Bamberg and Möser (2007).

Only a restricted number of academic studies (e.g., Webley and Siviter, 2000; Wells, 2006) have focussed on dog fouling and there has been even less published research related to the more recent issue of discarded bagged dog waste. SIRC (2008) investigated the behaviour of dog walkers in the countryside through site surveys in South Hampshire, England and a national online survey. A fifth of respondents stated that they had bagged dog faeces but not placed it in a bin. Stated reasons for this behaviour included forgetfulness, changes to the route and as a protest (e.g., against a lack of dog waste bins). Furthermore there was a reported high level of uncertainty regarding the legitimacy of disposing of bagged dog faeces in litter bins. This current study aims to explore the locational and social factors influencing the behaviour and attitudes of dog walkers to picking up and disposing of dog foul. This was achieved by:

1 undertaking path audits in popular dog walking areas in Lancashire, UK to determine the influence of path morphology, location and management (related to dog waste) on the frequency and location of bagged and non-bagged dog waste

2 conducting a nationwide internet-based questionnaire of dog walkers to determine their attitudes and behaviour to dog waste.

It is intended that the findings of this research may be utilised by local authorities in developing best practice guidance for tackling this emotive and environmentally important issue.

2 Methodology

2.1 Path audits

Eight popular dog walking paths in Lancashire were selected for this study (Table 1). A range of paths were selected to allow the study to investigate the influence of path morphology, location and management. All the selected paths were subject to Dog Control Orders in respect to the fouling of land by dogs. Five of the paths (1–5) formed part of a continuous path network in and around Avenham Park, Preston. The five paths were selected as they differed in type, morphology and management (Tables 1 and 2) and because they were inter-connected, allowing more direct comparisons, with respect to quantities of dog waste, to be made. Path 6 formed part of the tow path of the Lancaster Canal that runs through an urban area of Preston. Path 7 crossed Worden Park, Leyland east to west from the Main Car Park to the Cumberland Avenue exit and onto a path leading to an urban housing estate. Path 8 was a circular path around Turton and Entwistle Reservoir in a rural location near Egerton in Bolton.

Table 1 Description of paths selected for dog waste audits, 28/03/10–16/04/10

Path	*Location*	*Path type*	*Path width (m)*	*Controlling body*
Path 1	Managed urban/rural park – Avenham and Miller Park, Preston	Tarmac, cutting through parkland bordered by the River Ribble	Approx. 3 m	Preston City Council
Path 2	Riverside walk – non-managed urban/rural location, South Ribble	Tarmac, bordered on one side by the river Ribble and on the other by fields and a recreational park	Approx 1.25 m	South Ribble Borough Council
Path 3	Local Access Walk – non-managed urban/rural location Tram Road, South Ribble	Tarmac, straight path following old tram line, raised on embankment and lined with mature trees	Approx. 4 m	South Ribble Borough Council
Path 4	Local Access Walk – managed as part of Preston Junction Nature Reserve, South Ribble	Tarmac (0–159 m) gravel/mud (159–857 m) Path follows disused railway line on a raised embankment and crosses the River Ribble via old railway bridge	Approx. 2 m	Lancashire County Council

Table 1 Description of paths selected for dog waste audits, 28/03/10–16/04/10 (continued)

Path	*Location*	*Path type*	*Path width (m)*	*Controlling body*
Path 5	Local Access Walk – non-managed urban/rural location Cardinal Newman Playing fields, South Ribble	Tarmac road (0–271 m) dirt track (271–746 m)	Road (no pavements) approx. 4 m, dirt track approx. 4 m	South Ribble Borough Council
Path 6	Urban Canal Tow path, Lancaster Canal, Preston	Cinder track running alongside canal and backed onto by terraced housing	Approx. 2 m	Preston City Council
Path 7	Managed Urban Park, Worden Park, Leyland	Tarmac, path crosses playing fields, verges are mainly grass with scattered trees	Approx. 1.5 m	South Ribble Borough Council
Path 8	Rural Walk, predominantly accessed by vehicles. Turton and Entwistle Reservoir, Egerton, Bolton	Compacted stone, the reservoir is on one side of the path and a grass verge on the other and beyond this woodland that in places is bordered by a dry stone wall.	Approx. 2 m	United Utilities

