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Recycling at home and work: An exploratory comparison

Seonaidh McDonald
(Corresponding Author)
Aberdeen Business School
Robert Gordon University
Garthdee Road
Aberdeen
AB10 7QE
UK
s.mcdonald@rgu.ac.uk

Adekunle Oke
Aberdeen Business School
Robert Gordon University
Garthdee Road
Aberdeen
AB10 7QE
UK

Seonaidh McDonald is Professor of Sustainable Practices at Aberdeen Business School, Robert Gordon University. Her research centres on sustainable consumption. She has investigated a wide range of sustainable practices including recycling, green energy tariffs, travel, domestic appliances, food and household goods. This work has been published across several social science disciplines. Her work is largely underpinned by qualitative research methods and she also publishes in the research methods literature.

Adekunle Oke is a doctoral researcher at Aberdeen Business School, Robert Gordon University where he is currently investigating attitudes and behaviour towards recycling behaviour in UK workplaces. He also works as a research assistant where he has assisted in completing many projects such as consumers' green/ethical behaviour and research methods in entrepreneurship research. Adekunle has had several articles published in the field of waste management. His research and professional interests include waste and resource management, project and strategy management, biogas production and utilisation, geographic information systems, organisational behaviour, consumer behaviour, quality management, renewable energy and sustainability issues.

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Recycling at home and work: An exploratory comparison

Abstract

Purpose: Recent UK legislation requires businesses to segregate their food waste and present metal, plastic, glass and paper waste for collection separately. Despite decades of research on household recycling, scant attention has been paid to the waste that employees personally create and dispose of within their workplaces. There is an implicit assumption that what is already known about recycling at home will simply transfer into the workplace. However emerging debates in the wider green behaviour literatures suggest that behaviours may not translate straightforwardly into other contexts.

Methodology: This paper presents an exploratory study that comprehensively compares recycling at home and work for the first time. A one page questionnaire was hand delivered to 1000 households to ask them to indicate which materials they recycled at home and at work, and allowed them to comment on any differences. A total of 220 responses were received.

Findings: The data show recycling in both contexts across the full range of materials. An aggregate analysis shows that people generally recycle in both contexts. However further analysis at the level of individual materials gives a different picture, demonstrating that individuals are less likely to recycle at work than they are at home, suggesting that spillover between these contexts is neither automatic nor consistent.

Contribution: Since an individual's behaviour is shown to vary across materials, as well as across contexts this challenges the very notion of the 'recycler'. The findings challenge the extant research norms surrounding recycling research in a number of important ways. The outcome of this study is a set of six propositions which set out a future research agenda for the investigation of recycling behaviour in general, and workplaces in particular, in terms of unit of analysis, multiple material streams, and multiple contexts.

Limitations: Although this study gives insights into new areas and provides the basis for building future research agendas in the waste management field, it is very much exploratory in nature. In particular the questionnaire used was very simplistic in order to facilitate a healthy return rate from a sampling method which was known to include a significant proportion of recipients ineligible to reply (as they did not work outside the home). Although this was a successful strategy in terms of obtaining a large enough sample, it means that the data collected are only able to be analysed in a very limited way.

Keywords: recycling, domestic waste, household waste, commercial waste, workplace recycling, spillover

Introduction

In January 2014, the Scottish Government introduced novel policy measures that charged organisations with presenting waste produced by their employees as a series of segregated fractions (Waste (Scotland) Regulations, 2012). In January 2015, England and Wales followed suit (Waste (England & Wales) (Amendment), 2012). The introduction of these new regulations means that organisations across the UK are now responsible for segregating their food waste and presenting any metal, plastic, glass or paper waste separately for collection. Many organisations have gone to great lengths to reduce the waste created by their industrial processes, but have not tackled the waste created in offices and canteens by their employees in the same way. Although many have devised recycling schemes for their employees these have previously been voluntary in nature and vary in their effectiveness (Chapman & Walton, 2012). For the first time, UK organisations will have to depend on the compliance of their employees in order to meet their own responsibilities to present waste streams separately for recycling.

It is estimated that in Scotland alone workplaces produce around 2.9 million tonnes of mixed waste and that 1.1 million tonnes of this is landfilled each year when 90% of it could be reused and recycled (Zero Waste Scotland, 2012). Despite the fact that 'black bag' mixed waste arisings in commercial premises are on a par with those produced by households (Scottish Environmental Protection Agency (SEPA), 2015), the study of recycling in the workplace remains less common than the study of recycling at home (Lülfes & Hahn, 2014; Marans & Lee, 1993, Smith & O'Sullivan, 2012). There is a significant body of work related to domestic recycling that started in the 1970s, gathered steam in the 1980s and continues to this day (Hornik, Cherian, Madansky & Narayana, 1995, Miafodzyeva & Brandt, 2013). However a recent meta-analysis (Oke, 2015) suggests that there have been relatively few studies on workplace recycling in that same period. There could be a variety of reasons for this area of waste arisings being relatively overlooked. Firstly we suggest that the emphasis on studying waste produced in domestic contexts mirrors the preoccupation of policy and policy makers

with household waste. Taking European legislation as an example, at a transnational level, the European Union (EU) legislation on household waste is long established (Directive on Waste (75/442/EEC)) and well developed (Directive 2008/98/EC). This has led to member states, such as the UK focusing their attention on domestic waste more generally, and developing national targets for household recycling specifically (Department for Environment, Food & Rural Affairs (DEFRA), 2007, SEPA, 2012).

Secondly, we suggest that the relative dearth of research on workplace recycling may be based on an implicit assumption within the recycling literature that what is already known about recycling in the home will translate into the workplace. This does seem like a reasonable assumption to make: The people creating and potentially recycling their own waste in workplace settings are a subset of those who recycle at home; and the waste fractions produced are similar in many respects to those produced in a domestic context. However recent research in the wider green consumer behaviour literature suggests that behaviour will not necessarily be transferred across contexts (McDonald, Oates, Alevizou, Young & Hwang, 2012). For example, studies have shown that people do not necessarily continue to recycle whilst on holiday (Barr, Shaw, Coles & Prillwitz, 2010; Dolnicar & Grün, 2009) or while away from home at University (Robertson & Walkington, 2009; Scott, 2009), raising questions over whether people will transfer any existing domestic recycling behaviour to their workplaces. This means that as well as the need to know more about workplace recycling in its own right, there is also a need to determine whether recycling behaviour in the home will translate into workplace contexts. If this translation is possible, a huge amount of research in addition to that carried out in the workplace becomes instantly applicable to guide employers in their efforts to design effective recycling schemes. If however there is a disconnect between recycling at home and at work, a new focus on workplace recycling behaviour will be required by waste management academics going forward in order to support these new efforts at separating waste in the workplace that are demanded by recent legislation.

