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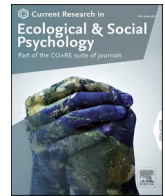
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Promoting the transfer of pro-environmental behaviours between home and workplaces

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ABSTRACT

Promoting individual lifestyle changes towards pro-environmental behaviours (PEBs) has been one of the key strategies for tackling the climate crisis adopted by governments. Messaging to promote PEBs has been used in different contexts – most notably home and workplace settings; however, the message phrasing, opportunities, and motivations for adopting these behaviours can differ between locations. In this study, from a sample of working people, we investigate the sources and themes of PEB messages they remember. We then classify these based on their underlying motivations (egoistic, altruistic or biospheric). We compare these messaging prompts to those PEBs actually tried by participants and the factors leading to their successful or failed adoptions related to institutional or societal norms. Finally we explore what motivates and supports the transfer of adopted contextual PEBs between home and work. Our results highlight that messaging triggering a diversity of motivations may lead to the greatest adoption rates. For transfer of actions to be successful between contexts, both infrastructure and behavioural norms need to receive support for PEB changes to become habitual and ubiquitous.

Introduction

Globally there is an increasing focus on promoting sustainable lifestyles in order to tackle a range of environmental challenges including climate change, local pollution and resource scarcity (UNEP, 2011), and to transition societies to live within planetary boundaries (Rockström et al., 2009). The United Nations sustainable development goal (SDG) targets include increasing awareness of how lifestyles affect natural environments and reflecting how personal behaviours have become an issue of global concern. SDG12 on sustainable consumption and production includes calls to reduce waste and increase recycling and reuse. Across Europe, this neoliberal focus upon the role of individuals in solving environmental issues, as opposed to significant societal structural changes (Tom Hargreaves, 2011) through more sustainable lifestyles, has been largely concentrated on encouraging the adoption of pro-environmental behaviours (PEBs) (Darnton et al., 2006). In this paper we define this as actions of individuals to minimize their negative impact on the natural and built world (e.g., minimize resource and energy consumption and reduce use of non-toxic substances and food waste) (Kollmuss and Agyeman, 2002).

Increasingly, more people are demonstrating understanding of the planet's environmental crises and support for the protection of nature and the conservation of resources (a recent UK example was the outcry over plastic waste (Press Association, 2018) and the campaigns against sewage dumping (e.g., 38 Degrees 'Stop dumping raw sewage into our seas and waterways' petition). However, many fail to make choices that minimize negative environmental impacts due to the so-called value-action gap (Barr et al., 2011) where, despite knowing the impacts, people behave in a way contradictory to their knowledge or beliefs. Different sources of information, such as government campaigns, media, and informal conversations try to influence individuals' PEB and which sustainable actions to undertake. However, as Dolan et al. (2012) highlight, some PEB communicators are more trusted than others, which has implications on which messages have salience to individuals in relation to their actions and may vary by setting (workplace versus household).

PEBs that can be undertaken by individuals can have effects at different scales. This can range from hyper local actions within households, such as reducing or composting food waste, to those affecting global activities, such as individual consumption changes that

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collectively across many individuals influence industries and supply chains (e.g. the rise of vegan diets).

Power dynamics influence on the transferability of PEB praxis

Improving our understanding of how patterns of behaviour are translated between different contexts (Barr et al., al.,2011) and along processes (work and home; or shopping to cooking) could streamline the delivery and uptake of positive environmental actions (Nye and Hargreaves, 2009). Davis and Challenger (2013, p.7) report “there is little work that has empirically explored whether an individual’s willingness to engage in environmentally sustainable action at home influences participation at work, or vice- versa, in particular, whether the domains exert a positive or negative effect on one another”.

Studies to date have only presented a somewhat limited insight into what factors may influence the adoption and transferability of PEB from different settings (e.g. from work to home). Factors may be external and contextual (Dolnicar et al., 2017), as well as internal or individual (Kollmuss and Agyeman, 2002; Everard et al., 2016). Key influences identified have included required financial investment and restricting time constraints through to different value and belief systems (Halpenny, 2010).

In the workplace, influencing factors on behavioural norms are primarily a result of the direction and working policies of employers or managers, with relatively less agency for employees than they have in their own homes. Thøgersen (2008) reasons that this power dimension of PEB is directly related to the reinforcement of descriptive norms through societal (intra-household or intra-workplace) triggers, which is connected to the level of control that an individual has over their decisions and resource allocation. This relates to social cognitive theory on attitudes that describes beliefs about what most people do in a particular situation as descriptive norms and beliefs about what others expect one to do, or what constitutes moral conduct, as injunctive norms (Thøgersen, 2008; Huber et al., 2018).

Actions of individuals within the home or workplace can either support PEB or potentially, due to different attitudes or belief norms, conflict with it. For the individual, the scenario can be very different between the two settings, as the influencing factors can be quite distinct. Recent evidence indicates that there are clear differences in PEB motivations between home and workplace that limit transferability of behaviour (Blok et al., 2015). These can be influenced by book-keeping effects where individuals keep a mental log of actions. Feeling they have already contributed to protecting the environment can reduce the uptake of secondary related PEBs (Chatelain et al., 2018) potentially undermining efforts to daisy-chain (connect complementary actions together) or reinforce actions moving from one context to another. It is important to manage the differences between work and home (Kreiner, 2006) behaviours due to the stress that may be caused to the individual as a result of having to continuously switch between different norms in different contexts - attributed to cognitive dissonance.