Table 2 Recorded characteristics of audited sections of the eight selected paths

Path	*Survey distance (m)*	*Grid reference (survey start point)*	*Number of dog waste bins*	*Number of litter bins*	*Number of combination litter/dog waste bins*
Path 1	1,000 m	SD53850, 28686	2	3	0
Path 2	1,000 m	SD54150, 28569	2	0	0
Path 3	716 m	SD54149, 27839	0	0	0
Path 4	1,077 m	SD54021, 27740	0	0	0
Path 5	746 m	SD53685, 27407	0	0	1
Path 6	1,000 m	Aqueduct street, Preston	3	0	0
Path 7	1,000 m	Main car park	0	1	5
Path 8	1,000 m	Batridge Barn car park above the reservoir	0	2	0

All audits were undertaken between the 28th March and the 16th April 2010 before significant foliage and plant growth had occurred which would have made locating dog waste more difficult. Where applicable, each path was surveyed over a 1,000 m distance. Where this was not possible due to obstructions or significant changes in path type/ location the total distance of the survey was recorded. Path surface, width and general characteristics were recorded at the start of each survey (see Tables 1 and 2) and a grid reference was also taken using a Garmin eTrex Venture GPS. Path distance was recorded using a road meter (manufactured by Trumeter). The survey was limited to locating dog waste that could be seen from the path (approximately within 3 metres each side). Where

dog waste was located, the distance on the path and exact location (e.g., on the path or off the path) was recorded (and in most cases a grid reference taken) and for bagged dog waste, bag colour/type were noted. Where a number of dog faeces were present in a single area a judgement was made by the researcher as to how many individual dog fouls were present. In addition to dog waste, location of any notable path features was also recorded including the provision of seating and the intersection points with other paths.

2.2 Online dog walkers questionnaire

Results from the path survey helped to inform the development of a national online dog walking questionnaire conducted from September 2010 to January 2011.The questionnaire was designed using the Bristol Online Surveys Software and was made available for online completion for a period of three months from September 2010 to January 2011. An internet domain was purchased (http://www.dogwalkinsurvey.co.uk) and used to redirect potential respondents to the questionnaire. Promotional materials (e.g., business card sized flyers) were distributed to veterinary surgeries and through online social networks (e.g., Facebook). In addition an editorial was published in the national magazine *Your Dog* that encouraged readers to complete the survey. Prior to release the questionnaire was pre-tested, revised and piloted on 6 dog owners.

The questionnaire consisted of 38 predominantly closed questions divided into four sections headed as follows:

- *About your dogs:* This section sought to gather general information related to the number and size of dogs walked, the frequency, extent and location of dog walks and the status of dogs in relation to vaccination, worming and micro chipped identification.
- *Dog waste:* This contained 13 questions that focussed on establishing the participant's attitude and behaviour with respect to dog fouling and what factors (e.g., location and type of bins) influence the decision to clean up after their dog(s). Participants were asked to identify locations where dog waste was least likely to be picked up and the level of agreement with statements regarding cleaning up dog waste (e.g., dog walkers should not have to clean up after their dog(s) in open countryside). In addition participants were asked to rate the importance of stated factors that have influenced their behaviour in relation to clearing up after their dog (e.g., concerns about being confronted by a member of the public) and were also asked to rate the importance of specified factors that lead to dog owners picking up and bagging dog waste but leaving it behind (e.g., an uncertainty about placing dog waste into litter bins). Participants were also asked if they would consider becoming part of some kind of responsible dog owners group and what items they (e.g., armband) and their dogs (e.g., collar) would be willing to wear that would indicate membership
- *Dog waste and the law:* This section was included to establish participant's knowledge of the law related to dog fouling and also asked if they had ever confronted a dog owner for not clearing up after their dog(s) or had been challenged for not clearing up after their dog(s).

- *About you:* This contained general demographic questions including age, ethnicity and regional location. In addition participants were asked if they were professionally employed or involved in dog-related economic activities (e.g., pet shops, vets, pet food manufacture).

For the purposes of the survey the word 'foul' was replaced by 'waste' as it was felt that the former had negative connotations that may have influenced responses. In addition the questionnaire was described as a 'dog walking survey' rather than a 'dog waste survey' to minimise pre-conceptions of potential respondents.

