Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours

Lorraine Whitmarsh[1,3] & Saffron O'Neill[2,3]

[1] School of Psychology, Cardiff University

Tower Building, Park Place, Cardiff CF10 3AT, UK

[2] Department of Resource Management and Geography, University of Melbourne, 221 Bouverie Street, VIC 3010, Australia

[3] Tyndall Centre for Climate Change Research, UK

Tel: +44 (0)2920 876972

Fax: +44 (0)2920 874858

E-mail: WhitmarshLE@cardiff.ac.uk

This is a pre-copy-editing, author-produced PDF of an article accepted for publication in a Special Issue of the *Journal of Environmental Psychology* on 'Identity, place and environmental behaviour', following peer review. The definitive publisher-authenticated version is available online at: 10.1016/j.jenvp.2010.01.003

Abstract

Policy-makers are interested in cost-effective and socially acceptable ways of encouraging the public to adopt more environmentally-friendly lifestyles. One area which UK policy-makers are focussing on is 'catalyst behaviour', the notion that taking up a new behaviour (such as recycling) may cause people to adopt other pro-environmental behaviours. Yet, evidence for such 'spill-over' effects is so far limited, and it is unclear when and how cross-situational motivations (e.g., pro-environmental identity) may predict behaviour and when contextual factors are more important. We report on a postal survey (N=551) of pro-environmental behaviours amongst the UK public. We assess the influence of pro-environmental self-identify on consistency across a range of behaviours. Pro-environmental values, perceived behavioural control, subjective norm, attitudes, and demographic factors were also measured. Findings show self-identity to be a significant behavioural determinant over and above Theory of Planned Behaviour variables for carbon offsetting behaviour. However, pro-environmental self-identity was only a significant predictor for certain other pro-environmental behaviours; background variables were also important predictors. Limitations, implications for theory and policy are discussed.

Keywords

Self-identity, pro-environmental behaviour, spill-over effects, theory of planned behaviour

1. Introduction

In recent years, the UK has positioned itself at the centre of international efforts to address climate change, setting an ambitious target of 80% reduction in greenhouse gas emissions by 2050 (HM Government, 2008). This level of response to climate change has profound implications for individual choices and behaviour. With over one-third of many nations' carbon emissions coming from private travel and domestic energy use (e.g., DEFRA, 2005), governments are recognising the urgent need to encourage individuals to adopt low-carbon lifestyles. Policies to achieve this have met with limited success: after decades of information campaigns and other (often economic) measures to encourage 'green' behaviours, the public is prepared to (and often does) recycle, but few take action beyond this (e.g., DEFRA, 2002, 2007; Whitmarsh, 2009). Travel habits remain particularly resistant to change (King, Dyball, Webster, Sharpe, Worley, DeWitt, Marsden, Harwatt, Kimble, & Jopson, 2009; Verplanken, Aarts, & van Knippenberg, 1997).

1.1 Cross-situational environmental motivations and spill-over effects

There is much interest amongst UK policy-makers in finding levers to produce wholesale shifts in lifestyles towards 'greener' (particularly, low-carbon) living. In general, governments are reluctant to regulate in large part because of the fear of public backlash and loss of political support (Carter & Ockwell, 2007). Consequently, across the political spectrum, there is a great interest in the latest methods to 'edit choices' or 'nudge' lifestyles in a desired direction through cost-effective and socially acceptable approaches

(e.g., Cialdini, 2006; Thaler & Sunstein, 2008) 'without [recourse to] huge centralised bureaucracy' (Letwin, cited in Chakrabortty, 2008) or compromising consumer sovereignty (Hinchliffe, 1996).

One particular area in which the UK Department for Environment, Food and Rural Affairs (DEFRA) has recently shown interest is 'catalyst behaviours', the notion that taking up a new behaviour (such as recycling) may lead to adoption of other, more environmentally-beneficial, behaviours (see DEFRA, 2008b; WWF-UK, 2009). Such a notion appears to hold the promise of changing a suite of behaviours in a cost-effective manner with little regulation or structural change. On the other hand, DEFRA also acknowledge that negative spill-over may exist, whereby taking up one behaviour (e.g., recycling) deters another (e.g., waste prevention)[i].

This view of a common motivational root underpinning pro-environmental behaviours has intuitive appeal. It also has some theoretical support from models of behaviour that postulate cross-situational goals or general values (Lindenberg & Steg, 2007; Rokeach, 1973; Schwartz & Bilsky, 1990). Furthermore, there is some – albeit limited – evidence of such spill-over effects in relation to pro-environmental behaviour (e.g., Whitmarsh, 2009). Recent studies suggest behaviour may be clustered in some way that reflects either similar 'types' of behaviour, in respect of context or frequency or different levels of environmental commitment (easy/difficult), or similar individual characteristics, such as values or demographics. Barr and colleagues' (Barr, Gilg, & Ford, 2005) UK study identified three such clusters – which they label 'purchase decisions' (shopping,

composting and reuse), 'habits' (domestic water and energy conservation), and 'recycling' – and found these relate to different lifestyles (i.e., socio-demographic characteristics and values). This analysis did not extend to broader environmentally-significant action such as travel or political behaviours. Danish research on spill-over effects has found that individuals are fairly consistent within similar categories of behaviour, and that there are significant correlations across these categories – buying organic food and recycling (0.31, $p<.05$); buying organic food and using alternative transport (0.16, $p<.05$); recycling and using alternative transport (0.17, $p<.05$) – which can be accounted for by common motivational causes (general environmental values and concern) (Thøgersen & Ölander, 2006). Despite these promising insights, it is still far from clear why or how spill-over effects occur and whether they are due primarily to contextual factors or individual motivations.