Motivations and degrees of self-determination to undertake PEBs

For policy makers, their goal and challenge are to promote PEBs more universally so that they become routine and ‘taken for granted’ (Tom Hargreaves, 2011, Morren and Grinstein, 2016). Recent research (Punzo et al., 2019) highlighted that this entails making PEBs easy and convenient even when they provide little tangible benefit to the individual. According to Quedsted and Luzecka (2014) PEBs exhibit many altruistic elements but can also include behaviour that can be viewed as being motivated by a mixture of self-interest (e.g., activities minimising one’s own health risk), alongside concerns for other people (including the next generation) or other species (e.g., reducing air pollution affecting other species’ health). In their Framework of Motivations, Stern (2000) highlights the relationship between human environmental values and behavioural actions, identifying egoistic, altruistic and

biospheric motivations. Egoistic values focus on actions that benefit the self, e.g., buying the cheapest option that happens to benefit the environment; altruistic values promote behaviour that benefits others, e.g., buying lower polluting products to improve others’ health; and finally, biospheric values relate to beliefs on the need to protect the environment (De Groot and Steg, 2010). A complementary framing of motivations focuses upon the degree of self-determination. This ranges in a continuum from extremes of motivation where a person feels incompetent or lacking control with no sense of purpose or accompanying reward; through to intrinsic where a PEB becomes part of one’s self-identity and has been found to be interesting or enjoyable to perform (De Groot and Steg, 2010). Research has highlighted that people having greater sense of self-determination results in more PEB actions being undertaken (Pelletier et al., 1998).

Social context influence on the adoption of PEBs

Alongside these individual motivations it is increasingly recognised that our social networks and contacts can also have significant influence on our PEBs (Christakis and Fowler, 2009). This can also be one of the key distinguishing factors between the home and work setting and the reason why a single individual can have two different behavioural profiles.

Anywhere where people come together can result in collective learning over PEBs, described in social cognitive theory as a ‘community of practice’ (CoP) (Wenger-Trayner and Wenger-Trayner, 2015). This relates to social cognitive theory on attitudes that describe beliefs about what most people do in a particular situation as *descriptive norms* and beliefs about what others expect one to do, or what constitutes moral conduct, as *injunctive norms* (Thøgersen, 2008; Huber et al., 2018).

In CoP, a social *injunctive norm* constitutes practices that are promoted or dissuaded in a particular setting (e.g. work or home). In a workplace these are often reflected in the monitoring information gathered about organisational impact. For example, if waste, energy use or CO₂ emissions are monitored or focussed upon within organisational strategies this implies those are the behaviours staff members should undertake. Similarly in a household monitoring energy consumption via Smart Meters relates to promoting saving behaviours. In a household setting members often share norms and attitudes that support PEB praxis although different individuals may vary in their knowledge and actions linked to their *descriptive norms*. Similarly, whilst they may not always have homogenous beliefs, a workplace-based community can often develop a common understanding of why, what and how they participate in shared practices of PEB (Parkhill et al., 2015) to ideally connect their employers’ *injunctive* prompts to the employees *descriptive* norms.

This paper contributes to the gap in the empirical evidence base by reporting upon the results from a creative co-investigation of PEB transference between home and workplace settings. We used the complementary theoretical lenses of Stern’s (2000) framework of motivations and Thøgersen (2008) social cognitive theory to analyse the drivers and barriers that supported or inhibited the exchange of behaviours between settings.

Methods

Individuals undertake some PEB actions consciously and deliberately, and others automatically in an almost unconscious way. Partly as a solution to the overwhelming volume of information we experience during our everyday lives, the mind uses several short-cuts and heuristics for storing and retrieving knowledge (Tversky and Kahneman, 1974). This is highly relevant to the identification of PEBs that cross this conscious-automatic action continuum. As a result, questionnaires or interviews may not be the best way to reliably access human memory of behaviour. Instead, to more fully understand PEB, less intrusive methods may be useful to capture the general pattern of human behaviour (and the transfer of actions between settings). This research tests a range of

alternative methods to test their efficacy in investigating PEBs in more creative and engaging ways.

Recruitment strategy

To address the topic of PEB transfer between home and work settings, and pilot the use of the creative engagement methods, we set up a purposive sampling framework based upon recruiting people with different levels of personal environmental awareness, and who were working for different employers likely to have a variety of sustainability policies. Participants were recruited in two case study cities (York and Dundee) through existing connections to key organisations (where we had workplace contacts), and social networks. Recruitment was then expanded via snowballing of participants where selected individuals were asked to recommend others fitting the inclusion criteria. We recruited only working aged people in employment to investigate these home/work behaviour dynamics. In total we recruited 54 participants (43% of whom were men) from a range of sectors and organisational sizes that were likely to have differing levels of policies aimed at influencing employee’s workplace environmental behaviours through encouraged or imposed injunctive norms (see Table 1). For comparative (and dissemination) purposes we also included participants from the city councils in both York and Dundee. These people were asked about their personal actions and knowledge of the Councils workplace PEB policies rather than representing their institutions viewpoint.

Methodology

To explore individuals’ behaviours in different settings we first gathered baseline information through participatory diagramming and then deployed research packs with cultural probes to gather longitudinal data about PEBs. Participatory diagramming encourages respondents to deconstruct or reconstruct the meaning and structure of their lives, and to convey this meaning and structure to others (Kesby, 2000; Jackson, 2012). Diagrams have proved to be a useful approach for developing semantic-level communication facilitating shared group understanding (Ohiwa et al., 1997). To identify which activities participants associated with PEB and which messengers were encouraging these actions we undertook affinity diagramming. Affinity diagrams are used to organize thoughts into useful categories helping transform data into useful and usable information (Cheng and Leu, 2011). The initial identification of messages was undertaken individually to try and reduce ‘group think’ (where individuals excessively influence one another) and normative pressures. The collective pool of messages was then sorted collectively by messenger and theme. This information was used to identify the salience of messages for our participants.

To identify which PEB actions our participants were already undertaking in different locations and the transferability of actions between settings we utilised Venn (or Matrix) diagrams that were annotated by participants using additional stickers or drawing to create a free-flow diagram (see Fig. 1).

To further investigate the issues longitudinally and encourage further reflections, participants were invited to take a research pack,

Table 1
Breakdown of project participant numbers by location and employment sector.