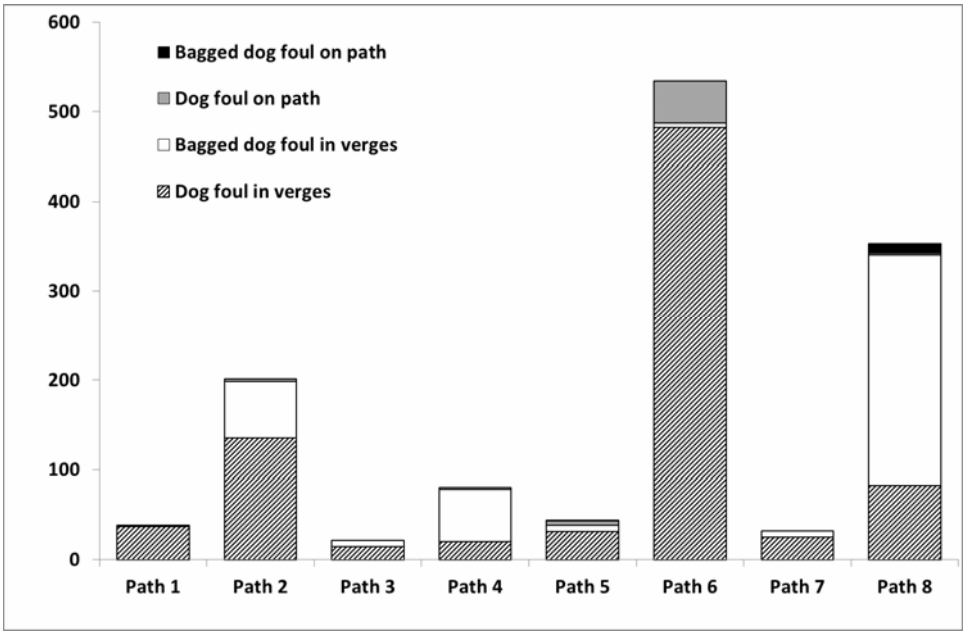
The raw data were managed using Bristol Online Surveys and analysed using Minitab release 16. Chi-square tests were used to investigate selected associations between answers.

3 Results

3.1 Path audits

All the selected paths were subject to Dog Control Orders in respect to the removal of dog faeces. Path descriptions and key features are provided in Tables 1 and 2 and the amount of dog fouling recorded on each path is summarised in Figure 1.

Figure 1 Recorded levels of dog fouling from the audited sections of the eight selected paths



3.1.1 Path 1: managed urban park – Avenham Park

This path is managed by Preston City Council and litter picking by park staff occurs on a regular basis. There was no bagged dog waste located on this path and the frequency of non-bagged dog waste was low and mainly aggregated around trees and lampposts on the edge of the path. No dog waste was recorded on the path itself or around the playground area. Dog waste and litter bins were present on the path and users were actively encouraged to use litter bins to deposit dog waste (bagged dog waste was present in all litter bins). The levels of litter on this path were also very low.

3.1.2 Path 2: Local access walk – riverside

This path is managed by South Ribble Borough Council and is relatively narrow and sinuous, bordered on both sides by unmanaged undergrowth. Bagged and non-bagged dog wastes were recorded on this path and were associated with access points (intersecting paths) and bridges spanning the path and the River Ribble. Bagged dog waste was recorded hanging on a barb wire fence and on the gate post of a kissing gate at 747 m. One dedicated dog waste bin was located on the survey path at 927 m with a further bin at 1,044 m. Both bins were close to the intersection with an access road and at the start of housing.

3.1.3 Path 3: Local access walk – Tram Road

This path follows a disused tram line and is directly linked to path 2 and path 5. The path is wide and straight (see Tables 1 and 2). Both bagged and non-bagged dog waste was recorded at low frequencies during the audit. There are no bins on this path.

3.1.4 Path 4: Local access walk – Preston Junction Nature Reserve

The Preston Junction path runs along a disused railway embankment and forms part of the Preston Junction Nature Reserve managed by Lancashire County Council. Bagged and non-bagged dog waste was recorded during the survey in low frequencies with the exception of where the path crossed over a disused railway bridge and intersected with path 1 (Avenham and Miller Park). Here, there were approximately 35 bags of dog waste (all bags were the same type/colour) recorded in a single location behind a wall. No bins were recorded on this path.

3.1.5 Path 5: Local access walk – lane and dirt track

This path and road are managed by South Ribble Borough Council. The path intersects with paths 3 and 4. Frequency of bagged dog waste is low in comparison with non-bagged waste which was concentrated on a mud track close to a car park that is used by a local sports club and by path users. One dog and litter combination bin was recorded during the audit.

3.1.6 Path 6: Urban canal tow path – Lancaster Canal

This section of the tow path is managed by Preston City Council. Bagged dog foul was only recorded four times on the surveyed path, near to the Aqueduct St entrance. There was a very high frequency of non-bagged dog waste along the 1,000 m distance that peaked at 40 dog faeces in 25 m at 725 to 750 m. Peaks in the frequency of dog faeces were associated with access points from the surrounding urban area.