In order to begin to address this important and timely question, this paper describes a pilot study that seeks to answer the question: do people who recycle at home also recycle at work? It will begin with an overview of the research on workplace recycling, leading to a consideration of the few studies which take account of both domestic and workplace contexts. This will be followed by a description of a pilot study aimed at uncovering whether or not there is a case for assuming that domestic recycling habits and diversion rates could be simply replicated in the workplace. The results of that study are then discussed and recommendations for the future development of the field in the form are made. This is done by developing a series of propositions for investigation by future researchers.

Research on Workplace Recycling

There are two main strands of literature that deal with recycling in a workplace context. The first is set within the wider literature on recycling and the second hails from literature pertaining to organisational citizenship behaviour (OCB). Although neither of these literatures focus on workplace recycling per se, there is a small amount of literature in each that is relevant to recycling in an organisational context. In the next section an overview of each of these bodies of work is provided in order to frame the pilot study that follows.

Studying recycling.

Research which investigates recycling behaviour more generally goes back to the 1970s and is mainly reported within the waste management literature (e.g. Timlett & Williams, 2008; Vincente & Reis, 2008), the social psychology literature (see Bamberg & Moser (2007) for a review), and, to a lesser extent, the consumer behaviour literature (e.g. Iyer & Kashyap, 2007; Thørgersen, 1994). This vast body of work is predominantly quantitative in nature, taking the form of experiments (e.g. Knutsson, Martinsson & Wolbrant, 2013; Schultz, 1999) and surveys (e.g. Oates & McDonald, 2006; Saphores, Ogunseitan & Shapiro, 2012) aimed at describing and/or explaining recycling behaviours at the level of the individual and focused on the domestic context. Work has been done on identifying the characteristics (e.g. Berger, 1997;

Vining & Ebreo, 1990), or motivations (e.g. Hage, Söderholm & Berglund, 2009; Hornik et al., 1995; Miliute-Plepiene, Hage, Plepys & Reipas, 2016) of the recycler or non-recycler; assessing the success of different elements of scheme design, such as convenience (Everett & Peirce, 1993; Miller, Meindl & Caradine, 2016), information (Baxter & Gram-Hanssen, 2016; Willman, 2015) and feedback (Lingard, Gilbert & Graham, 2001; Schultz, 1999). The sub-set of the recycling literature that focuses on workplace recycling can be seen to be very much within these same traditions.

Like much of the literature on domestic recycling, many of the extant studies of workplace recycling focus on the operation of a single recycling scheme (see for example: Clay, 2005; Ludwig, Gray & Rowell, 1998; Price & Pitt, 2011; Thomson & Chigaru, 2010; Tudor, Barr & Gilg, 2007), often linked to a single material (see for example: Brothers, Krantz & McClannahan, 1994; Lee, De Young & Marans, 1995). The vast majority of these studies have been conducted within single academic settings (Oke, 2015). Whilst universities are often large employers and constitute a legitimate site for investigating office-based recycling, the large preponderance of this organisation-type within the literature suggests a degree of convenience in the choice of sample organisations, not unlike the oft-critiqued utilisation of MBA students as a proxy for 'managers' found in the management and accounting literatures (Elliott, Hodge, Kennedy & Pronk, 2007). Further, more than half of the studies of workplace recycling have been conducted in the USA (Oke, 2015). Whilst there are not yet any international comparisons of workplace recycling, the wider recycling literature suggests caution in assuming that findings from one geographical region can be transferred to another due to fundamental variations in social norms, policy contexts and recycling infrastructure (Diamantopoulos, Schlegelmilch, Sinkovics & Bohlen, 2003; González-Torre, Adenso-Díaz & Ruiz-Torres, 2003; Halvorsen, 2012; Vicente-Molina, Fernández-Sáinz & Izagirre-Olaizola, 2013).

Most of the studies concerned with workplace recycling looked at recycling in the workplace in isolation from recycling behaviour in the home. Again this is a feature of the recycling literature more generally and, as such, is in line with the work on domestic contexts. There are, however, a few studies that raise the question of the relationship between recycling in domestic and workplace contexts and these will be considered in more detail in section 2.2.

Studying pro-environmental behaviour in the workplace.

A number of recent reviews of the Organisational Citizenship Behaviour (OCB) literature trace its development as a burgeoning theme in the field of organisational behaviour since the 1990s (LePine, Erez & Johnson, 2002; Podsakoff, MacKenzie, Paine, & Bachrach, 2000; Podsakoff, Podsakoff, MacKenzie, Maynes & Spoelma; 2014; Whitman, Van Rooy & Viswesvaran, 2010). The initial concerns of the field were in terms of ethical and social rather than environmental behaviours in organisational settings (Boiral, 2009). More recently, environmental behaviours have been considered (Daily, Bishop & Govindarajulu, 2009; Lülfs & Hahn, 2014) and have been the subject of theorising the extent to which environmental behaviours are similar to, or different from other OCBs (see e.g. Lamm, Tosti-Kharas & Williams, 2013). Much of the research focused on OCBs has been at the level of the organisation rather than the individual (Daily et al., 2009; Jenkin, Webster & McShane, 2011; Lamm et al., 2013; Lülfs & Hahn, 2013; Scherbaum, Popovich & Finlinson, 2008) and this is also true of the work looking at organisational citizenship behaviours for the environment (OCB-E). For example, there are a number of studies which look at OCB-E in terms of stakeholder influence (e.g. Gadenne, Kennedy & McKeiver, 2008) or strategic decision making (e.g. Bansal & Roth, 2000). Perhaps because of this, many take a managerialist perspective (Andersson & Bateman, 2000; Egri & Herman, 2000; Haugh & Talwar, 2010; Martin-Peña, Díaz-Garrido & Sánchez-López, 2010; Paillé, Boiral & Chen, 2013) in terms of considering benefits for organisational performance rather than to the environment (Ciocirlan, 2016) or the employee performing the behaviour. Commentators in the field have suggested that empirical testing is lacking in the field as a whole (Boiral & Paillé, 2012) and especially within the more recently developed stream of work

on OCB-E (Boiral, 2009; Lamm et al., 2013) which is largely theoretical (see e.g. Ciocirlan, 2016; Daily et al., 2009; Lülfs & Hahn, 2013; Norton, Parker, Zacher & Ashkanasy, 2015). This literature is wont to look at pro-environmental behaviours in the round, rather than investigating any single type of behaviour. Therefore, whilst there are a number of mentions of recycling behaviour as an example of an OCB-E (e.g. Boiral, 2009; Lamm et al., 2013) and scholars who draw on the recycling literature in their discussion of OCB-Es (e.g. Lülfs & Hahn, 2014), recycling in the workplace is not the focus of any single study.