The broader literature on pro-environmental behaviour highlights the diversity of factors which influence different environmentally-significant behaviours. Although environmental values or concern may play a role, other motivations and structural factors often play a greater role (e.g., Bamberg & Schmidt, 2003; Jackson, 2005; Kollmuss & Agyeman, 2002; Schultz, Oskamp, & Mainieri, 1995; Steg, Vlek, & Slotegraaf, 2001), hampering the pursuit of a single model of behaviour for predicting pro-environmental behaviour (Darnton, 2008). Indeed, it is important to consider that 'pro-environmental behaviour' need not be motivated by environmental concern or values at all (Stern, 2000). Whitmarsh (2009), for example, found that the proportion of the public taking action explicitly out of concern for climate change was much lower than the proportion

claiming to conserve energy; further, energy conservation was more commonly motivated by financial or health benefits than by environmental concern. There are also various psychological, social, economic and physical barriers that mitigate against environmental concerns being translated into pro-environmental behaviour (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; McKenzie-Mohr & Smith, 1999). This evidence would appear to undermine any expectation that people act consistently across diverse behavioural domains, or that there is a common motivational basis for pro-environmental behaviour.

This lack of generality across pro-environmental behaviours is consistent with the Theory of Planned Behaviour (TPB), which asserts that behavioural intention is determined by attitude towards performing the action, subjective norm (motivations to comply with the expectations of significant others) and perceived behavioural control (the extent to which the action is considered under one's control) (Ajzen, 1991). While much research on pro-environmental behaviour is focused at the broader level of 'general conservation stance' (e.g., Thøgersen & Ölander, 2006), the TPB (and its predecessor the Theory of Reasoned Action) emphasises that *specific* (behaviour-oriented) attitudes are more likely than broad orientations to predict behavioural intention (Ajzen & Fishbein, 1980).

1.2 Self-identity and pro-environmental behaviour

There have been various attempts to extend the TPB to encompass other potentially relevant determinants of behaviour, and thus improve its predictive power. A promising advance in this respect concerns self-identity (e.g., Sparks & Shepherd, 1992). This is

generally understood to mean the label used to describe oneself (e.g., Cook, Kerr, & Moore, 2002), and is influenced both by personal motivations (for self-esteem, self-enhancement, and self-understanding) as well as social interaction in the form of demands and expectations of others and the various roles we perform (Ellmers, Spears, & Doosje, 2002; Stryker & Burke, 2000; Tajfel & Turner, 1986). Consistent with self-perception theories, individuals act in accordance with their own, and others', expectations of them (Bem, 1967). Self-identity serves both to differentiate oneself from others and to conform to the values, beliefs and behaviours of the social groups to which one belongs (Christensen, Rothberger, Wood, & Matz, 2004). Assertion of identity may be understood as an attempt to establish consistency in our attitudes and actions and continuity across experiences, and therefore appears to be highly relevant in exploring consistency (and, ultimately, spill-over effects) across pro-environmental behaviours.

There are various studies which highlight the identity-behaviour link (e.g., Biddle, Bank, & Slavings, 1987; Eagly, Chaiken, & Jovanovich, 1993; Stets & Biga, 2003). Consumption behaviours and adoption of new products, for example, are linked to identity (Cook et al., 2002; Grewal, Mehta, & Kardes, 2000). Self-identity has been found to be a significant predictor of behaviour over and above TPB variables, including in relation to pro-environmental action (Fekadu & Kraft, 2001; Sparks & Shepherd, 1992; Sparks, Shepherd, & Frewer, 1995; Terry, Hogg, & White, 1999). For example, people who see themselves as typical recyclers are more likely to recycle than those who do not perceive themselves as recyclers (Mannetti, Pierro, & Livi, 2004). Identity may even override attitude in cases where our role identity dictates we behave in a certain way,

irrespective of how we feel about that behaviour (Charng, Pillavin, & Callero, 1988). Related literatures on place identity (sense of self linked to physical and symbolic attributes of particular locations; Proshansky et al, 1983) also show this can influence action to protect the local area/ecologies from perceived threats from development (e.g., Devine-Wright, 2009).

Past behavioural frequency may moderate the relationship between self-identity and behaviour: self-identity influences intentions at low, rather than high, levels of past behaviour (Fekadu & Kraft, 2001; Smith, Terry, Manstead, Louis, Kotterman, & Wolfs, 2007). It may be that behaviour informs identity construction as people seek behavioural consistency (Bem, 1967), but that, as behaviour becomes routine and automatic (i.e., habitual; Verplanken & Orbell, 2003), it disappears from view and thus from self-identity. On the other hand, research by Sparks and Shepherd (1992) found that people who identify themselves as 'green consumers' are more likely to buy organic food than those who do not, irrespective of past behaviour. Given the possible interaction of past behaviour and identity, our research considers both of these factors in relation to pro-environmental behaviour.

There appear to be at least two levels at which identity may operate in the context of pro-environmental behaviour: behaviour-specific and generic. The former includes, for example, identity as a 'typical recycler' (as in Mannetti et al., 2004), while the latter could encompass a sub-set of environmental actions, such as green consumption (as in Sparks & Shepherd, 1992), or indeed all possible pro-environmental actions. A recent

review of the spill-over literature (WWF-UK, 2009) suggested that the former may be useful for explaining *persistence* in performing a specific pro-environmental behaviour (and thus will be closely linked to past behaviour), while the latter may account for spill-over *between* pro-environmental behaviours. To date, however, there have been no efforts to measure both kinds of self-identity together or to consider how these forms of identity may be related or might interact.

The aims of the present study are two-fold. First, we test an extended model of the TPB which includes self-identity and past behaviour. We include both specific and generic identity measures to consider to what extent behavioural intention to purchase carbon offsets[ii] is influenced by self-identity as a 'carbon offsetter' and/or broader pro-environmental self-identity. We also consider the relationship between these two types of identity. Second, we investigate the relationships between various pro-environmental behaviours to assess the degree of consistency across a range of different behaviours. We consider whether such this consistency is due to a general motivational cause (pro-environmental self-identity, pro-environmental values or perceptions of climate change) or to contextual or demographic factors.