Sector	Workplace PEB	York	Dundee	Total	%
Charity	High	1	0	1	2%
Healthcare	High	1	0	1	2%
(Higher) Education	High	6	5	11	21%
IT Services	Medium	8	0	8	15%
Local Council	Very High	6	10	16	30%
Professional Services	Medium	3	4	7	13%
Retail	Medium	1	0	1	2%
Self Employed	Low	3	6	9	17%
		29	25	54	100%

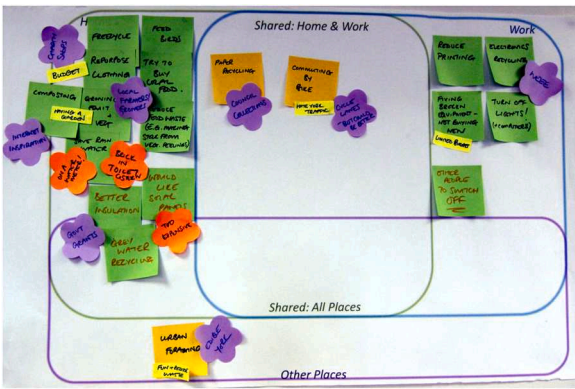


Fig. 1. Example Venn diagram annotated to create a free-flow visualisation.

consisting of a cultural probe kit. Cultural Probe approaches were originally conceived as a creative way of identifying and including local expertise and ideas as part of the design process (Gaver et al., 1999, 2004; Boehner and Vertesi, 2007; Matthews and Horst, 2008). They have been used to stimulate deep engagement in a topic through the use of creative activities or questions. The probe packs shown in Fig. 2 contained a mixture of items whose rationale is explained in Fig. 3. Participants were given tasks to complete over the course of a two-week period (although some material was returned and analysed after this deadline).

Analysis

The Affinity Diagrams information was compiled into Excel sheets, classified by the source of the information (employer, national government, local government or other). The exact comments on the participant’s ‘post-it’s’ were themed into topics that had emerged from the group discussions. Within each PEB theme the range of unique behaviour change actions was recorded. This data identified how flexible PEB changes are within that theme. Greater flexibility might enable a wider range of people to take up options and adopt them in a variety of places. To assess the motivations that might lead to an action being transferred between contexts, behaviour actions within PEB themes (e.g., Energy Saving or Recycling) have been classified into Egoistic, Altruistic or Biospheric drivers using Stern’s (2000) typology. The number of participants mentioning each type of motivation was recorded to identify the relative strength of specific drivers.

The Venn diagram findings were converted into count data of the number and overlap of action in MS Excel and visualised (using euler-diagrams.org). The motivations and barriers that had been highlighted during the free-flow activity were also converted into counts (either by number of mentions or number of participants including that element).



Fig. 2. Cultural Probe kit elements (daily diaries – left; photo message prompts – right).

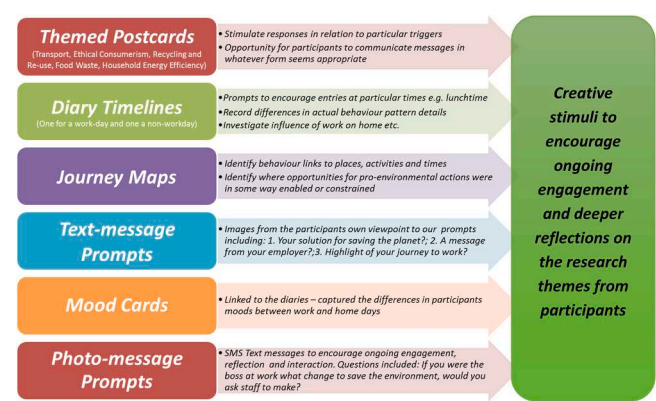


Fig. 3. Rationale and intention for Cultural Probe kit elements.

The open source Gephi software was used to represent these as networks. In social network mapping terminology (Hanneman and Riddle, 2005), activities became nodes and the connections or links between them were included as edges. Other material from the probe kits including SMS messages and photos, diagrams and postcard text were analysed for content related to our research themes and added into the baseline data of actions being undertaken by participants from the Venn data. Looking at the information participants supplied on their Venn diagrams and their probe responses the behavioural norms encouraging or discouraging the uptake of PEBs they described have been subjectively classified by the researchers into the type they embodied after Thøgersen (2008) as descriptive or injunctive norms.

Finally, to evaluate whether behaviours are unique to home or workplace settings or have transitioned between the two the locations of undertaken PEBs was assessed from the participants Venn and probe responses. Information on whether the PEB messaging that had led to the adoption of that behaviour emanated from work or home was used to identify actions that had successfully transitioned between the two settings. Any barriers that were preventing the transitioning of behaviours from the participant data was noted. Visualisations of these findings were produced identifying the overlap of PEB actions between work and home settings.

Results

Participants and their self-identified definitions of PEB

In 2014, 54 participants were recruited (30 of whom were women and 24 men) from a wide range of business sectors (Table 1). Through the affinity diagrams process participants reported a diversity in the range and number of environmental policies and practices they were aware of in their workplace. This personal remembrance has been used to rate the relative strength of PEB messaging emanating from their workplaces post workshop. This strength of messaging has been used to infer a range of potential behaviours transference from workplace to home amongst our participants.

The affinity diagrams identified the range of concepts on what constituted a PEB according to our participants (see Fig. 4). These included overarching activities to ‘save the planet’, to reducing personal environmental impacts through to reduced resource consumption. The smallest number of remembered reported messages were identified as being received from National Government (55 messages, 21% of sample); followed by Employers (58, 22%); Local Government (71, 27%). Collectively all other sources (78, 30%) were counted as the highest and included a range of media but particularly television, radio, and newspapers.

Fig. 4 indicates that employers are primarily promoting Sustainable Transport, Energy Saving, Waste Management and Recycling. These themes and related PEB messaging were also consistently coming from a cross-section of other sources. This reinforcement implies these behaviours should have been the ones most likely to be adopted by participants and also present in both home and work settings.