Studies Linking Recycling at Work and Home

A number of studies of workplace recycling have included questions about recycling at home. These have, without exception, established that if individuals are already recycling at home then they are more likely to participate in recycling at work. The first study which attempted to make a link between home and workplace recycling examined whether private recycling behaviour was a useful predictor of participation in office paper recycling schemes (Lee & De Young, 1994; Lee et al., 1995). The study surveyed nearly 1,800 Taiwanese office workers from 32 different firms, and found that although prior (home) recycling experience of a specific material was a predictor of office recycling, the actual rates of recycling at work were much lower than those reported at home. This is a relatively common finding (Clay, 2005; Thomson & Chigaru, 2010), echoing Price & Pitt's (2011) results from office workers, who were found to be more likely to recycle at work if they already recycled at home, and more likely to describe themselves as 'frequent recyclers' at work if they already took part in recycling at home. In a rare qualitative study of environmentally responsible behaviours in the workplace, Smith and O'Sullivan (2012) found narratives which demonstrated the transfer of recycling behaviours from home to work happening spontaneously, and raised the question of whether these two contexts ought to be considered as 'separate' at all in terms of individual behaviour.

By contrast, there are far fewer studies which investigate the question of whether workplace recycling can affect the likelihood of recycling at home. Saphores, Ogunseitun and Shapiro

(2012) found that individuals that had been required to recycle electronic waste at work or school were more likely to become e-waste recyclers at home. Andersson, Eriksson and Borgstede (2012) conducted a study on source separation and collected data on both workplace recycling and domestic recycling from their respondents. An interesting finding from this study was that the introduction of an Environmental Management System in the workplace was found to also prompt domestic recycling for employees who did not previously recycle at home.

In a study that looked more broadly than just recycling, Chapman and Walton (2012) examined a wide range of pro-environmental behaviours in both domestic and workplace contexts in Australia. They reported positive associations between recycling at work and recycling at home (in both directions) with role models in both contexts having positive effects on pro-environmental behaviours at both home and work. Similarly, in their study of attitudes and behaviours of non-academic University staff, Davis, O'Callaghan and Knox (2009) found positive correlations between personal and work-based attitudes and behaviours.

In summary then, much less is known about workplace recycling than domestic recycling. Much of what is known is based on US data, which may or may not be representative of recycling behaviour in other nations. The majority of extant studies worldwide concentrate on a single material and/or a single organisation. This means that there is still much work to be done in terms of understanding recycling (non)behaviours in the workplace.

The research that compares workplace and domestic recycling is scant, fragmented across disciplines and is often not the explicit focus of the study being undertaken. Within the social psychology literature researchers are raising questions about whether individual participation in one pro-environmental behaviour (such as recycling) can increase the likelihood of participation in another (such as purchasing organic vegetables) (Thøgersen & Ölander, 2003) with mixed results. The studies discussed here that focus on one context but ask (almost

incidentally) about the other context, or set out to compare contexts are implicitly raising a related question about whether participation in a pro-environmental behaviour in one context (such as home) could cause what is termed 'spillover' and/or predict participation in that same pro-environmental behaviour in another context (such as work (Lee et al., 1995); student life (Clay, 2005; Robertson & Walkington, 2009) or vacation (Barr et al., 2010; Dolnicar & Grün, 2009)).

Summary

There are two strands of literature which would appear to inform the question of how people recycle in the workplace: the recycling literature and the organisational behaviour literature. Compared to the vast array of studies undertaken on recycling within the domestic sphere, the recycling literature is relatively silent on the workplace as a context for recycling. Some research has been undertaken on recycling in a workplace context but it a) focuses on single materials; b) is dominated by research in the university sector; and c) fails to address the underlying question of whether and how workplace recycling is similar to or different from recycling in the home. On the other hand, the OCB-E literature takes the workplace as a central focus, but it currently tends towards the theoretical and, as such is concerned with OCB-Es in general rather than recycling in particular. There is some shared heritage between these debates in terms of a social psychology underpinning and some shared touchstones (both theoretical and empirical) in the literature. Perhaps due to their different focuses on the individual and organisational levels respectively it is not surprising that very little cross fertilisation between these debates has taken place. Drawn together however, they frame an important gap in knowledge: a) does recycling in workplaces differ from recycling at home; and b) if it is different, then in what ways does it differ?

Having consolidated the work that compares domestic and workplace recycling through this review, the pilot study presented here sets out to contribute to both of these debates. This is achieved by increasing knowledge about workplace recycling in the UK in general, looking at

multiple materials and not controlling for a single or specified workplace. In addition, it will take the comparison of recycling in domestic and workplace contexts as its central focus, systematically comparing respondent behaviour in each context, material by material for the first time. The timeliness of this endeavor is underlined by the recent changes in UK legislation about workplace recycling.

The pilot study that is described below is a first, tentative step in addressing the identified gap. As such it answers contemporary calls that cut across both research domains to undertake detailed study of recycling behaviour in organisational settings (Lülfes & Hahn, 2014; Norton et al., 2015; Oke, 2015; Young, et al., 2013).

Method

A short questionnaire was designed in order to survey householders about their recycling habits in the home and in the workplace. The questionnaire consisted of a single sheet of A4 with the cover letter printed on one side (see Figure 1) and the questions printed on the other (see Figure 2). The design of the questionnaire was deliberately kept very simple with the fewest possible questions in order to facilitate as high a response rate as possible. Perhaps the most contentious design decision taken was not to ask householders for any demographic information. This decision was informed by practical, methodological and theoretical considerations. In a practical vein, we were encouraged by the effect of a similar design on response rate in a previous study (McDonald & Oates, 2003). From a methodological point of view, the aim of this pilot study was not to uncover the characteristics of those who recycled at work, nor to compare them with the characteristics of those who recycled at home. Instead our aim was to compare the behaviour of each individual respondent across two contexts. Therein lies the novelty and contribution of our approach. Finally, from a theoretical point of view, set against a background where recycling is becoming regarded as a norm in UK society (Thomas & Sharp, 2013) lessening the effects of sociodemographic distinctions, and where socio-demographics have been shown to offer either contested or weak explanations of

environmental behaviours (as distinct from attitudes or knowledge) (Diamantopoulos, Schlegelmilch, Sinkovics & Bohlen, 2003) we follow the view of McDonald et al., (2012) that demographic data may be less valuable than was originally hoped in the early days of recycling research. Taking all these issues into account then, a decision was taken not to lengthen the questionnaire and make people less willing to participate (Iglesias & Torgerson, 2000). This decision does of course place a very real limit on the findings obtainable from this pilot study: in our endeavour to optimise the number of answers to a very focused set of research questions, we have certainly limited the breadth of our findings and also the extent of statistical analyses that we would be able to perform on the responses. This is further considered in the final section of the study on limitations.