3.1.7 Path 7: Managed urban park - Worden Park Leyland

Worden Park is managed by South Ribble Borough Council. The bins that are provided in the park are emptied daily and litter picking occurs on a regular basis. The frequency of bagged and non-bagged dog waste was very low with less than five dog faeces recorded in all 25 m segments of the surveyed path. Dog and litter combination bins were stationed approximately every 200 m along the path. The majority of recorded non-bagged dog faeces were recorded in the vicinity of trees.

3.1.8 Path 8: Circular reservoir walk – Turton and Entwistle Reservoir

Turton and Entwistle Reservoir is owned and managed by United Utilities. Frequency of both bagged and non-bagged dog waste was very high along the surveyed path. The greatest amounts (28 bagged and 23 non-bagged dog faeces in a 25 m section) of dog waste were recorded within 300 m of the main access point (Batridge car park) with frequency decreasing with distance from this point. Peaks in bagged dog waste were associated with gaps in the dry stone wall (that bordered the path) that served as access points to dirt paths into surrounding woodland. The only bins (for general litter) provided at this location were located in the Batridge car park.

3.2 Online dog walkers questionnaire

The questionnaire was completed by 933 participants of whom 84% were female. The majority of respondents were from England (78%) with representation from Scotland (7%), Wales (4%) and Northern Ireland (< 1%).

Most respondents (90%) walked their dogs at least once a day with 67% accessing the areas where they normally walk their dogs on foot. There was a wide variation with respect to how dog walkers controlled their animals, 14% indicated that they normally walk their dog(s) off the lead, 37% indicated that they kept their dog(s) on a lead unless in a location remote from traffic and 20% only used a lead on street pavements. In contrast 8% indicated that they never let their dog(s) off the lead.

Dedicated dog waste bins were provided in 67% of areas where respondents regularly walked their dogs but 59% and 46% either somewhat agreed or strongly agreed that dog waste and bagged dog waste respectively were an issue where they walk their dog(s). Bagged dog waste was considered to be visually and environmentally worse than non-bagged dog waste by 57% and 76% of dog walkers respectively.

There was strong agreement with the statements that dog walkers should always clean up after their dogs on street pavements (98%) and in public parks and playing fields (97%) however only 56% strongly agreed that dog walkers should clean up after their dog(s) in all locations. In contrast 34% and 45% respectively, strongly disagreed that dog walkers should clean up after their dog(s) in open countryside and farmland grazed by

livestock. A minority (3%) strongly agreed that dog walkers should not have to clean up after their dog(s) in any location. When asked about the action that they would take if their dog fouled while out walking 92% indicated that they would clean up the waste and either use a dedicated dog waste bin if available or take it away for disposal elsewhere. A minority of respondents (8%) indicated that they would only clean up the dog waste if it was on the path and there was a single response stating that they would never clean up or move dog waste. These results were not significantly ($p > 0.05$) influenced by respondent's professional employment or involvement in the dog industry ($\chi^2 = 2.639$, $p = 0.267$). If no dedicated dog waste bins were available 57% of surveyed dog walkers would choose to place the bagged dog waste into a general litter bin (if available) with 72% of all respondents aware that litter bins could be used to dispose of bagged dog waste. A total of ten respondents indicated that they would either leave the bagged dog waste in a prominent place or place it in the undergrowth alongside the path.

The importance of selected factors influencing behaviour related to clearing up dog waste is listed in Table 3. Mean values generated from ordinal scales (1–5) indicated that the most important factors influencing behaviour were: picking up dog waste was considered the 'right thing' to do (mean = 4.66) and also reducing the spread of disease (mean = 4.38). Concerns about being confronted by members of the public or by other dog owners (mean = 2.80 and 2.79 respectively) and the influence of dog waste related campaigns (mean = 2.7) were considered to be of least importance. Although not location specific, a lack of dog waste bins (mean = 3.97) was considered the most important factor for explaining why some dog walkers pick up dog waste but then discard it (see Table 4).

56% of respondents stated that they would consider becoming part of a responsible dog owners group. There was a significant association between the responses to this question and professional employment or involvement in the dog industry (e.g., pet shops, kennels, vets, pet food manufacture) ($\chi^2 = 4.425$, $p = 0.035$). Respondents were significantly more likely to consider becoming part of a responsible dog owners group if they were involved in the dog industry ($p < 0.05$).

Table 3 Mean levels of importance of factors influencing behaviour of dog walkers to clear up dog waste

Factors influencing behaviour related to clearing up dog waste	*Mean*
Good for the environment	3.80
Reduces the spread of disease	4.38
Toxocaracanis (parasite found in dog faeces)	4.33
Threat of being fined or prosecuted	3.29
The right thing to do	4.66
Confrontation by members of the public	2.80
Confrontation by other dog owners	2.79
Dog waste related campaigns	2.70
Money spent by the local authority to clean up dog waste	2.69
Availability of bins	3.57

Notes: Higher scores indicate greater importance (based on a scale of 1–5 where 1 is not important and 5 very important).