Within each PEB theme a mix of unique individually promoted actions were identified by participants. The highest number of unique PEB action options were related to Sustainable Transport and Energy Saving (see Fig. 5). Having this broader range of different behaviour change options should have enabled a wider level of uptake of PEB in these thematic areas. For example, workplaces giving employees a choice between car sharing, bus passes and bike purchase subsidies should enable more people to adopt an action within this PEB theme. Other themes with a large variety of potential actions (Waste Management and Conservation) were primarily only being promoted by governmental and other sources but not by employers. This implies that these actions were targeted at domestic behaviour changes and would be less likely to be adopted as workplace norms unless they were transferred by employees from home.

Assessing whether the motivations to adopt PEB messages might lead

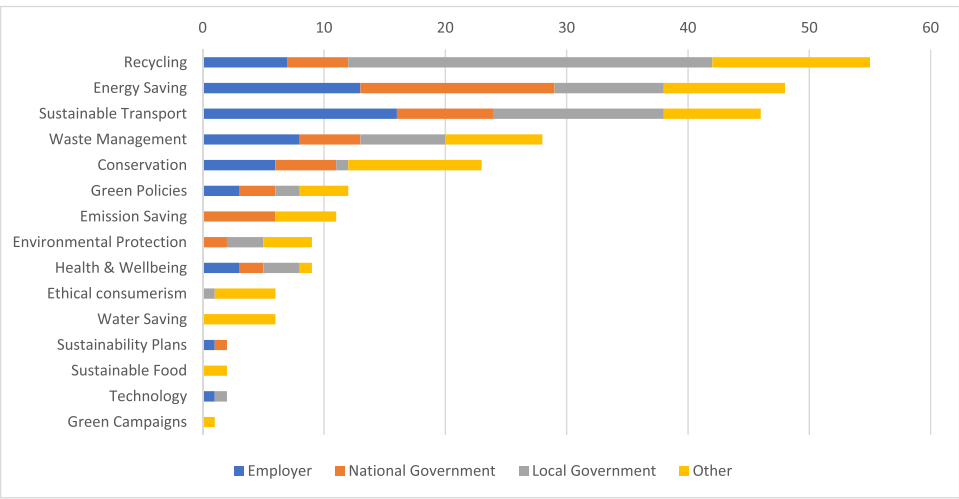


Fig. 4. Number of mentions of differing PEB themes by messaging source. Note: Participants were allowed to mention the same theme being delivered from different sources e.g., energy saving from National Government and Employer. This data represents the total count of all mentions.

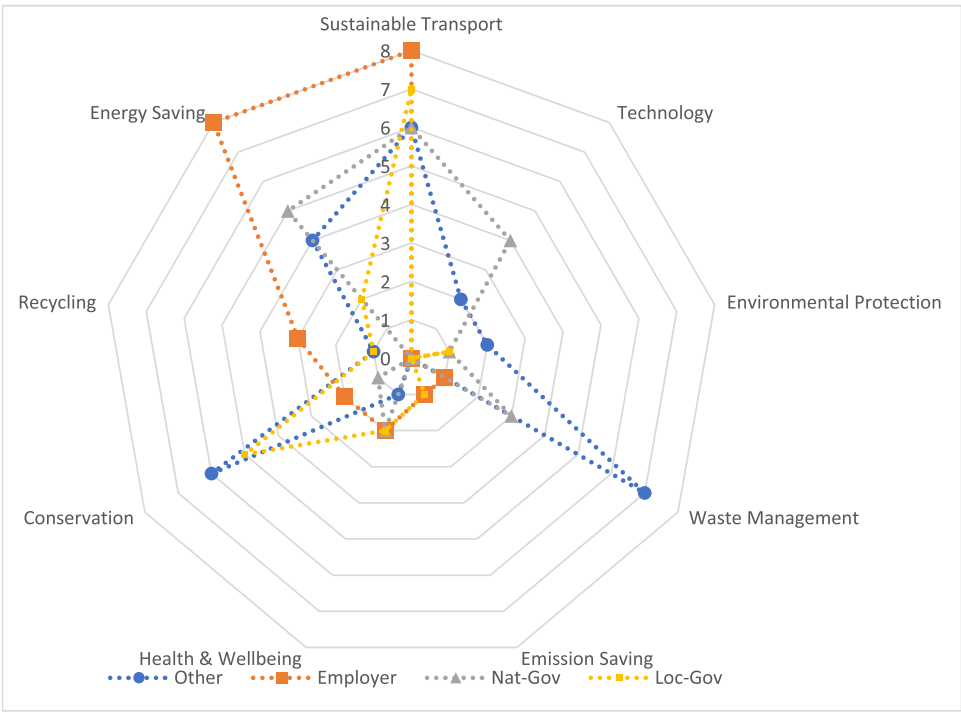


Fig. 5. Number of unique ideas by theme and messaging source (note ideas were unique within that source but overlap between themes e.g., Cycle to work scheme messaging is attributed to both the Employer and National Government) [Note: only themes with more than one source for unique ideas are included].

to them being transferred between home, work and other settings reveals a complex picture (see [table 2](#)) with different drivers being linked to these two contexts. The largest number of remembered messages (40%) referred to altruistic motivations. These included undertaking recycling to reduce pollution, donating unwanted items to charity for reuse, or reducing emissions to help with global warming. 32% of messages used biospheric motivations linked to saving the environment

with participants strongly remembering conservation, environmental protection and recycling drivers. Egoistic motivation messages (linked to personal gain or self-interest) were used in a minority of messages (27.5%) but were remembered strongly by participants indicating their salience. Egoistic messages were strongly connected to the PEB themes of energy saving, sustainable transport and recycling which can all be linked to money saving either through direct economic benefits or

Table 2
Motivations for action underpinning PEBs from Employers vs All other messaging sources combined . [Note: Bold asterisks are for themes with 10 or more mentions by different participants (see [figure 1](#))].

Motivations	Egoistic		Altruistic		Biospheric	
	Employer	Combined Sources	Employer	Combined Sources	Employer	Combined Sources
Conservation			*	*	*	*
Emission Saving		*		*	*	*
Energy Saving	*	*	*			
Environmental Protection				*		*
Ethical Consumerism				*		*
Green Campaigns				*		
Green Policies		*	*	*	*	*
Health & Wellbeing	*	*	*	*		
Recycling		*	*	*	*	*
Sustainability Plans			*	*	*	*
Sustainable Food						*
Sustainable Transport	*	*	*	*		
Technology		*	*	*		
Waste Management		*	*	*	*	*
Water Saving			*	*	*	

indirect reduced household taxation costs.