Rather than focusing on a specific work environment (offices, university), the sample is drawn from a population with access to comparable opportunities to recycle their household waste. No inferences about individual's specific employment setting are made except to exclude those who do not work outside the home. The variables of interest are the material type and the difference between reported home and work recycling habits. The study will firstly ascertain whether there is a stated difference between recycling behaviour at home and at work. Secondly, there will be an analysis of whether recycling behaviours vary across materials in the different contexts.

Figure 1: Invitation to participate

Dear Householder,

The aim of this survey is to find out whether people recycle the same things at home and at work. **If nobody in this household works outside of the home, please just ignore this letter.**

In the table overleaf is a list of materials that can be recycled. Please put a tick or a cross in each box to indicate whether or not you recycle any of these materials at home or at work. Feel free to add comments to any of the boxes to explain your answers, like the example shown below:

Materials Recycled	at Home	at Work
Paper	✓	x no banks

Once you have completed the table, please put this letter back in the freepost envelope that it came in and post it back to me. If you have any questions about this survey, please contact me on [phone number] or [email address]

Yours sincerely,
[signature]

Figure 2: Questionnaire

Materials Recycled	at Home	at Work
Paper		
Glass		
Plastic		
Metal		
Cardboard		
Garden waste		
Food waste		
Textiles		
Other(s):		

If there is a difference between the materials that you tend to recycle at home and at work, please comment below on why you think this happens:

Thank you very much for your help with this research.

The questionnaire (see Figure 2) was placed inside an open freepost envelope and hand delivered to 1000 households in [UK town]. Householders were asked to complete the questionnaire, place it into the freepost envelope and put it back into the post. The questionnaires were not marked in any way and so the responses to the survey were entirely anonymous. Figure 1 shows the format and content of the cover letter containing the invitation and instructions for participation. [*nb: both have been anonymised to facilitate peer review*]

The questionnaires were analysed by entering a numeric 1 to represent all of the boxes ticked by each respondent into an Excel spreadsheet. This allowed the statistical analysis of the dataset as described below. The free text answers to the final question were also entered in to the spreadsheet to allow them to be contextualised with respect to the materials recycled by that respondent. However for the purposes of analysis they were collated in a single text document and underwent a thematic analysis using a constant comparison approach (Richards, 2014) and were used as a basis for suggesting possible explanations for the patterns of numerical answers uncovered in the analysis that follows.

Sample

[town name] is a town in [county], UK with a population of approximately 7000 residents ([county] Council 2010). It has comparatively low unemployment at 0.8% as compared to the [region] average of 4% and slightly higher than the region's average income (Office of National Statistics (ONS), 2008). [town name] was selected for the study as it is a small commuter town in the [county] countryside 16 miles from [large city]. This means that there is a diverse range of commercial employers who collectively are likely to recycle the complete range of materials. This provides the potential to get information about recycling in rural, as well as urban workplaces. 40% of the population are employed in [city], and a further 39% of the town's population is employed in [town name]. Importantly, the area is home to thriving farming, tourism and timber related industries. Furthermore, the diversity of employment sectors ensures that respondents are likely to reflect the range of products included in the

questionnaire both at work and at home. This study was carried out before the waste separation legislation was introduced for workplaces and so it will provide a baseline study of individual behaviour which is entirely voluntary on the part of both the individuals and their households.

Households were sampled by taking a consensus sample of 40 streets in [town name], which were randomly selected to ensure representation from a wide range of council tax bands. The decision to collect data by sampling households rather than workplaces was necessary to reduce the costs of the survey (questionnaires were delivered by hand by the researchers) and the limitations this imposed are discussed in section 5.

All the households in the town receive the same municipal recycling facilities provided by [county] Council:

- A fortnightly doorstep collection of paper and white/grey cardboard;
- A fortnightly doorstep collection of mixed glass, metal and plastic bottles;
- A recycling center which provides for the disposal of paper, glass, plastic bottles, cardboard (any), food and drinks cans, cardboard drinks packs, telephone directories (periodically), textiles, scrap metal, garden waste, oil, rubble, oil, car batteries, domestic batteries, Waste Electrical and Electronic (WEEE), domestic appliances, and furniture as well as general household waste; and
- Several 'bring' sites' scattered across the town in car parks near schools and supermarkets which also provide a range of banks for glass, paper, plastic bottles, cardboard (any), food and drinks cans, and textiles.

Results & Discussion

A total of 220 responses were received from the 1000 households, giving a response rate of 22% which would not be considered unusual for a postal questionnaire (Baruch & Holtom, 2008), particularly as households with no-one working outside the home would have not been able to respond. The responses were all coded and analysed first to compare recycling rates at home and at work, then for differential recycling rates across individuals and at the level of each material.

The results demonstrate that 80% of respondents recycle one material or more in both home and work contexts, 16% only recycle at home and the remaining 4% recycle in neither context. No respondents reported recycling only at work. This is in line with many of the studies discussed above. However once the recycling is broken down by material, a different picture emerges, which is one of uneven participation between home and work (see Figure 3).

The graph (Figure 3) clearly demonstrates a higher rate of recycling at home than at work across all material types, even for common recycling materials such as paper. To establish whether the same individuals were recycling across contexts, separate recycling scores for home and work were calculated for each individual. The score was the total number of 'yes' responses across the 8 recycling categories (i.e. excluding 'others'). A Wilcoxon signed rank test ($p < 0.0005$) which was used to test the paired differences indicated a significant difference between the home and work recycling scores. The mean of the ranks demonstrated more recycling at home (102.33) while the mean of the ranks for recycling at work was 35.5. Further, only 4 individuals obtained a higher score for work than home recycling.

The data were then set out as a series of contingency tables that compared recycling at home (yes/no) with recycling at work (yes/no) for each material so that a McNemar test could be used to check for marginal homogeneity. This test sought to ascertain whether there were any material level differences between the incidence of recycling between work and home. Results

indicate that a significant difference between recycling at home and work was found for all eight materials as none had a McNemar p-value exceeding 0.0005. Specifically, there are significantly more instances of recycling at home than at work. This is true overall, and for every individual material.