2. Methods

2.1. Participants and design

Data collection was via a postal survey conducted in August-October 2008 in Norfolk and Hampshire, UK. Three thousand questionnaires (with stamped, addressed return

envelopes) were distributed by hand to a random sample of residents, drawn from the electoral register, within nine wards (six in Norfolk, three in Hampshire). The wards represented both urban and rural, and diverse socio-demographic, stratifications.

In total, we received 551 responses (representing a response rate of 18.4%[iii]). Participants in the postal survey were broadly demographically representative of the population sampled (see Table 1), although somewhat higher qualified (26% have a degree, slightly more than the national average of 20% according to 2001 census data). Data was analysed using SPSS.

2.2. Measures

The eight-page questionnaire included both closed and open questions, and addressed knowledge and attitudes in relation to climate change, TPB and self-identity measures for carbon offsetting, pro-environmental values and self-identity, pro-environmental behaviours, as well as background characteristics (see Table 1). Questionnaires were piloted with 15 residents from Norfolk, following which only minor modifications to the questionnaire were required.

2.2.1 TPB and self-identity in relation to carbon offsetting

Based on previous qualitative research (Lippincott Mercer, 2006; Lovell et al., 2009), 15 statements were developed to measure attitudes to offsetting on a 5-point scale from 'strongly agree' to 'strongly disagree'. Principal Components Analysis (PCA) indicated these formed two distinct components accounting for 58% of variance:

- Component 1 (9 items, alpha=0.90) comprised *Positive Attitudes*: 'I would trust companies offering carbon offsetting to use the money I paid in the right way', 'By making people more aware of how their behaviour affects the environment, carbon offsetting encourages more environmentally-friendly behaviour', 'People who care about the environment tend to buy carbon offsets', 'Carbon offsetting should be mandatory', 'Carbon offsetting can help tackle climate change', 'Carbon offsetting can help people in developing countries', 'Carbon offsetting can help wildlife and habitats', 'Carbon offsetting is a quick and easy way of tackling climate change', and 'Carbon off-setting can help reduce unavoidable emissions'.
- Component 2 (6 items, alpha=0.85) comprised *Negative Attitudes:* 'Carbon offsetting encourages people to carry on doing things that harm the environment', 'Carbon offsetting will make no difference in the fight against climate change', 'Carbon offsetting is just another form of taxation', 'Carbon off-setting is too much hassle', 'Carbon offsetting is a waste of time', and 'Carbon offsetting is a rip-off'.

Perceived behaviour control for offsetting was measured with one item: 'At the moment, how easy would you find it to purchase carbon off-sets?' on a 4-point scale from 'very easy' to 'not at all easy'.

Responses to the following three items were multiplied to produce the *subjective norm* (alpha=0.69): 'Do any of your friends, family or colleagues buy carbon offsets?' ('yes',

'no'); 'How much influence do your family, friends and colleagues have on your decision to purchase - or not purchase - carbon offsets?' (4-point scale from 'large influence' to 'no influence'), and 'In general, what do you think your family's, friends' or colleagues' views would be of you purchasing carbon offsets?' (5-point scale from 'very favourable' to 'very unfavourable').

Behavioural intention was assessed on a 4-point scale (from 'definitely will' to 'definitely won't') with the item 'Do you think you will use carbon offsetting in the future?'

Two items on a 5-point agreement scale measured *offsetting identity* (alpha=0.81): 'I am not the type of person who would buy carbon offsets' (scoring reversed) and 'I am the type of person who would buy carbon offsets'.

Past behaviour was measured with the item 'Have you ever offset your carbon emissions?' ('yes', 'no').

2.2.2 Pro-environmental values and self-identity

Pro-environmental values were measured using a reduced (6-item) version of the New Environmental Paradigm (NEP) scale (alpha=0.7) (Dunlap, Van Liere, Mertig, & Jones, 2000; Whitmarsh, 2009)[iv].

A *pro-environmental self-identity* scale was developed using measures adapted from previous research (Cook et al., 2002; Sparks & Shepherd, 1992). Four items – 'I think of myself as an environmentally-friendly consumer', 'I think of myself as someone who is very concerned with environmental issues', 'I would be embarrassed to be seen as having an environmentally-friendly lifestyle' (scoring reversed), and 'I would not want my family or friends to think of me as someone who is concerned about environmental issues' (scoring reversed) – were measured on a 5-point agreement scale and formed a reliable scale (alpha=0.7).

Pro-environmental behaviour (PEB) encompasses multiple domains, frequencies and impacts of action (Stern, 2000). A recent UK review, led by DEFRA (2008a), has identified 12 'headline behaviours' which include both low and high environmental impact actions, as well as one-off and regular decisions, relating to four behavioural domains: domestic energy/water use, waste behaviour, transport, and eco-friendly shopping.

1. Domestic energy/water use includes: installing insulation products, better energy management and usage, installing domestic micro-generation through renewables, and more responsible water usage.
2. Waste behaviours include: increasing recycling and segregation, and wasting less (food).
3. Transport actions include: buying/using more energy efficient (low carbon) vehicles, using the car less – seeking alternatives for short trips (<3 miles), and reducing non-essential flying (short haul).

4. Shopping choices include: buying energy efficient products, eating food locally in season, and adopting a diet with lower environmental impacts.

In several cases, these headline behaviours are too broad to be measured directly (e.g., 'better energy management and use' or 'wasting less'), so where appropriate we have derived multiple measures to disaggregate these activities. Table 2 shows the pro-environmental measures used in the survey. When scaled, these 24 items formed a reliable measure of pro-environmental behaviour (PEB; alpha=0.92). The mean score on the PEB scale is 27.9 (SD=9.7) out of 72.