Table 4 Mean levels of importance of factors influencing the behaviour of dog walkers who pick up dog waste but then discard it

Factors influencing dog walkers to pick up and then discard dog waste	*Mean*
Embarrassed to be seen carrying bags of dog waste	2.47
A lack of dog waste bins	3.97
Uncertainty about placing dog waste into litter bins	3.02
Avoid taking dog waste home or into cars	3.60
Some owners do not usually clean up after their dog but may feel obliged to (e.g., in the presence of other people) and discard the bag later	3.50

Notes: Higher scores indicate greater importance (based on a scale of 1–5 where 1 is not important and 5 very important).

Approximately half of all respondents (48%) indicated that they had confronted a dog walker for not cleaning up after their dog(s) but conversely only 6% (54 individuals) indicated that they had themselves been challenged for not clearing up. Of the 54 individuals that stated they had been challenged the vast majority (52) were challenged (either correctly or incorrectly) by members of the public with only two cases involving local council enforcement staff. There was no significant association ($p > 0.05$) between the likelihood of respondents confronting a dog owner for not clearing up and professional employment or involvement in the dog industry ($\chi^2 = 0.022$, $p = 0.883$).

Respondent awareness of fixed penalty fines associated with not picking up dog foul was extremely high (98%).

4 Discussion

4.1 Study limitations

It is recognised that the method of recruiting participants for this study may have biased results. Recruitment focussed on the use of social media and targeted online dog forums and other dog orientated groupings and therefore it could be argued that respondents were likely to be dog enthusiasts. Furthermore, Webley and Siviter (2000) have suggested that self-report measures cannot be relied upon when investigating rule-breaking behaviour. Further study is also required to determine in what circumstances non-conformity occurs and what social norms or sanctions transgressive owners would respond to. In an observational study by Westgarth et al. (2010) dog walking behaviour was studied in popular outdoor environments. In observations associated with dog fouling, 63% of dog walkers picked up. However, in a questionnaire survey (Westgarth et al., 2008) of the local area, 90% of dog owners reported to always/usually pick up dog faeces. These study limitations were recognised during development of the questionnaire and questions designed to identify and mitigate against potential bias attributed to completion rates by dog enthusiasts. For example respondents were asked if they were professionally employed or involved in dog-related activities (24%), if their dog(s) had been micro chipped (90%) and how often their dog(s) are vaccinated and wormed (78% had their dogs vaccinated at least every 12 months and wormed at least every six months). This can be contrasted with the study by Westgarth et al. (2008) which attempted to survey all the households in a defined area that found a third of dogs had not been vaccinated. It is also

recognised that the gender balance of respondents may have influenced results (84% of surveys completed by females). However, it is not known how this relates to the actual gender ratios of dog walkers. While it is recognised that the questionnaire was completed by a disproportionality high number of dog enthusiasts this has been recognised in the analysis and it is contended that the findings, while not truly representative of the dog walking public, are of value in determining current attitudes and behaviours of dog walkers to dog faeces.

4.2 Path audits

It is recognised that the path audits can only provide 'snap shots' of the actual situation with respect to dog fouling at the selected paths. In addition direct comparison of the frequency of dog faeces between paths has limited value as path usage (e.g., footfall) was not recorded. Therefore, the authors have employed caution in the interpretation of the findings.

It is widely recognised that dog waste is a major issue for the public and therefore also local authorities (e.g., Wells, 2006, 2007). In the UK the issue is usually addressed through the introduction of legal measures and where practical/economical the provision of dedicated dog waste bins. However, the findings from these audits support the assertion put forward by Webley and Siviter (2000) that the solution to the problems associated with dog fouling is not that simple. For example, the two paths with the lowest recorded levels of dog waste were in Worden Park and on Tram road. On Worden Park bins are provided every 20 m but at Tram road there were no bins and so the reason for the low frequency of dog waste cannot be put solely down to presence of bins. Tram road is a very wide (approx. 4 m) and straight path that is used by cyclists, families and dog walkers. Visibility on the path is high and so a dog that fouls on the path would be easily seen. It is suggested that heightened visibility on this path reduces the amount of dog waste (people more likely to pick up) and non-bagged waste (people less likely to discard). The location of paths also makes a difference to the amount and type of dog waste. At the rural reservoir, which is accessed primarily by vehicles, the amount of recorded bagged dog waste was high (269 bags on a 1,000 m path section). It is suggested that users of this path are motivated to pick up after their dogs due to visibility and a positive perception of the area (e.g., rural, largely litter free and used by families). However, the lack of bins and a reluctance to take dog waste into their vehicles may have led to the high number of discarded bags.