Figure 3: % Recycling rates across materials at work and at home

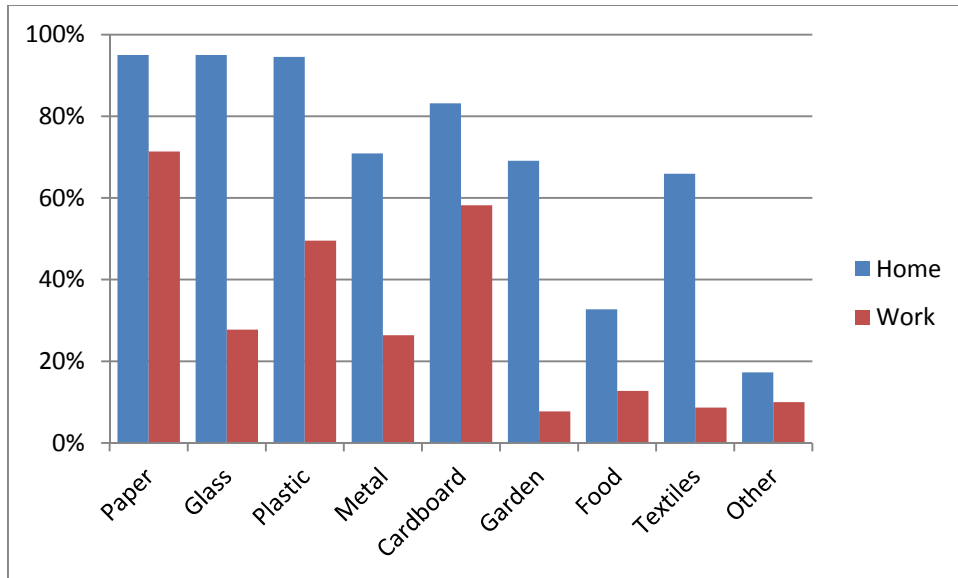


Table 1: Instances of recycling at home, work, both or neither, by material¹

Material	Recycles at Home only	Recycles at Work only	Recycles at Home and Work	Recycles at Neither
Paper	54	1	155	10
Glass	148	0	61	11
Plastic	99	0	109	12
Metal	102	5	53	60
Cardboard	64	9	119	28
Garden	139	4	13	64
Food	56	12	16	136
Textiles	131	5	14	70
Total instances	793	36	540	391

¹ Note that the numbers in Table 1 exclude data collected in the ‘other’ category and so will add up to different totals than those presented for the dataset as a whole.

The data show that recycling at home does not mean that individuals will automatically recycle at work. Importantly, this significant difference holds true regardless of materials. For some materials, such as garden waste or textiles, such differences might be expected due to the different patterns of waste arisings in the two contexts. However even for materials such as paper which can be found in both contexts there is a significant difference in recycling behaviour. For example, just over a quarter (25.8%) of those who recycle paper at home do not recycle paper at work. These results highlight that studies that just ask about recycling at home and work in general will get very mixed messages because there are large differences between the instances of recycling for different materials.

Some of the comments offered in response to the open question at the end of the questionnaire (see Figure 2) offer insights into why this is the case. One of the most common statements made by respondents was that they could not recycle many of the materials at work because they either did not arise in a work setting or that there were no facilities to recycle them at work. Whilst it is likely that in many workplaces, some materials, such as glass, are found in lower quantities than they might be at home, it is extremely unlikely that they are entirely absent from a workplace. For example, although jam jars and ketchup bottles might be relatively rare, soft drink bottles and coffee jars may well be found in many workplaces. This is corroborated by Waste Watch estimates that 3% of commercial and office waste is glass (Waste Online, 2004). Reporting occasional occurrence of recyclables as non-occurrence is something that has been found in previous studies of non-recyclers (McDonald & Oates, 2003). It is possible that glass is not collected in workplaces due to the health and safety constraints of including them in mixed recyclables or having glass banks in office locations that have to be emptied by hand. However, assertions that no facilities exist at work should be treated with caution as several respondents reported that there were no facilities in [town name] to recycle metals (although food and drink cans are included in the fortnightly doorstep collection and banks are available at the recycling center as well as at a number of

points throughout the town) or garden waste (despite a dedicated skip located at the recycling center).

Another theme underlying many responses was that of responsibility (Martinsson & Lundqvist, 2010). By noting that no facilities were available to them at their workplace, respondents may be seeking to absolve themselves from the responsibility of their non-recycling behaviour. Studies of office recycling have found that low recycling rates are often attributed to the proximity of facilities (for example, Brothers et al., 1994; Ludwig et al., 1998). In an interesting parallel, the 'fault' here is transferred from the individuals as the users of the recycling services to the organisations as providers of facilities. This is underlined by a few respondents who reported that they assumed that their waste was being recycled (even when no sorting or storing of recyclables was in evidence) or that they did not know whether it was recycled. The responsibility for sorting waste is further blurred when cleaning services are outsourced to another company.

However there is a small group of individuals who report that they take their recyclables home with them in order to recycle them along with their own household waste. One respondent noted that although there was workplace recycling, a colleague had set it up informally and simply took the recyclables away periodically and put them in banks on her way home. For those determined to recycle in the workplace, informal systems have been put in place to counter lack of official provision in some work places. These data are in line with some of Smith and O'Sullivan's (2012) findings.

This pilot study underlines and extends the extant work on workplace recycling (e.g. Clay, 2005, Lee et al., 1995) by showing that when the sampling is done in such a way as to include a wide and unspecified range of employment contexts, private behaviours are not being reproduced at work, or not being reproduced to the same extent, regardless of workplace. Dannenberg, Hausam, Laurence and Powell (2012) suggest that the limited nature of

transferability of recycling could be attributed to different behaviour patterns in different contexts. The data surfaced about responsibility could offer some insight into the difference in recycling rates: whilst at home people consider recycling to be their own personal responsibility our data suggest that at work they may feel that the responsibility is their employer's. Overall, the findings support the view that green behaviours are not necessarily consistent (McDonald et al., 2012). Further complexity has been added to the body of knowledge regarding recycling at work by examining instances of recycling in both contexts for each material separately. The results presented here support Andersson et al.'s (2012) suggestion that there is a need to further explore recycling behaviour beyond a simple home/work difference.

Taking into consideration the significantly different levels of recycling for different materials at home and work, there is little support for the straightforward transferability of recycling between contexts. No evidence for consistent or sustained spillover has been found within these data, raising questions about the implicit assumptions that what is known about domestic recycling will be applicable to recycling at work. Even taking into consideration the availability and relevance of certain materials there was still a significant difference between recycling at home and work. The significant results at material level clearly indicate that more research is needed.

Conclusions

Further work will be required to understand fully the differences in the habits that have been suggested by this pilot study. The exploratory work described here raises a number of interesting new lines of enquiry for waste management research. In the remainder of this section, these new lines of enquiry will be highlighted by the development of a series of propositions for future research.