Finally, two measures were included on *driving* and *flying behaviours*: 'How often do you personally use a car or van to travel, either as a driver or as a passenger?' ('6-7 days a week', '3-5 days a week', '1-2 days a week', 'once or twice a month', 'less often', 'never'); 'Did you take any flights in 2007 for leisure, holidays or visiting family or friends?' ('yes', 'no').

2.2.3 Knowledge, attitudes and perceptions in relation to climate change

The questionnaire included a range of questions relating to knowledge, attitudes and perceptions in relation to climate change (these results are reported elsewhere; see Whitmarsh, O'Neill, Seyfang, & Lorenzoni, 2009). Some of these measures are considered relevant to the current analysis, since pro-environmental behaviour may be motivated by concern about climate change associated with perceived risk or responsibility (O'Connor, Bord, & Fisher, 1999; Stern, Dietz, & Kalof, 1993), and may depend on knowledge and understanding about the causes of climate change (Bord,

O'Connor, & Fisher, 2000; O'Connor, Bord, Yarnal, & Wiefek, 2002). In the regression analyses, we have therefore included measures of:

- *Personal importance of climate change*: 'How important is the issue of climate change to you personally?' (4-point scale from 'very important' to 'not at all important');
- *Perceived risk from climate change:* 'Do you think climate change is something that is affecting or is going to affect you, personally?' ('yes', 'no', 'don't know');
- *Self-assessed knowledge about climate change*: 'How much, if anything, would you say you know about climate change' (5-point scale from 'a lot' to 'nothing, have never heard of it'); and
- *Belief about the causes of climate change:* 'Do you think: Climate change is caused only by natural processes, Climate change is caused only by human activity, Climate change is caused by both natural processes and human activity, There's no such thing as climate change, or I don't know what is causing climate change' from which participants were asked to select one option.

3. Results

3.1 TPB and self-identity in predicting offsetting

In order to test the roles of self-identity and past behaviour in addition to the TPB in determining intention to purchase carbon offsets, we included TPB variables within a regression analysis (Model 1), then extended the TPB with offsetting identity (Model 2) and past behaviour (Model 3), and finally added general pro-environmental self-identity,

pro-environmental values and PEB scores (Model 4). As shown in Table 3, the extended TPB had greater predictive power (Model 2, R^2=0.46; Model 3, R^2=0.49) on intention to offset than the standard TPB (Model 1: R^2=0.39), while the general pro-environmental measures improved the predictive power somewhat further (Model 4: R^2=0.52). (Background variables were also included in a fifth model but only contributed 1% additional variance; only age was a significant, weak, negative predictor).

In the standard TPB model, attitude is the only significant predictor; subjective norm and perceived behavioural control are both non-significant variables. In the extended model, offsetting identity exerts a strong positive influence, and past behaviour is also a significant positive predictor; general pro-environmental identity (but not PEB or environmental values) is a significant, but fairly weak, predictor.

Correlation between the two types of identity ('offsetting' and 'pro-environmental') is significant, though relatively weak (r=0.19; p=.001).

3.2 Relationships between pro-environmental behaviours

To investigate the relationships between behaviours, and any spill-over effects, a PCA with Varimax rotation was conducted on the 24 PEB items. This indicated 8 components with Eigenvalues over 1, explaining 54.3% of variance (Table 4). Component 1 relates primarily to *Waste reduction (with some energy/water conservation)*; component 2 to *Eco-shopping and eating*; component 3 to *Regular water and domestic energy conservation*; component 4 to *One-off domestic energy conservation actions*; component

5 is *Eco-driving*; component 6 is *Political actions*; component 7 is *Reducing car use and flights*; component 8 is *Flying*. (Since Flying is not a pro-environmental behaviour it is not examined in the further analysis, below). This analysis suggests some spill-over effects between similar (in respect of context or frequency) behaviours.

3.3 Self-identity as a predictor of pro-environmental behaviours

Analysis was first conducted on the full set of pro-environmental behaviours, using score on the PEB scale as the dependent variable in a linear regression. The results (see Table 5) show that, consistent with our expectations, pro-environmental self-identity is the strongest (positive) predictor. Other significant variables are personal importance of climate change and number of children in the household.

Regression analyses were also conducted for each behavioural cluster identified in the rotated PCA. Results from these analyses (aggregated in Table 6) suggest that self-identity is only a significant predictor for some behaviours, namely waste reduction, regular water and domestic energy conservation, and eco-shopping and eating (for which it is the strongest predictor). Further, identity is a *negative* (though non-significant) determinant of travel-related PEBs. Pro-environmental values, measured using the NEP scale, do not positively predict any of the PEBs.

Different background variables are also significant predictors of the PEB clusters. *Waste behaviours* are associated with older and female respondents with larger households in rural areas. *Eco-shopping and eating* is predicted by a high level of education. *Regular*

water/energy conservation is predicted by a low level of education and urban location. *One-off energy conservation* is associated more with male respondents with children. *Eco-driving* is more likely amongst older respondents, with children in rural areas; while *reducing car use and flying* is more prevent amongst young, highly educated, urban respondents.

Risk perception of climate change is not a significant predictor of behaviours; while issue importance is relevant for political actions, and all conservation actions. Generally there is little influence of knowledge (apart from for political actions) or perceived causes of climate change.

4. Discussion

4.1 Self-identity and pro-environmental behaviour

Our findings reinforce existing evidence for the importance of self-identity in predicting environmentally-significant behaviour. We found self-identity to be a significant behavioural determinant over and above TPB variables for carbon offsetting behaviour. Behaviour-specific self-identity (as a 'carbon offsetter') exerted the strongest influence on intention to offset. Generic 'pro-environmental' self-identity also influenced offsetting intention, although the influence was not as strong as the more specific identity measure. We also found that past behaviour exerted a significant and independent influence on intention. This supports the growing body of evidence which indicates self-identity and

past behaviour are important influences on behavioural intention and, when combined with TPB variables, can produce a more predictive model than the TPB alone.