Personal (historical) habits may also play a role in behaviour related to dog fouling. The survey of the Lancaster Canal tow path revealed a high density of dog waste but less than 1% of this waste was bagged. Significant sections of the path are bordered by terraced housing with limited personal outside space (largely restricted to backyards and communal alleyways). It is suggested that the tow path is an area of green space in this rural environment that has traditionally been used by dog owning residents as a communal space in which their dogs can defecate. Therefore, it may be perceived (by residents) as acceptable to not pick up after their dogs in this area.

How dog walkers perceive the area that they are in may be an overriding factor (even more so than provision of bins) in determining behaviour related to dog fouling. Results from the five interconnected path audits suggested that there were large differences in the amount and type of dog waste present on these paths and that these differences were not related to bin provision. Path 1 (in the formal Avenham Park) and path 4 (Preston

Junction) are connected to each other. However, frequency and type of dog waste present on these paths is very different. On path 1, the frequency of dog fouling is low and no bagged dog waste was recorded, however, where the two paths meet a hotspot for bagged dog waste exists and levels of all types of dog waste are higher on path 4. This indicates a change in perception and behaviour of some dog owners as they pass from the managed park to the unmanaged, often overgrown (vegetation) Preston Junction (or vice versa). The high frequency of bagged dog waste at the interface between these two areas may have arisen through a reduced sense of guilt/responsibility and/or visibility to other path users. This link can also be seen in path 8 where the greatest frequency of bagged dog waste was associated with areas where the main path was met by smaller paths through gaps in a dry stone wall. Bags of dog waste were discarded either side of the gaps in the wall (not visible from the main path). Dog owners may have felt guilty about discarding bags on or near the main path but once out of sight (passing through the gap in the wall) of other users they discarded the bags at the earliest opportunity.

The path audits have suggested that there are a number of factors influencing the occurrence of bagged and non-bagged dog waste including: location of path, type of user, perception of the environment, presence of transitional areas (e.g., exits/entrances), visibility/path morphology, landscape features (e.g., walls), habit, bin location and usage of litter bins. Therefore, the provision of dedicated dog waste bins that are expensive to buy, service and maintain may not (by themselves) alleviate the problem.

4.3 Online dog walkers questionnaire

Results from the questionnaire corroborated the findings of path audits in suggesting that situational factors influenced behaviour with respect to clearing up dog faeces. In agreement with the findings of Westgarth et al (2008), the vast majority of respondents (97%) strongly agreed that dog walkers should clean up after their dogs on street pavements and public parks and playing fields while less than 12% strongly agreed in open countryside or farmland grazed by livestock. This result is corroborated by the observational study of Webley and Siviter (2000) which focussed on conformity and non-conformity in contingent behaviour to explain dog fouling as minor social rule breaking (Goffman, 1966). The present study also suggests that situational factors are of significance in explaining why an owner would clear up in one context, but in another context might make judgements about what dog faeces was, such as something biodegradable, and have a more permissible attitude to whether they should clean up. Webley and Siviter's study demonstrated that dog owners were more likely to pick up in a park situation compared with pavements and suggested that this reflected a general sensitivity to the needs of other users. Although situational factors may influence behaviour, questionnaire results suggest that there is only a very small minority of dog walkers that will not clear up after their dog(s) in any location. It is suggested that this observation may be associated with several factors including the strength of enforcement, attitudes of owners to rule transgression and the potential lack of internalisation of cleaning up dog faeces as a social norm. Studies investigating other pro-environmental behaviours (e.g., recycling) have also identified small sections of the public that are unwilling to engage in behavioural change. There is often a disproportionate amount of attention and finances given to changing the behaviour of these 'laggards' and the effectiveness of these activities. As more than half of respondents (57%) indicated that they walk their dogs on a set route and 52% stated that their dog(s) either always or

regularly fouled in the same place, the localised impact of a small minority of 'irresponsible' dog walkers may be significant.

While the availability of bins was considered to be an important factor influencing behaviour the key driver was that dog walkers considered clearing up after their dogs was simply following the internalised and externally sanctioned rules of being a responsible dog-owner. It was considered 'the right thing to do' and this was partly a result of an awareness of the health risks associated with dog foul. It is also suggested that this attitude is more strongly held by dog walkers than other members of the public.