This study shows that material level analysis is an important area for future study as it is clear that people's domestic recycling habits are not necessarily being carried over either in scope or in frequency into their workplaces regardless of material type. If our questionnaire had simply asked whether people recycle at home and recycle at work, we would have been led to the conclusion that 80% of domestic recycling behaviour is translated into the workplace. This underlines the fact that researchers need to move away from treating all materials as a composite, or as equivalents for each other.

Proposition 1: *Research into recycling behaviours should allow comparison of those behaviours across a range of materials.*

The qualitative data make it clear that some respondents feel that the responsibility for the lack of recycling lies with the employers. They further suggest that a lack of suitable facilities is to blame for their lack of recycling. With commercial waste continuing to grow year on year (SEPA, 2010) and legislation changing to compel employers to separate their waste, the problem of recycling at work will remain an issue. However if employers are failing to engage even those people who have already made decisions to recycle within their private lives, it is clear that more research is needed to understand how to increase workplace recycling. Broadly the results of this study underline the need for more research into workplace (non)recycling behaviours, but specifically they suggest that:

Proposition 2: *The issue of employees' perceptions of responsibility for recycling in the workplace should be investigated in terms of how it impacts on employee (non)recycling behaviour, and*

Proposition 3: *Workplace recycling research should investigate the effects of the provision of different designs and levels of recycling facilities on recycling behaviour.*

The data presented here on the instances of recycling for different materials suggest that there is more complexity than a simple home/work divide as implicitly suggested by extant research would suggest. Further, consistent spillover is not evident for the same activities across

contexts, adding to the debates on the transferability of pro-environmental behaviours and suggesting a new line of enquiry. Much more research will be needed in order to extend the spillover debate from its current emphasis on spillover within or between 'domains' of pro-environmental behaviour to consider whether there is, or could be, spillover for the same behaviours between contexts (including home, workplaces, vacation, leisure, retail, for example).

Proposition 4: *Future research on recycling (or any pro-environmental) behaviour should include studies of the same behaviours across multiple contexts.*

In fact these data offer quite a profound challenge to the very notion of 'recycler' and 'non-recycler' and, by extension, to the very core of the waste management literature. By collecting data about different materials and different contexts from the same people at the same time, it is possible to demonstrate that individuals that one study (of e.g. domestic paper recycling in a specific town) would classify as a recycler, another study (of e.g. glass recycling in a specific workplace) would classify as a non-recycler. In order to move the waste management literature forward in a significant way, it will be necessary to leave this binary classification behind and change the ways in which recycling is studied.

Proposition 5: *Waste management researchers should move away from the individual as a unit of analysis (i.e. recycler versus non-recycler) to the recycling act as a unit of analysis.*

Looking at the recycling behaviours reported at home and work from a practitioner perspective, it seems that the household recycling facilities provided in [town name] by the local authority are better known and better used compared to schemes provided in the local workplaces. As a result, local businesses might learn much from the municipal approach. Further, for each of the materials covered by the new legislation (metal, plastic, glass, paper and food waste), there is significantly less likelihood that people are recycling in their workplaces even if they are already recycling these same materials at home. However, from a compliance point of

view, food waste, with only 13% of respondents reporting workplace recycling, and a weaker tradition of home recycling, potentially offers the biggest challenge for employers. Findings from this study suggest that some employers may not be making the changes necessary within their organisations in order to be compliant with the spirit of the new legislation.

Proposition 6: *Research will be required to establish the levels of (and perhaps approaches to) organisational compliance with the new recycling legislation for workplaces.*

Taken together, these propositions outline a robust way forward for waste management researchers who need to rise to the challenge of looking at individuals, materials and contexts in new ways in order to develop the field. Simply assuming that what we know about domestic recycling can be universally applied to workplaces, or that if a person recycles at home then they are a 'recycler' will be an insufficient basis for future recycling research. This exploratory study has uncovered some of the opportunities and challenges ahead in this field.

This study is a pilot one and has a number of associated limitations. Although 220 responses were received, allowing a meaningful sample size for statistical purposes, there is a high non-response rate. It is suggested that this is in part due to the in-built design flaw of distributing questions about workplace recycling to private residences, therefore including many people in the sample who would not be eligible to answer the survey. The decision not to include any identifying codes or collect demographic data undoubtedly increased the response rate, but means that there is no way to calculate the representativeness of this sample. Overall however, this pilot study has uncovered some important findings and established that a much larger, multiple material, multiple context, national (or even international) level study will be required in order to understand how best to meet government aspirations and targets for recycling workplace waste internationally.

References

- Anderson, L. M., & Bateman, T. S. (2000). Individual environmental initiative: Championing natural environmental issues in US business organizations. *Academy of Management Journal*, 43(4), 548-570.
- Andersson, M., Eriksson, O., & von Borgstede, C. (2012). The effects of environmental management systems on source separation in the work and home settings. *Sustainability*, 4(6), 1292-1308.
- Bamberg, S., & 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*, 27(1), 14-25.
- Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal*, 43(4), 717-736.
- Barr S.W., Shaw G., Coles T. & Prillwitz J. (2010). 'A holiday is a holiday': Practicing sustainability, home and away. *Journal of Transport Geography*, 18, 474-481.
- Baruch, Y. & Holtom B.C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, 61, 1139-1160.
- Baxter, J., & Gram-Hanssen, I. (2016). Environmental message framing: Enhancing consumer recycling of mobile phones. *Resources, Conservation and Recycling*, 109, 96-101.
- Berger, I. E. (1997). The demographics of recycling and the structure of environmental behavior. *Environment and Behavior*, 29(4), 515-531.
- Boiral, O. (2009). Greening the corporation through organizational citizenship behaviors. *Journal of Business Ethics*, 87(2), 221-236.
- Boiral, O., & Paillé, P. (2012). Organizational citizenship behaviour for the environment: Measurement and validation. *Journal of Business Ethics*, 109(4), 431-445.