In relation to the broader range of pro-environmental behaviours, pro-environmental self-identity was a significant predictor for several of these categories of behaviours, namely waste reduction, regular water and domestic energy conservation, and eco-shopping and eating (for which it was the strongest predictor). However, one-off domestic energy conservation, travel and political behaviours were not significantly predicted by identity.

Background and attitudinal variables were also important predictors. Gender, household composition, age, urban vs. rural location, and education were salient for different behavioural clusters. This finding reflects the important structural constraints and drivers of environmentally-significant behaviour, identified in previous research (e.g., DEFRA, 2002; Lorenzoni et al., 2007). This is particularly evident for travel behaviours, which are more dependent than regular domestic or consumption behaviours on contextual factors, such as the provision of alternatives to driving (which are typically more available in urban than rural areas). Similarly, installing domestic energy conservation products or systems (e.g., insulation, boilers, solar panels) depends on contextual factors such as home ownership (McKenzie-Mohr & Smith, 1999). Individuals may thus be unable to translate their pro-environmental self-identity into consistent pro-environmental behaviours due to lack of available options. In addition, the lack of influence of pro-environmental self-identity on travel behaviours may suggest competing identities, such

as strong social identities associated with car ownership and taking foreign holidays (Barr, Coles, & Shaw, 2008; Steg et al., 2001).

Since our data are correlational and not experimental or longitudinal, we are unable to determine whether certain behaviours *caused* the adoption of others (i.e., acted as catalyst behaviours). Nevertheless, our initial investigation in this area has reinforced findings from other studies on the role of cross-situational environmental motivations. Yet, in contrast to previous studies on spill-over effects between PEBs (e.g., Barr et al., 2005; Thøgersen & Ölander, 2006), we found that pro-environmental values (measured using the NEP) did not predict any of the PEBs. Rather, our analysis suggests that identity is a stronger cross-situational motivation for behaviour than values. However, we also found that personal importance of climate change is a significant predictor for political actions and all energy/water conservation actions perhaps implying a common value basis motivating action (both direct and indirect) to tackle climate change. This conclusion is not fully supported by other research, though, which suggests energy conservation tends to be motivated more by financial or health considerations than out of concern for climate change (Whitmarsh, 2009).

It is also noteworthy that there is an apparent disparity between understanding and perceptions of climate change and pro-environmental action. None of the PEBs (apart from political action) were influenced by knowledge, and risk perception similarly exerted no significant influence[v]. This is consistent with the widely reported knowledge-action gap in relation to pro-environmental behaviour in general (e.g., Kollmuss &

Agyeman, 2002) and climate change in particular (DEFRA, 2007; Whitmarsh, 2009). The disparity between awareness and concern about climate change on the one hand, and action on the other (even amongst those likely to be worst affected, such as flood victims; Whitmarsh, 2008a), highlights the significant structural, social, informational, economic and psychological barriers to low-carbon lifestyles (Lorenzoni et al., 2007).

In general, our regression analyses explained low levels of variance; the highest was for shopping and eating (i.e., consumption activities). This may be due to the measure used (the self-identity measure included an item explicitly on consumption) but is more likely to be because shopping for material objects (unlike energy or water use) is *conspicuous* consumption and more likely to be an expression of identity (Belk, 1988; Dittmar, 1992).

The weak relationship between the two types of identity (behaviour-specific and generic), as well as the association of past behaviour and specific identity, are also intriguing findings. As noted earlier, the relationships between different behavioural levels of identity have not previously been examined but the recently-drawn distinction between behavioural persistence over time versus consistency across behaviours (WWF-UK, 2009) may be instructive here. We may understand identity as having functions along both *temporal* and *contextual* dimensions. In other words, pro-environmental self-identity helps us establish consistency and continuity across experiences. Further work is needed to elucidate these functions of pro-environmental self-identity and to consider how the 'contextual' dimension might relate to place identity and social identity.

4.2 Policy implications

Recent policy interest in cross-situational motivations and spill-over effects appears at least in part to be justified. The implication of our research is that how we think of ourselves can have an important influence on pro-environmental intentions. This is particularly the case for visible consumption behaviours, namely purchasing environmentally-friendly products. This has implications for the design of marketing strategies to promote green goods which target green identities. More generally, the existence of identity as a driver across several behaviours highlights the need to prime relevant aspects of identity (e.g., via targeted information) and target particular group identities (e.g., via segmentation). In the UK, DEFRA has adopted this latter approach by segmenting the public according to their values, identities and background characteristics in order to target these groups with appropriate messages and interventions to encourage greener lifestyles (DEFRA, 2008a).

A more challenging issue concerns addressing conflicts of identity. Although we have noted a (weak) relationship between behaviour-specific and generic pro-environmental self-identity, there are many other examples of incompatible identities. In particular, how can we increase the salience of 'green identity' relative to other (particularly, socially-prized) identities such as being 'well-travelled'? Even the most committed environmentalists reconcile green credentials with their decision to fly on holiday (Barr et al., 2008; Whitmarsh, 2008b); and few are willing to give up their car (King et al., 2009) which is associated with a high standard of living and 'quality of life' (Black, Collins, & Snell, 2001). Targeting people's self-identity and social identity – their need to conform

and to be consistent (Christensen et al., 2004; Festinger, 1957) – may offer opportunities for changing behaviour. There is evidence that cognitive dissonance can produce more pro-environmental behaviour particularly amongst people who are trying to be green, but fall short (Thøgersen, 2004). Thus, people who perceive an inconsistency could be encouraged to take steps to change their behaviour and act more sustainably. On the other hand, this strategy may have the opposite effect such that if the gap between desirable behaviour and pro-environmental behaviour becomes too great, individuals change their attitude towards the environment, rather than their lifestyle. Innovative strategies are required to use people's guilt or shame to motivate change, rather than disempowering and risking denial or apathy (Cohen, 2001; O'Neill & Nicholson-Cole, 2009). Other possible approaches may hinge on the interaction of self-identity and social identities, such that a particular social identity may be changed through the actions of significant individuals within that group (Postmes, Haslam, & Swaab, 2005).