When looking at the sources of messages, employers typically more strongly promoted altruistic and biospheric messages. This may be related to the recognition that there was little direct tangible personal gain for individual employees from helping their company to reduce consumption or recycle. The exception to this was in the areas of Energy Saving and Sustainable Transport where employers messaging was connected to actions aimed at directly benefiting individuals (mainly psychologically through green awards or highlighting their contribution to electricity saving for example). Conversely, local and national government campaigns more commonly promoted egoist benefits across a range of actions. These were aimed at personal economic benefit linked to reducing household expenditure (on energy, transport etc.).

Participants' PEB activities, barriers, motivations

Investigating the actual behaviour undertaken by participants through the individual Venn diagrams and longitudinal cultural probe kits revealed the influence of the PEB messaging on their actual actions (see Fig. 6). Most participants mentioned they were motivated to perform actions saving them money (factors (f) = 43; no. of participants mentioning (n) = 19) linked to Egoistic benefits.

Availability of supporting infrastructure was the main enabling factor identified by participants (f = 19; n = 13). Factors supporting the adoption of PEBs were when they became habits (f = 7; n = 5) and being forced to by local or national government or their employers (f = 5; n = 5). To be successful participants highlighted how policies needed to be supported by the physical availability of infrastructure for norms to develop and for a PEB to become habitual. For example, frequent recycling bins or suitable waste management facilities in the office were required to establish these behaviours in workplace settings and for them to be normalised amongst staff members.

The largest benefits identified promoting the undertaking of PEBs were related to personal health and wellbeing gains (f = 24; n = 15) which deliver Egoistic benefits. Arguments were made by participants that health and wellbeing gains were also Altruistic as they would lead to less demands on healthcare providers freeing these services for others and result in less sick days from work. Benefiting the environment combined with protecting wildlife was the third most common driver for taking up PEBs (f = 34; n = 16) linked to biospheric motivations. Connecting across the three motivation drivers (Egoistic, Altruistic and Biospheric) were family upbringing (f = 9; n = 7) and protecting things for the next generation (f = 4; n = 4).

The main barrier to change was excessive cost of pro-environmental options (f = 14; n = 9). More weakly, there was also a lack of trust in the messaging being received (f = 4; n = 3). This was preventing adoption of larger PEB supporting investments such as installing domestic solar

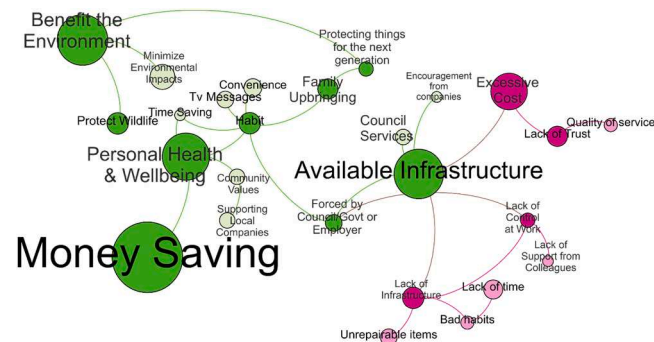


Fig. 6. Network of enabling or encouraging factors (Green) or disabling barriers (Purple). Note: Size of nodes indicates the frequency of their occurrence on the combined data from Venn diagrams and probe pack responses; Unique factors identified through the probes are shown in pale colours; Connections are based on the links shown on the Venn and in the probe responses.

panels or fitting energy efficient boilers related to cynicism as to whether the financial savings on eco-products would match the promoted figures. There was also a degree of confusion on what the best course of action was. For example, was there an overall environmental benefit in replacing an existing working item with a more energy efficient version or was it better to reduce consumption and maintain current items for longer? People also mentioned the issue of many consumer items being largely unrepairable, which related to how waste was being generated linked to encouragement for repeat consumption that in some cases was embedded within the supply chain of products.

Specific workplace related barriers to undertaking PEBs emerged linked to a lack of control at work (f = 3; n = 3) and a lack of support from colleagues (f = 1; n = 1). These were described in relation to the added time it took to undertake some PEB activities which was connected to the lack of availability of infrastructure. Participants also mentioned they felt unable to influence their companies' culture, which was blocking the transfer or adoption of PEBs.

Considering the belief norms underpinning the undertaking of PEBs; most (n = 12; 57%) encouraging norms were identified as representing injunctive dimensions (see table 3). These included actions dictated by employers or government policies such as waste management approaches, but also those activities that were biospheric or altruistic in nature which were undertaken because participants felt that it was what others expected them to do. Three behaviours (Benefiting the Environment; Community Values; and Minimizing Environmental Impacts) combined both descriptive (what most people do) and injunctive (what others expect you to do) drivers. Discouraging drivers were more strongly linked to injunctive norms, related to fears of sanctions and beliefs around what others thought was appropriate, which in turn influenced actions particularly in the workplace.

Transferability of PEB activities

We also considered whether behaviours are unique to home or work settings or have transitioned between these two places. On average our participants indicated they were undertaking nineteen distinct PEB activities at the time of our focus groups. The overlap and uniqueness of behaviours in different settings is represented in Fig. 7.

The data indicates that approximately four PEBs were shared between workplace and home settings. Completely 'Shared' (dark green) PEB that were undertaken across all contexts by that individual

Table 3
Classification of PEB factors norms (after Thøgersen (2008)). Note items in bold have both injunctive and descriptive dimensions.