Although awareness of fines related to dog fouling was extremely high (> 98%) the threat of being fined or prosecuted was not seen as a dominant factor influencing behaviour. It is recognised that, there are significant difficulties in regulating, resourcing and implementing dog control orders with respect to dog fouling. Furthermore, this regulatory approach may be developing a negative view of dog owners amongst the non-dog owning public. Therefore, given that only a minority of irresponsible dog walkers may be responsible for the majority of dog fouling, it is suggested that a regulatory approach to this problem may not be the most appropriate approach. However, implementing a requirement (in locations with high levels of dog waste and public use) for dogs to be kept on leads (an offence that can be implemented under Dog Control orders) may lead to a reduction in the presence of dog waste as a direct association can then be made between the owner and the defecating dog. This suggestion is supported by observations made by Westgarth et al. (2010) at a beach, public park and a sports field in England and by Wells (2006) at public parks in Northern Ireland who recorded that dog owners cleaned up after their dogs more often when the dogs were on a leash. However, research by SIRC (2008) suggested that the opportunity to walk dogs off the lead was considered the single most important factor in determining dog walking location and this factor must be considered before any designation changes are implemented.

This research would suggest that actively engaging with responsible dog owners (56% of respondents indicated that they would consider becoming part of a responsible dog owners group) and promoting the message that most owners already clean up after their dogs (as suggested by Webley and Sivitar, 2000) and consider it a social norm may result in behavioural change amongst those dog walkers that do not currently pick up. This may be further enhanced by making responsible dog owners more visible/identifiable and the provision of more overt signage in popular dog walking areas. In Falkirk, Scotland, the local council have operated a Green Dog Walker Campaign for the last four years. Dog walkers in the council area are encouraged to wear an armband and/or their dogs wear a collar that indicates a commitment to cleaning up after their dog. Over 700 dog walkers in the Falkirk area have committed to the project and other community groups have started their own schemes. Further research is needed to evaluate the role of responsible dog owners in facilitating change, as well as explaining the transgression behaviour of non-conformists (through direct engagement).

Results obtained from the path audits highlighted the occurrence, and locational disparity of discarded bagged dog waste. The presence of discarded bagged dog waste within urban and rural environments has increased markedly over the last ten years. Bagged dog waste may have the same associated health risks as non-bagged dog waste but has a potentially greater environmental impact as the bag and the faeces may persist for longer periods of time in the environment (e.g., on a beach, bagged dog waste may be washed out and returned by the tide). The added plastic burden is also an issue (even if bags are biodegradable) and bags may also pose a choking hazard for livestock and

wildlife. In addition in managed areas there are health and safety risks associated with the removal of bagged dog waste (e.g., from the branches of trees) and when inadvertently encountered while grass cutting and/or strimming. The presence of these bags may also have a negative aesthetic impact. Results from the questionnaire have suggested that dog walkers consider bagged dog waste as much of an issue as non-bagged dog waste with 56% of respondents either somewhat agreeing or strongly agreeing that discarded bagged dog waste is an issue where they walk their dogs compared to 59% for non-bagged dog waste. There may be multiple drivers for the behaviour of picking up and then discarding dog waste. While respondents considered a lack of dedicated dog waste bins as the most important factor (mean = 3.97) there was also strong importance (mean = 3.60) attributed to the assumption that some dog walkers discarded bagged dog waste as they did not want to take it home or into their cars. This is supported by the high level of discarded bags located close to the car park at path 8 the circular reservoir walk. The path audits suggested that visibility was a key factor in the behaviour of dog walkers with respect to dog waste and that some dog owners may only clean up after their dogs when obliged to (e.g., in the presence of others). It was considered that given the opportunity these dog walkers would seek to discard the bagged dog waste as quickly as possible and respondents considered that this was also an important factor (mean = 3.50) influencing this behaviour.

It has been suggested that demographic factors can significantly influence pro-environmental behaviours (e.g., Kollmuss and Agyeman, 2002) and observations by Wells (2006) of 400 dog walkers in Northern Ireland attempted to determine the profile of a 'typical dog fouler'. Results from this study suggested that socio-economic status and gender influenced reactions to dog waste. Individuals with a lower income had a lower regard for the environmental issue of dog fouling and more females cleaned up after their dogs than males (which has direct bearing on this current study where 84% of questionnaire respondents were female). In contrast a study by Webley and Siviter (2000) suggested that there were no significant differences between responsible and irresponsible dog owners in terms of age, gender, price of dog, etc. Results from the current study have allowed the authors to identify discrete groups within dog walkers on the basis of their attitudes and behaviour towards clearing up after their dogs that are outlined below. These typologies were developed qualitatively with direct reference to the scheme proposed by Campbell (2007) that categorised people according to their attitudes and behaviour on littering.