At the same time, situational factors are also clearly important drivers and barriers to pro-environmental behaviour as noted repeatedly in previous research. These factors will, and do, constrain opportunities for green self-identity to be translated into effective pro-environmental behaviour. As discussed elsewhere, the implications here pertain to provision of enabling and equitable mechanisms (e.g., affordable and efficient public transport, lower cost eco-friendly goods, personal carbon allowances, community competitions) for reducing society's carbon dependence and the environmental impacts of behaviour (Lorenzoni et al., 2007).

4.3 Limitations and further research

In this research, we found support for an extended TPB model in relation to carbon offsetting intention. However, we did not test this model on the full range of PEBs. This would be a useful avenue for future research, particularly in light of the structural constraints on pro-environmental travel behaviours and thus the possible salience of perceived behavioural control in this context. Further work should also consider behavioural frequency (not just past behaviour as a dichotomous variable, as in this study); offsetting is a relatively infrequent activity, but for more regular activities (e.g., domestic energy and water conservation) there is a need to explore possible moderating effects of past behavioural frequency on the relationship between self-identity and behaviour. Ideally, future studies should also use multi-item scales to measure all constructs, since these are more reliable than single items (which we used for PBC as well as for past behaviour).

Further work might also develop an expanded measure of pro-environmental identity which encompasses more inter-personal and situational dimensions, giving consideration to the links between self-identity, social identities, role identities and place identity. Related to this, our observation of an association between behaviour-specific and generic pro-environmental identity deserves further investigation. More broadly, there is still much work to be done in investigating the functions, construction, and communication of the various dimensions of pro-environmental identity.

Finally, our study represents an initial empirical investigation using correlational data into the role of identity in determining consistency across diverse pro-environmental behaviours. While we have identified the importance of identity in determining several such behaviours, further (experimental/longitudinal) work is needed to model spill-over effects and in particular to examine whether identity is causally implicated in spill-over between behaviours.

Acknowledgements

This research was funded through the Tyndall Centre for Climate Change Research, which is supported by three UK research councils: NERC, EPSRC and ESRC. Grateful thanks go to the survey respondents who kindly gave their time to make this research possible and to the valuable comments of two anonymous reviewers.

References

Ajzen, I. (1991). The theory of planned behaviour. *Organizational behavior and human decision processes,* 50, 179-211.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, New Jersey: Prentice-Hall.

Bamberg, S., & Schmidt, P. (2003). Incentives, Morality, or Habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior,* 35(2), 264-285.

Barr, S., Coles, T., & Shaw, G. (2008). *Changing behaviours for a changing climate: a lifestyles approach.* Paper presented at the International Conference on Climate change impacts and adaptation: Dangerous rates of change. Sept 22nd-24th, Exeter.

Barr, S., Gilg, A. W., & Ford, N. (2005). The household energy gap: examining the divide between habitual- and purchase-related conservation behaviours. *Energy Policy,* 33 1425-1444.

Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research,* 15, 139-168.

Bem, D. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review,* 74(3), 183-200.

Biddle, B. J., Bank, B. J., & Slavings, R. R. L. (1987). Norms, preferences, identities and retention decisions. *Social Psychology Quarterly,* 50(4), 322-337.

Black, C., Collins, A., & Snell, M. (2001). Encouraging walking: The case of journey-to-school trips in compact urban areas. *Urban Studies,* 38(7), 1121-1141.

Bord, R. J., O'Connor, R. E., & Fisher, A. (2000). In what sense does the public need to understand global climate change? *Public Understanding of Science,* 9, 205-218.

Carter, N., & Ockwell, D. G. (2007). *New Labour, new environment? An analysis of the Labour government's policy on climate change and biodiversity loss. Report*

prepared for Friends of the Earth. Centre for Ecology Law & Policy (CELP), University of York: www.york.ac.uk/res/celp/projects/foe/docs/fullreportfinal.pdf.

Chakrabortty, A. (2008). *From Obama to Cameron, why do so many politicians want a piece of Richard Thaler?* Guardian Online. Available from Guardian Web site, www.guardian.co.uk/politics/2008/jul/12/economy.conservatives.

Charng, H.-W., Pillavin, J. A., & Callero, P. L. (1988). Role identity and reasoned action in the prediction of repeated behaviour. *Social Psychology Quarterly,* 51, 303-317.

Christensen, N., Rothberger, H., Wood, W., & Matz, D. (2004). Social norms and identity relevance: a motivational approach to normative behaviour. *Personality and Social Psychology Bulletin,* 30(10), 1295-1309.

Cialdini, R. B. (2006). *Influence: Psychology of Persuasion. Collins Business Essentials Edition*. New York: HarperCollins.

Cohen, S. (2001). *States of Denial: Knowing about Atrocities and Suffering*. Cambridge: Polity.

Cook, A. J., Kerr, G. N., & Moore, K. (2002). Attitudes and intentions towards purchasing GM food. *Journal of Economic Psychology,* 23(5), 557-572.

Darnton, A. (2008). *Practical Guide: An overview of behaviour change models and their uses*. Government Social Research Unit: www.gsr.gov.uk/downloads/resources/behaviour_change_review/practical_guide.pdf

DEFRA. (2002). *Survey of public attitudes to quality of life and to the environment: 2001*. London: Department for Environment, Food and Rural Affairs.

DEFRA. (2005). *Experimental Statistics on Carbon Dioxide emissions at Local Authority and Regional Level*. London: Department for Environment, Food and Rural Affairs.

DEFRA. (2007). *Survey of Public Attitudes and Behaviours toward the Environment: 2007*. London: Department for Environment, Food and Rural Affairs.