	Discouraging	Encouraging
Descriptive	Bad Habits Lack of Time Lack of Trust Unreparable Items	Benefit the Environment Community Values Convenience Family Upbringing Habit Minimize Environmental Impacts Money Saving Personal Health and Wellbeing Time Saving Available Infrastructure Benefit the Environment Community Values Council Services Encouragement from Companies Forced by Council/Govt or Employer Minimize Environmental Impacts Protect Wildlife Protecting things for the next generation Quality of service Supporting Local Companies Tv Messages
Injunctive	Excessive Cost Lack of Control at Work Lack of Infrastructure Lack of Support from Colleagues Quality of Service TV Messages Unreparable Items	

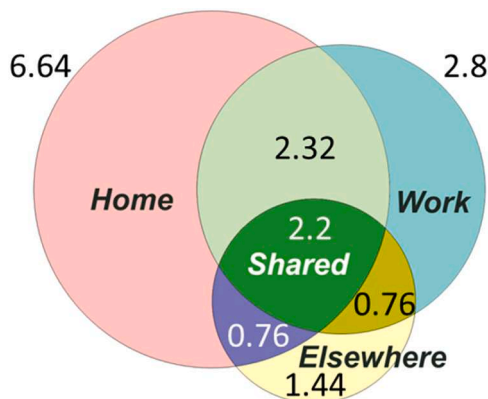


Fig. 7. Venn diagram indicating the overlap of behaviours between contexts. Numbers indicated the average number of PEBs in each context across all participants [Total home = 11.16; Work = 7.32; Other = 3.64].

represented environmental behaviour that appeared to have stuck to the person – not to a place – and become a personal norm or habit.

These results indicate that we have a spectrum of PEB activities across our participants. On the extremes we have people for whom undertaking PEBs has become an embedded habit where they act consistently across all contexts (home, work and other) (Fig. 8 left & middle). Alongside these extremes were people who shared some home and work PEBs but also undertook unique actions in specific settings (outside of work or home) (Fig. 8 right).

The nuances in PEBs are the number of actions shared across settings with typically more PEBs adopted domestically and then shared with work. This may be due to the differing affordances of these settings linked to infrastructure or incentives and behavioural norms. Reflecting on what enabled the transferability of activities from one context to another, participants commented on a lack of control that prevented them undertaking some of the actions they performed at home, for example, turning down the heating to save energy and money to other settings including work. The absence of support, both from colleagues, but also managers, appeared to be a significant barrier to employees transferring more of the actions and behaviours they undertook at home.

Some indications suggested that with sufficient coherent and consistent support in both home and workplaces, it was feasible for PEBs to become consistent habits that participants implemented everywhere. Sustainable travel was the third most consistent PEB identified by participants with complementary messages coming from all sources (national and local government, employers, and other sources) (see Fig. 4). Fig. 9 illustrates that many participants used cycling as a transport for work commuting and to reach other destinations indicating this was

already a habit. (Fig. 9 Panel A). However, for some the behaviour was instigated by promotion at the workplace and transferred back to the home context (Fig 9. Panel B). The enabling factors identified supporting uptake and long-term adoption of this PEB were primarily related to schemes supporting discounted cycle purchase via employers but relied significantly upon the provision of safe cycling routes connected to the appeal of this transport mode to beat traffic congestion leading to it becoming a habit (Panel C). This example indicated that for our participants the messaging promoting behaviours needed to be reinforced with cues indicating this was a common or supported activity linking back to the concepts of injunctive (safe cycling routes and cycle purchase schemes indicate it is a typical behaviour) and descriptive (infrastructure provision indicates lots of people cycle) norms.

In summary these results indicated the research participants undertook many different PEB activities, motivated by a wide variety of different reasons, but mainly to save money (an egoistic driver) and benefit the environment (biospheric). Available infrastructure was a key enabling condition, which when lacking undermined the uptake or transferability of activities between contexts. This research shows that for the participants in this study on average PEBs were associated with a place (home, work, other) more so than with the person with unique behaviours undertaken in different settings. People undertook more actions at home, although a substantial number of activities were undertaken in more than one context, with some becoming habits.

Discussion

Our study highlights some key findings in terms of the potential of transference of PEBs between work and home settings. Some messages on key PEB themes (e.g., recycling, energy saving and sustainable transport) were being received from multiple sources (including national and local governments, and employers) reinforcing these messages across contexts. This consistency and reinforcement of messaging strengthened the potential for these PEBs to transfer. Considering the variety of remembered messaging from different sources also highlighted that for some PEB themes a mixture of actions were being promoted.

Our findings indicate that promoting PEBs through a greater diversity of actions and motivations may help support their adoption by a wider range of participants and their transference. This is particularly the case where different motivations and behavioural norms may influence actions. At home, personal financial gain strongly (egoistically) motivated adoptions whereas at work promoting actions for altruistic or biospheric reasons was more common. Conversely, for some PEBs a limited range of actions was promoted (e.g., recycling), however, this simplicity and consistency of messaging appeared to help improve these behaviours becoming habitual across settings. This was reinforced by a broader range of motivations supporting egoistic, altruistic and

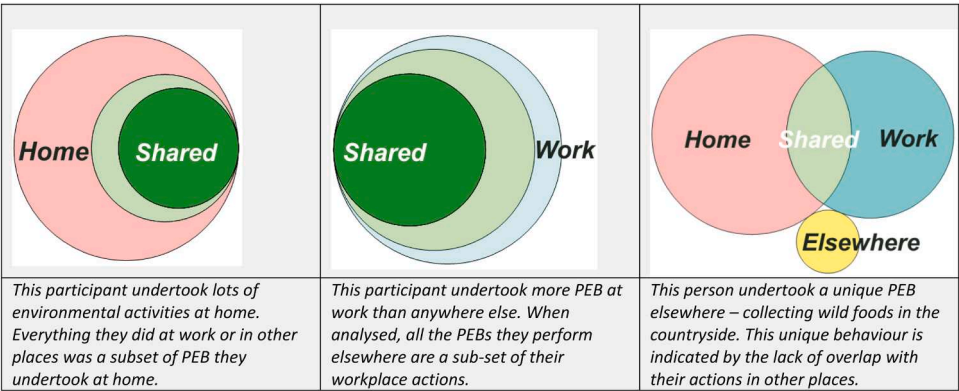


Fig. 8. Unique patterns of individual behaviour revealed by our Venn diagram. The original diagram can be seen at top. [Note symbols were randomly assigned by participants on their diagrams and were not consistent].