- Brothers, K.J., Krantz, P.J. & McClannahan, L.E. (1994). Office paper recycling: A function of container proximity. *Journal of Applied Behaviour Analysis*, 27, 153-160.
- Chapman, J. & Walton, H. (2012). Encouraging pro-environmental action: Lessons for Australian workplaces and households. *Adelaide: Centre for Work + Life, University of South Australia*. <http://w3.unisa.edu.au/hawkeinstitute/cwl/documents/Work-life-sustainable-living-interim%20report.pdf> (accessed April, 2013).
- Ciocirlan, C. E. (2016). Environmental Workplace Behaviors Definition Matters. *Organization & Environment*, 1086026615628036.
- Clay, S. (2005). Increasing University recycling: factors influencing recycling behaviours among students at Leeds University. *Earth and Environment*, 1, 186-228.
- Daily, B. F., Bishop, J. W., & Govindarajulu, N. (2009). A conceptual model for organizational citizenship behavior directed toward the environment. *Business & Society*, 48(2), 243-256.
- Dannenberg, C.J., Hausam, B.L., Laurence, H.Y. & Powell, K.L. (2012). The moral appeal of environmental discourses: the implications of ethical rhetorics. *Environmental Communication. A Journal of Nature and Culture*, 6, 212-232.
- Davis, G., O'Callaghan, F. & Knox, K. (2009). Sustainable attitudes and behaviours amongst a sample of non-academic staff: A case study from an Information Services Department, Griffith University, Brisbane. *International Journal of Sustainability in Higher Education*, 10, 136-151.
- Department for Environment, Food & Rural Affairs (DEFRA) (2007). *Waste strategy for England 2007*. London: DEFRA.

- Diamantopoulos, A., Schlegelmilch, B.B, Sinkovics, R.R, & Bohlen, G.M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation, *Journal of Business Research*, 56(6), 465-480.
- Dolnicar, S. & Grün, B. (2009). Environmentally friendly behavior can heterogeneity among individuals and Contexts/Environments be harvested for improved sustainable management? *Environment and Behavior*, 41, 693-714.
- Elliott, W.B., Hodge, F.D., Kennedy, J.J. & Pronk, M. (2007). Are M.B.A. Students a Good Proxy for Nonprofessional Investors? *The Accounting Review*, 82, 139-168.
- Egri, C. P., & Herman, S. (2000). Leadership in the North American environmental sector: Values, leadership styles, and contexts of environmental leaders and their organizations. *Academy of Management Journal*, 43(4), 571-604.
- European Union (1975). Council Directive 75/442/EEC of 16 July 1975 on waste. *Official Journal of the European Communities* No. L194, 25.07.1975.
- European Parliament and the Council of the European Union (2008). Directive 2008/98/EC of the European parliament and of the council: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:EN:PDF> (accessed January, 2013).
- Everett, J. W., & Peirce, J. J. (1993). Curbside recycling in the USA: convenience and mandatory participation. *Waste Management & Research*, 11(1), 49-61.
- Gadenne, D. L., Kennedy, J., & McKeiver, C. (2009). An empirical study of environmental awareness and practices in SMEs. *Journal of Business Ethics*, 84(1), 45-63.

- González-Torre, P. L., Adenso-Díaz, B., & Ruiz-Torres, A. (2003). Some comparative factors regarding recycling collection systems in regions of the USA and Europe. *Journal of environmental management*, 69(2), 129-138.
- Hage, O., Söderholm, P., & Berglund, C. (2009). Norms and economic motivation in household recycling: empirical evidence from Sweden. *Resources, Conservation and Recycling*, 53(3), 155-165.
- Halvorsen, B. (2012). Effects of norms and policy incentives on household recycling: An international comparison. *Resources, Conservation and Recycling*, 67, 18-26.
- Haugh, H. M., & Talwar, A. (2010). How do corporations embed sustainability across the organization? *Academy of Management Learning & Education*, 9(3), 384-396.
- Hornik, J., Cherian, J., Madansky, M. & Narayana, C. (1995). Determinants of recycling behavior: A synthesis of research results. *The Journal of Socio-Economics*, 24, 105-127.
- Iglesias, C. & Torgerson, D. (2000). Does length of questionnaire matter? A randomised trial of response rates to a mailed questionnaire. *Journal of Health Services and Research Policy*, 5, 219-21.
- Iyer, E. S., & Kashyap, R. K. (2007). Consumer recycling: Role of incentives, information, and social class. *Journal of Consumer Behaviour*, 6(1), 32-47.
- Jenkin, T. A., Webster, J., & McShane, L. (2011). An agenda for 'Green'information technology and systems research. *Information and Organization*, 21(1), 17-40.
- Knutsson, M., Martinsson, P., & Wollbrant, C. (2013). Do people avoid opportunities to donate?: A natural field experiment on recycling and charitable giving. *Journal of Economic Behavior & Organization*, 93, 71-77.

- Lamm, E., Tosti-Kharas, J., & Williams, E. G. (2013). Read this article, but don't print it: Organizational citizenship behavior toward the environment. *Group & Organization Management*, 1059601112475210.
- Lee, Y.J. & De Young, R. (1994). Intrinsic satisfaction derived from office recycling behavior: A case study in Taiwan. *Social Indicators Research*, 31, 63-76.
- Lee, Y.J., De Young, R. & Marans, R.W. (1995). Factors influencing individual recycling behaviour in office settings: A study of office workers in Taiwan. *Environment and Behaviour*, 27, 380-403.
- LePine, J. A., Erez, A., & Johnson, D. E. (2002). The nature and dimensionality of organizational citizenship behavior: a critical review and meta-analysis. *Journal of Applied Psychology*, 87(1), 52.
- Lingard, H., Gilbert, G., & Graham, P. (2001). Improving solid waste reduction and recycling performance using goal setting and feedback. *Construction Management & Economics*, 19(8), 809-817.
- Ludwig, T.D., Gray, T.W. & Rowell, A. (1998). Increasing recycling in academic buildings a systematic replication. *Journal of Applied Behaviour Analysis*, 31, 683-686.
- Lülfes, R., & Hahn, R. (2013). Corporate greening beyond formal programs, initiatives, and systems: a conceptual model for voluntary pro-environmental behavior of employees. *European Management Review*, 10(2), 83-98.
- Lülfes, R., & Hahn, R. (2014). Sustainable behavior in the business sphere: A comprehensive overview of the explanatory power of psychological models. *Organization & Environment*, 27(1), 43-64.

- Marans, R.W, & Lee, Y.L. (1993). Linking recycling to waste management planning: A case study of office workers in Taiwan. *Landscape and urban planning*, 26, 203-214.
- Martin-Pena, M. L., Diaz-Garrido, E., & Sanchez-Lopez, J. M. (2010). Relation between management's behavioural intentions toward the environment and environmental actions. *Journal of Environmental Planning and Management*, 53(3), 297-315.
- Martinsson, J. & Lundqvist, L.J. (2010). Ecological citizenship: coming out 'clean' without turning 'green'? *Environmental Politics*, 19, 518-537.
- McDonald, S., Oates, C.J., Alevizou, P.J., Young, C.W. & Hwang, K. (2012). Individual strategies for sustainable consumption. *Journal of Marketing Management*, 28, 445-468.
- McDonald, S., & Oates, C. (2003). Reasons for non-participation in a kerbside recycling scheme. *Resources, conservation and recycling*, 39(4), 369-385.
- Miafodzyeva, S. & Brandt, N. (2013). Recycling behaviour among householders: synthesizing determinants via a meta-analysis. *Waste and Biomass Valorization*, 4, 221-235.
- Miliute-Plepiene, J., Hage, O., Plepys, A., & Reipas, A. (2016). What motivates households recycling behaviour in recycling schemes of different maturity? Lessons from Lithuania and Sweden. *Resources, Conservation and Recycling*, 113, 40-52.
- Miller, N. D., Meindl, J. N., & Caradine, M. (2016). The Effects of Bin Proximity and Visual Prompts on Recycling in a University Building. *Behavior and Social Issues*, 25, 4.
- Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behavior a theoretical framework, multilevel review, and future research agenda. *Organization & Environment*, 28(1), 103-125.
- Oates, C. J., & McDonald, S. (2006). Recycling and the domestic division of labour: Is green pink or blue? *Sociology*, 40(3), 417-433.