4.4 Dog walking typologies

- *Proud to pick up* – happy to be seen carrying dog waste, will pick up in all locations and take it home if no bins are available.
- *It is the right thing to do* – will pick up in public places but will seek to dispose of the waste as soon as it is practical.
- *I have done my job....* – if there is no bin available will leave the bagged waste to be dealt with by others.
- *Only if I have to* – will only pick up in the presence of other people – likely to discard when no one is looking.

- *Disengaged* – will not pick up in any situation even if they are aware of the environmental consequences of their actions.

Further study is required to ascertain if such typologies are a limited reflection of a more complicated reality, fixed, or whether people move between them. In order for local authorities to tackle the issue of dog waste it may be necessary to develop individual strategies for each of the suggested dog walker typologies and potentially tailor these strategies to individual locations.

This study has highlighted the importance of contingent factors in determining the behaviour of dog walkers towards clearing up after their animals. This formative study has highlighted the complexities of the issue and in particular the importance of interactions between situational, social and individual motivational factors in influencing behaviour. It is suggested that significantly more research is required to assist in addressing this emotive yet complex problem.

References

Atenstaedt, R.L. and Jones, S. (2011) 'Interventions to prevent dog fouling: a systematic review of evidence', *Public Health*, Vol. 125, No. 2, pp.90–92.

Bamberg, S. and Möser, G. (2007) 'Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour', *Journal of Environmental Psychology*, Vol. 27, No. 1, pp.14–25.

Campbell, F. (2007) *People Who Litter: ENCAMS Research Report*, ENCAMS, Wigan, UK.

Department of Environment, Food and Rural Affairs (Defra) (n.d.) *Dog Control Orders: Guidance of Sections 55 to 67 of the Clean Neighbourhoods and Environment Act 2005*, Defra Publications, London.

ENCAMS (2005) *Control of Dogs Survey 2005/06* [online] http://www.keepbritaintidy.org/ImgLibrary/dogfouling_control_dogs_survey_639.pdf (accessed 5 June 2012).

Goffman, E. (1966) *Behavior in Public Places*, The Free Press, Cambridge.

Innes, E.A., Bartley, P.M., Maley, S.W., Wright, S.E. and Buxton, D. (2007) 'Comparative host-parasite relationships in ovine toxoplasmosis and bovine neosporosis and strategies for vaccination', *Vaccine*, Vol. 25, No. 3, pp.5495–5503.

Kollmuss, A. and Agyeman, J. (2002) 'Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behaviour', *Environmental Education Research*, Vol. 8, No. 3, pp.239–260.

Pet Food Manufacturers Association (PFMA) (2012) *UK Pet Population Statistics* [online] http://www.pfma.org.uk/pet-population/ (accessed 2 July 2012).

Podberscek, A.L. (1994) 'Dog on a Tightrope: the position of the dog in British Society as influenced by press reports on dog attacks (1988 to 1992)', A*nthrozoos: A Multidisciplinary Journal of the Interactions of People & Animals*, Vol. 7, No. 4, pp.232–241.

Sport Industry Research (SIRC) (2008) *Assessment of Perceptions, Behaviours and Understanding of Walkers with Dogs in the Countryside*, A report prepared for The Kennel Club and Hampshire County Council [online] http://www3.hants.gov.uk/shu-research-paper.pdf (accessed 5 June 2012).

Waste Improvement Network (WIN) (2011) *WIN Focus 12 Cleaning Up Dog Waste* [online] http://www.win.org.uk/ (accessed 5 June 2012).

Webley, P. and Siviter, C. (2000) 'Why do some owners allows their dogs to foul the pavement? The social psychology of a minor rule infraction', *Journal of Applied Psychology*, Vol. 30, No. 7, pp.1371–1380.

Wells, D. (2006) 'Factors influencing owners' reactions to their dogs' fouling', *Environment and Behavior*, Vol. 38, No. 5, pp.707–714.

Wells, D.L. (2007) 'Public understanding of toxocariasis', *Public Health*, Vol. 121, No. 3, pp.187–188.

Westgarth, C., Christley, R.M., Pinchbeck, G.L., Gaskell, R.M., Dawson, S. and Bradshaw, J.W.S. (2010) 'Dog behaviour on walks and the effect of use of the leash', *Applied Animal Behaviour*, Vol. 125, Nos. 1–2, pp.38–46.

Westgarth, C., Pinchbeck, G.L., Bradshaw, J.W.S., Dawson, S., Gaskell R.M. and Christley R.M. (2008) 'Dog-human and dog-dog interactions of 260 dog-owning households in a community in Cheshire', *Veterinary Record*, Vol. 162, pp.426–442.