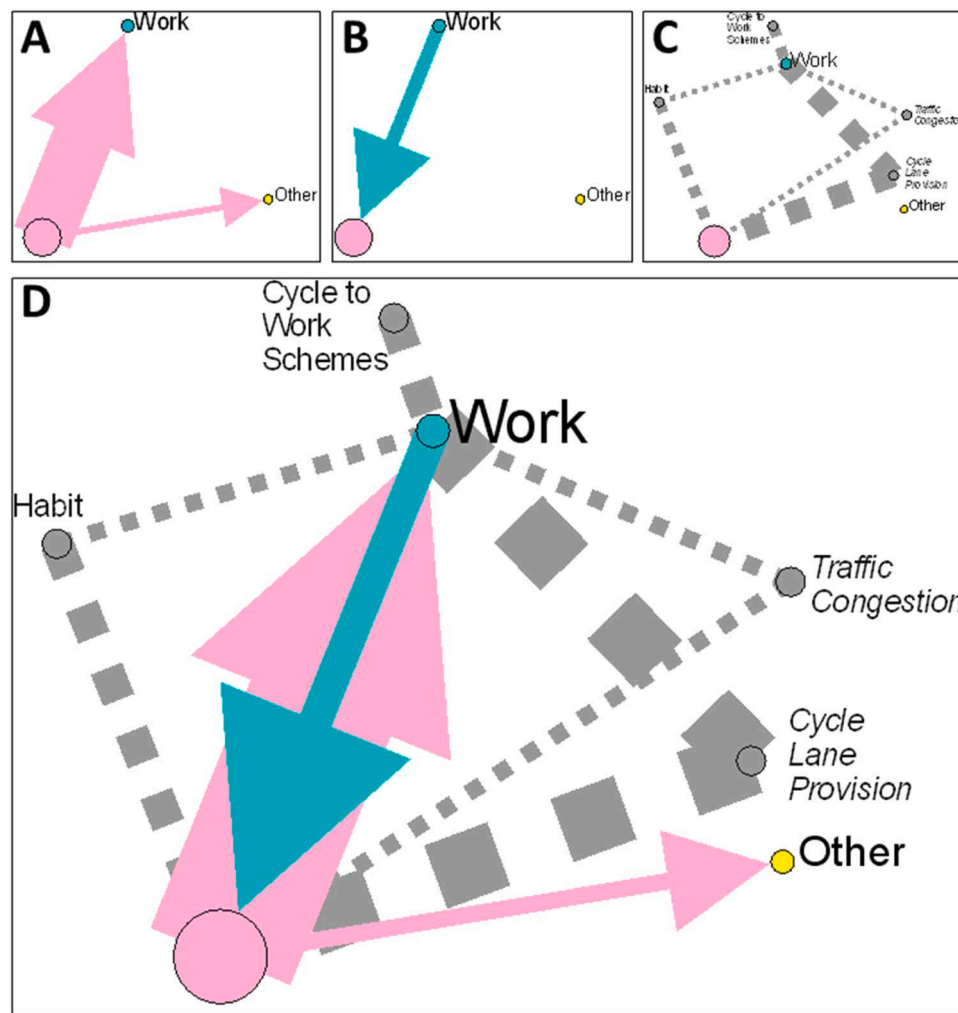


Fig. 9. Strength of transferability of cycling between work and home environments. Panel A shows the transfer of behaviour from home to work (arrow width indicates the number participants mentioning transfer). Panel B is transfer from work to home. Panel C are additional enabling factors. Panel D is the full model of work-home behaviour transfer.

biospheric justifications. A diversity of drivers may trigger a wider cross section of people to adopt particular PEBs habitually. Our findings on the normative factors highlighted that injunctive workplace norms (what employers expected their staff to do) may inhibit the transference of PEBs from home linked to a lack of employees influence over workplace policies. To be successful, our results indicate workplace PEB adoption or home transference needs to include both the presence of suitable infrastructure combined with strong promotion from management to influence the workplace culture leading to support from colleagues. These findings also identified that biospheric concerns around benefiting the environment straddled both descriptive and injunctive normative dimensions indicating that PEB campaigns could utilise these motivations more strongly in their messaging to good effect.

Study implications

These findings illustrate two complementary pathways for linking and reinforcing PEB change in work and home settings. Firstly, some messages and actions had been promoted universally at the individual, household, and workplace level, boosting their remembrance and salience. For example, all participants had taken on-board materials recycling and performed this action everywhere. This finding appears to indicate that mental spillover effects that mitigate against performing linked PEBs (Chatelain et al., 2018) could be offset when actions are undertaken in different settings. This would indicate that changing

location makes the action sufficiently different for individuals to be considered a dissimilar behaviour in their mental accounting. Enabling infrastructure is a critical factor in enabling these universal actions making them easy and straightforward across locations. For example, if there were no obvious recycling bins at work our participants indicated that they did not undertake this action even if they thought this was the behavioural norm. More importantly some of our results indicated that there was a willingness to translate and undertake behaviours encouraged and learnt in one setting to another. Linked to the need to make PEBs distinct to overcome issues of mental accounting our findings support other evidence (Michie et al., 2014; Halpern, 2015) that targeting only financial gain to stimulate pro-environmental actions may not be the most efficient entry point to encourage behaviour transfer between settings. Instead focussing messaging on other factors such as protecting environmental assets (biospheric concerns) for future generations (altruistic) may encourage people to maintain or adopt behaviours in a wider range of locations.

These pathways and enabling factors supporting the development of behavioural norms that lead to PEB transfer between contexts are presented theoretically in the diagram below (Fig. 10.).