- Oke, A. (2015). Workplace Waste Recycling Behaviour: A Meta-Analytical Review. *Sustainability*, 7, 7175-7194.
- Office for National Statistics (2008). Family Spending: 2007 Edition. Cardiff: ONS.
- Paillé, P., Boiral, O., & Chen, Y. (2013). Linking environmental management practices and organizational citizenship behaviour for the environment: a social exchange perspective. *The International Journal of Human Resource Management*, 24(18), 3552-3575.
- Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., & Bachrach, D. G. (2000). Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. *Journal of Management*, 26(3), 513-563.
- Podsakoff, N. P., Podsakoff, P. M., MacKenzie, S. B., Maynes, T. D., & Spoelma, T. M. (2014). Consequences of unit-level organizational citizenship behaviors: A review and recommendations for future research. *Journal of Organizational Behavior*, 35(S1), S87-S119.
- Price, S. & Pitt, M. (2011). The influence of facilities and environmental values on recycling in an office environment. *Indoor and Built Environment*, 21, 1-10.
- Richards, L. (2014). *Handling qualitative data: A practical guide*. London: Sage.
- Robertson, S. & Walkington, H. (2009). Recycling and waste minimisation behaviours of the transient student population in Oxford: Results of an on-line survey. *Local Environment*, 14, 285-296.
- Saphores, J.D.M., Ogunseitan, O.A. & Shapiro, A.A. (2012). Willingness to engage in pro-environmental behaviour: An analysis of e-waste recycling based on a national survey of US households. *Resources, conservation and recycling*, 60, 49-63.

- Scherbaum, C. A., Popovich, P. M., & Finlinson, S. (2008). Exploring Individual-Level Factors Related to Employee Energy-Conservation Behaviors at Work. *Journal of Applied Social Psychology, 38*(3), 818-835.
- Scott, A. (2009). *Understanding Sustainable Development in Households*. Unpublished PhD thesis, University of Sheffield.
- Scottish Environment Protection Agency (SEPA) (2010). Waste data digest 10: Key facts and trends. Edinburgh: SEPA and Scottish Government.
- Scottish Environment Protection Agency (SEPA) (2012). Waste Data Digest 12: Key facts and trends: www.sepa.org.uk/waste/waste_data.aspx (accessed January 21, 2013).
- Scottish Environment Protection Agency (SEPA) (2015). Household Waste Generated: <http://www.gov.scot/Topics/Statistics/Browse/Environment/TrendHouseholdWaste> (accessed November, 2015).
- Schultz, P. W. (1999). Changing behavior with normative feedback interventions: A field experiment on curbside recycling. *Basic and applied social psychology, 21*(1), 25-36.
- Smith, A.M. & O'Sullivan, T. (2012). Environmentally responsible behaviour in the workplace: an internal social marketing approach. *Journal of Marketing Management, 28*, 469-493.
- Thomas, C., & Sharp, V. (2013). Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: A review of social norms and recycling. *Resources, Conservation and Recycling, 79*, 11-20.
- Thomson, M. & Chigaru, T. (2010). Financial savings through environmental changes. *Journal of Renal Nursing, 2*, 285-288.
- Thøgersen, J. (1994). A model of recycling behaviour, with evidence from Danish source separation programmes. *International Journal of Research in Marketing, 11*(2), 145-163.

- Thøgersen, J. & Ölander, F. (2003). Spillover of environment-friendly consumer behaviour. *Journal of Environmental Psychology*, 23, 225–236.
- Timlett, R. E., & Williams, I. D. (2008). Public participation and recycling performance in England: A comparison of tools for behaviour change. *Resources, Conservation and Recycling*, 52(4), 622-634.
- Tudor T, Barr S & Gilg A (2007). Linking Intended Behaviour and Actions: A case study of healthcare waste management in the Cornwall NHS. *Resources, Conservation and Recycling* 51, 1–23.
- Vicente, P., & Reis, E. (2008). Factors influencing households' participation in recycling. *Waste Management & Research*, 26(2), 140-146.
- Vicente-Molina, M. A., Fernández-Sáinz, A., & Izagirre-Olaizola, J. (2013). Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *Journal of Cleaner Production*, 61, 130-138.
- Vining, J., & Ebreo, A. (1990). What makes a recycler? A comparison of recyclers and nonrecyclers. *Environment and behavior*, 22(1), 55-73.
- Waste Online (2004). Waste at work information sheet:
www.wasteonline.org.uk/resources/InformationSheets/WasteAtWork.htm (accessed November, 2015).
- Waste (Scotland) Regulations (2012).
http://www.legislation.gov.uk/sdsi/2012/9780111016657/pdfs/sdsi_9780111016657_en.pdf (accessed January, 2014).

Waste (England and Wales) (Amendment) Regulations (2014).

http://www.legislation.gov.uk/uksi/2014/656/pdfs/uksi_20140656_en.pdf (accessed February 5, 2015).

Whitman, D. S., Van Rooy, D. L., & Viswesvaran, C. (2010). Satisfaction, citizenship behaviors, and performance in work units: A meta-analysis of collective construct relations. *Personnel psychology*, 63(1), 41-81.

Willman, K. W. (2015). Information sharing and curbside recycling: A pilot study to evaluate the value of door-to-door distribution of informational literature. *Resources, Conservation and Recycling*, 104, 162-171.

Young, W., Davis, M., McNeill, I. M., Malhotra, B., Russell, S., Unsworth, K., & Clegg, C. W. (2015). Changing behaviour: successful environmental programmes in the workplace. *Business Strategy and the Environment*, 24(8), 689-703.

Zero Waste Scotland (2012). The Composition of Mixed Waste from Scottish Health and Social Care, Education, Motor, Wholesale and Retail Sectors in 2011, Zero Waste Scotland: Stirling.