Since the original data presented here was collected (in 2014) a variety of national PEB campaigns (also including local promotion when appropriate) have been launched in the UK. These included efforts to promote household energy saving through behaviour changes, switching providers (Citizens Advice Bureau, 2022) and green homes grants

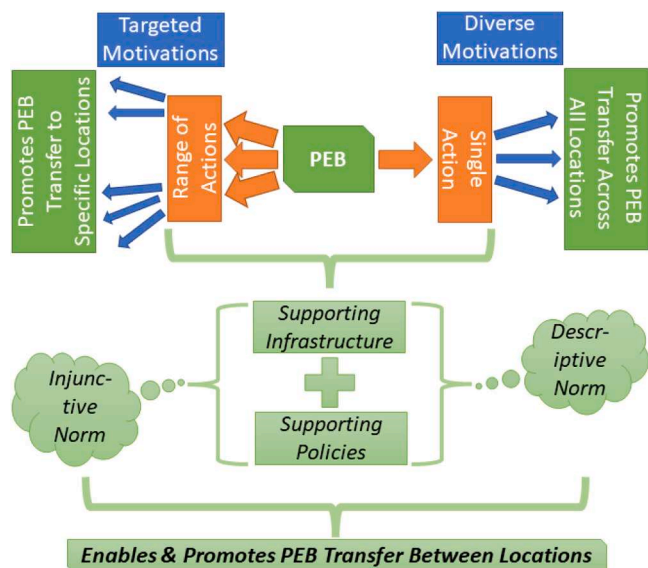


Fig. 10. Visualisation of the successful causal pathways enabling and promoting the adoption and transfer of PEBs within and between home and workplace settings.

(Department for Business Energy and Industrial Strategy, 2021) to enable investments in insulation or energy efficiency improvements. These campaigns targeted reducing household bills as motivators tapping into purely egoistic drivers. One of the most lauded schemes were efforts to reduce single-use plastic bags that were promoted through biospheric motivations supported through the egoistic cost saving driver of a nominal tax on their use to nudge change (Halpern and Sanders, 2016). This intervention also resulted in spill-over effects adoption of plastic use reduction in other contexts including workplaces (Thomas et al., 2019). Personal electric vehicles have been promoted through tax incentives (home charger installation grants, vehicle tax exemption and vehicle purchase grants including for business use) (RAC, 2021). These primarily egoistic motivations again rely on cost savings for individuals and for business. Actions around food and diets show greater diversity in their messaging motivations. WRAPs 2021 'Food Waste Action Week' (WRAP, 2021) was promoted biospherically with slogans including "wasting food feeds climate change". These messages were supported by social media campaigns using celebrities and influencers attempting to make waste reduction a descriptive typically undertaken norm. Similarly, efforts to promote reductions in meat consumption have been promoted on biospheric grounds for individuals to contribute to addressing the climate crisis. This primary driver has been supported with egoistic motivations of the potential health benefits of such dietary changes including lower cholesterol and combatting weight gains. The Veganuary campaign has explicitly included a workplace challenge that encourages sharing a shift to plant-based diets with colleagues (Wood, 2022).

These campaigns indicate that PEB promotion was still largely centred upon egoistic drivers, however, the most successful that had succeeded in transitioning actions between home and work included greater diversity of messaging including biospheric elements (utilising the left-hand side of the Fig. 10 pathways). Varying the motivation designed to trigger the behaviour may make it appear distinct from actions taken in another location. The relative lack of control for employees over business finances and consequent absence of personal benefits represented a clear barrier for home PEB transfer into workplaces and supports moving beyond single egoistic motivation messages.

Study limitations

Our results highlight that longitudinal engagement research strategies can usefully tap into rich qualitative information identifying motivations and beliefs. They appeared popular with participants (based on the levels of returns in individual survey elements) however, the novelty of these time-consuming activities would likely diminish if used routinely. These approaches add significant value and depth to findings however, they are labour intensive and costly to deploy and analyse meaning that they are best used to identify knowledge gaps for further investigation better undertaken using more conventional survey tools.

Our findings were generated from a relatively small number of participants meaning all findings would benefit from further validation. Whilst we tried to determine the relative number of workplace PEB policies from the participant data this would be better if independently determined and could then form another dimension to the analysis. The pathways illustrated in Fig. 10 developed from our data require additional research to test whether the motivational norms behind messaging needs to be tailored to specific contexts with a variety of drivers reinforcing one another, or whether messaging with consistent drivers between contexts would be most effective. This is particularly relevant for home-work transference where egoistic benefits do not appear to be particularly appropriate due to different levels of individual agency between these settings.

Conclusion

Our findings highlight both the complexity of influences on behaviour in different settings and the opportunities to influence actions this represents. Our results provided evidence that behaviour can migrate between these contexts implying that positive actions can stick to the person (becoming a habit) rather than remaining where the actions were initially received. PEB activities taken up at home appear to have the most influence on participant's norms leading to their transfer to a work context. However, some workplace activities have influenced wider patterns of behaviour, e.g., sustainable transport and bike-to-work schemes.

Our study findings indicate that potentially there are positive feedbacks in the translation of behaviour between work-home and/or elsewhere. It does not appear that pro-environmental actions in one setting mitigate against actions in other places due to people already feeling they have 'done their bit'. Instead with suitable encouragement from policy, employers, and physical infrastructure it appears that once a behaviour became a norm in one context people would undertake that activity elsewhere. Without this support however participants indicated that most would instead adopt the institutional culture (injunctive norm) of the organisation.

Unfortunately, our data also revealed an underlying salience barrier with the perception that the motivations behind employers PEB messaging was always driven by business economic or reputational benefits. PEBs resulting in better workforce health or well-being benefited the employer through fewer sick days; PEBs linked to wildlife conservation campaigns provided marketing opportunities or tax breaks. This lack of trust in the message and the communicator both influenced PEB uptake and inhibited transfer of actions to other settings.

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Ethics & Informed Consent Statement

The project underwent ethical review processes at the University of York through the Environment and Geography Departmental procedure. The original informed consent form can be seen below.

Environmental Values

I have been made aware the project objectives and how the information I provide will be used.

I am aware that I can leave the meeting and project at any point – but that the information I have provided up to that point may still be used by the project team.

By agreeing to participate in the meeting I have consented to being recorded for project purposes.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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