DEFRA. (2008a). *A Framework For Pro-Environmental Behaviours* London: Department for Environment, Food and Rural Affairs.

DEFRA. (2008b). *Science and Research Projects: Exploring Catalyst Behaviour - EV0508*. http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16324.

Devine-Wright, P. (2009). Rethinking NIMBYism: The role of place attachment and place identity in explaining place-protective action. *Journal of Community & Applied Social Psychology, in press.*

Dittmar, H. (1992). *The Social Psychology of Possessions: To Have is to Be*. New York: St Martin's Press.

Dunlap, R., Van Liere, K., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues,* 56(3), 425-442.

Eagly, A. H., Chaiken, S., & Jovanovich. (1993). *The Psychology of Attitudes*. Fort Worth, TX: Harcourt Brace.

Ellmers, N., Spears, R., & Doosje, B. (2002). Self and social identity. *Annual Review of Psychology,* 53, 161-186.

Fekadu, Z., & Kraft, P. (2001). Self-identity in planned behavior perspective: Past behavior and its moderating effects on self-identity-intention relations *Social Behavior and Personality,* 29(7), 671-686.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.

Grewal, R., Mehta, R., & Kardes, F. R. (2000). The role of the social-identity function of attitudes in consumer innovativeness and opinion leadership. *Journal of Economic Psychology,* 21, 233-252.

Hamilton, K., Bayon, R., Turner, G., & Higgins, D. (2007). *State of the Voluntary Carbon Market 2007*. London: Ecosystem Marketplace and New Carbon Finance.

Herring, H., & Sorrell, S. (Eds.). (2008). *Energy efficiency and sustainable consumption: Dealing with the rebound effect*. Basingstoke: Palgrave Macmillan.

Hinchliffe, S. (1996). Helping the earth begins at home: the social construction of socio-environmental responsibilities. *Global Environmental Change,* 6(1), 53-62.

HM Government. (2008). *Climate Change Bill; Commons Amendments at 3rd Reading*. London: http://www.publications.parliament.uk/pa/ld200708/ldbills/087/2008087.pdf.

Jackson, T. (2005). *Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change*. Guildford: Sustainable Development Research Network: http://www.sd-research.org.uk/researchreviews/documents/MotivatingSCfinal_000.pdf.

King, S., Dyball, M., Webster, T., Sharpe, A., Worley, A., DeWitt, J., et al. (2009). *Exploring public attitudes to climate change and travel choices: deliberative*

research. Final report for Department for Transport. http://www.dft.gov.uk/pgr/scienceresearch/social/climatechange/attitudestoclimatechange.pdf: People Science & Policy Ltd & ITS, Leeds.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior. *Environmental Education Research,* 8(3), 239-260.

Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social Issues,* 63(1), 117--137.

Lippincott Mercer. (2006). *Conscious Consumer: Insights from qualitative research. Report Commissioned by The Climate Group and Clean Air Cool Planet, Sponsored by BSkyB*. www.cleanair-coolplanet.org/information/Glynn_slides.pdf.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change,* 17(3-4), 445-459.

Lovell, H., Bulkeley, H., & Liverman, D. (2009). Carbon offsetting: sustaining consumption? *Environment & Planning A.,* 41(10), 2357 – 2379.

Mannetti, L., Pierro, A., & Livi, S. (2004). Recycling: planned and self-expressive behaviour. *Journal of Environmental Psychology,* 24, 227-236.

McKenzie-Mohr, D., & Smith, W. (1999). *Fostering Sustainable Behavior: An introduction to community-based social marketing*. Gabriola Island, B.C., Canada: New Society Publishers.

O'Connor, R. E., Bord, R. J., & Fisher, A. (1999). Risk perceptions, general environmental beliefs, and willingness to address climate change. *Risk Analysis,* 19(3), 461-471.

O'Connor, R. E., Bord, R. J., Yarnal, B., & Wiefek, N. (2002). Who wants to reduce greenhouse gas emissions? *Social Science Quarterly,* 83(1), 1-17.

O'Neill, S., & Nicholson-Cole, S. (2009). 'Fear won't do it': Promoting positive engagement with climate change through visual and iconic representations. *Science Communication,* 30(3), 355-379.

POST. (2007). *POSTnote no.290 - Voluntary Carbon Offsets*. London: The Parliamentary Office of Science and Technology (POST).

Postmes, T., Haslam, S. A., & Swaab, R. I. (2005). Social influence in small groups: An interactive model of social identity formation. *European Review of Social Psychology,* 16, 1-42.

Proshansky, H., Fabian, A., & Kaminoff, R. (1983). Place-identity: Physical world socialisation of the self. *Journal of Environmental Psychology, 3*, 57-83.

Rokeach, M. (1973). *The nature of human values*. New York: Free Press.

Schultz, P. W., Oskamp, S., & Mainieri, T. (1995). Who recycles and when: A review of personal and situational factors. *Journal of Environmental Psychology,* 15, 105-121.

Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology,* 58, 878-891.

Smith, J. R., Terry, D., Manstead, A. S. R., Louis, W. R., Kotterman, D., & Wolfs, J. (2007). Interaction effects in the theory of planned behavior: The interplay of self-identity and past behavior. *Journal of Applied Social Psychology,* 37, 2726-2750.

Sparks, P., & Shepherd, R. (1992). Self-identity and the theory of planned behaviour: Assessing the role of identification with green consumerism. *Social Psychology Quarterly,* 55(4), 388-399.

Sparks, P., Shepherd, R., & Frewer, L. J. (1995). Assessing and structuring attitudes toward the use of gene technology in food production: The role of ethical obligation. *Basic and Applied Social Psychology,* 16(3), 267-285.

Steg, L., Vlek, C., & Slotegraaf, G. (2001). Instrumental-reasoned and symbolic-affective motives for using a motor car. *Transportation Research Part F: Traffic Psychology and Behaviour,* 4(3), 151-169.

Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues,* 56(3), 407-424.

Stern, P., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior,* 25(3), 322-348.

Stets, J. E., & Biga, C. F. (2003). Bringing identity theory into Environmental Sociology. *Sociological Theory,* 21(4), 398-423

Stryker, S., & Burke, P. J. (2000). The past, present, and future of an identity theory. *Social Psychology Quarterly,* 63(4), 284-297.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of Intergroup Relations* (pp. 7-24). Chicago: Nelson-Hall.

Terry, D. J., Hogg, M. A., & White, K. M. (1999). The theory of planned behaviour: Self identity, social identity and group norms. *British Journal of Social Psychology,* 38, 225-244.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. New Haven, CT: Yale University Press.

Thøgersen, J. (2004). A cognitive dissonance interpretation of consistencies and inconsistencies in environmentally responsible behaviour. *Journal of Environmental Psychology,* 24, 93-103.

Thøgersen, J., & Ölander, F. (2006). To what degree are environmentally beneficial choices reflective of a general conservation stance? *Environment and Behavior,* 38(4), 550-569.

Verplanken, B., Aarts, H., & van Knippenberg, A. (1997). Habit, information acquisition, and the process of making travel mode choices. *European Journal of Social Psychology,* 27, 539-560.

Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology,* 33, 1313-1330.

Whitmarsh, L. (2008a). Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. *Journal of Risk Research,* 11(3), 351 - 374.

Whitmarsh, L. (2008b). Carbon offsetting - a way of avoiding emissions reductions? *EnvironmentResearchWeb*, Nov 5th. Available at: environmentalresearchweb.org/cws/article/opinion/36551.

Whitmarsh, L. (2009). Behavioural responses to climate change: Asymmetry of intentions and impacts. *Journal of Environmental Psychology,* in press.

Whitmarsh, L., O'Neill, S., Seyfang, G., & Lorenzoni, I. (2009). *Carbon Capability: what does it mean, how prevalent is it, and how can we promote it?* Tyndall Working Paper, in press.

WWF-UK, 2009. Simple and Painless? The limitations of spillover in environmental campaigning. Godalming, UK: WWF-UK. http://assets.wwf.org.uk/downloads/simple_painless_report.pdf

Table 1. Demographic characteristics of survey sample*

Gender	%
Female (0)	53.4
Male (1)	44.9
Prefer not to say	1.7

Age	%
16-24 (1)	7.3
25-44 (2)	28.7
45-64 (3)	38.2
65 and over (4)	25.5
Prefer not to say	0.4

Household income (before tax)	%
Up to £9,999 per annum (0)	12.4
£10,000 - £19,999 per annum (1)	13.9
£20,000 - £29,999 per annum (2)	11.8
£30,000 - £39,999 per annum (3)	10.8
£40,000 - £49,999 per annum (4)	7.8
£50,000 - £74,999 per annum (5)	11.4
£75,000 or more per annum (6)	7.4
Don't know (7)	7.0
Prefer not to say	17.5

Qualifications	%
No formal qualifications (0)	19.9
GCSE/ O-Level (1)	12.1
A-Level/ Higher/ BTEC (2)	10.7
Vocational/ NVQ (3)	14.2
Degree or equivalent (4)	26.1
Postgraduate qualification (5)	14.6
Other	2.5

Qualifications in science-related subject	%
No formal qualifications (0)	40.3
GCSE/ O-Level (1)	27.2
A-Level/ Higher/ BTEC (2)	12.1
Vocational/ NVQ (3)	2.7
Degree or equivalent (4)	12.1
Postgraduate qualification (5)	5.0
Other	0.6

No. of adults (incl. you) living in your house	%
1	25.3
2	55.4
3	12.2
4 or more	7.1

No. of children (ie., under 16) living in your house	%
0	77.3
1	9.8
2	9.1
3 or more	3.9

Area density	%
City (3)	59.3
Town (2)	12.0
Village or hamlet (1)	28.6

County	%
Norfolk (1)	63.7
Hampshire (2)	36.3

Political party most likely to support	%
Labour (1)	16.1
Liberal Democrats (2)	13.4
Conservative (3)	28.7
Green (4)	11.8
Other / Prefer not to say	21.3
Would not vote (0)	8.7

* Figures shown in brackets indicate values entered in analyses

Table 2. Pro-environmental behaviour measures and scores

	Mean	SD	Unrotated factor loading[3]
Please indicate the last time you took this action (if at all)[1]:			
- Installed insulation products in your home	1.15	0.968	.372
- Bought or built an energy-efficient home	0.18	0.572	.111
- Installed a more efficient heating system	0.80	0.999	.308
- Installed a renewable energy system (e.g., solar panels, wind turbine) in your home	0.07	0.396	.106
- Changed to a 'green' energy tariff for your home	0.25	0.732	.328
- Bought a low-emission vehicle (e.g., hybrid, electric, biofuel, less than 1.4l engine)	0.34	0.806	.201
- Bought a product to save water (e.g., water butt, water 'hippo', low-flush toilet)	1.05	1.143	.510
Please indicate how often you take each action[2]:			
- Turn off lights you're not using	2.56	0.714	.532
- Drive economically (e.g., braking or accelerating gently)	1.75	1.128	.385
- Walk, cycle or take public transport for short journeys (i.e., trips of less than 3 miles)	1.86	1.003	.403
- Use an alternative to travelling (e.g., shopping online)	0.90	0.938	.369
- Share a car journey with someone else	1.05	0.905	.396
- Cut down on the amount you fly	1.10	1.184	.456
- Buy environmentally-friendly products	1.43	0.799	.703
- Eat food which is organic, locally-grown or in season	1.60	0.856	.602
- Avoid eating meat	0.66	0.949	.442
- Buy products with less packaging	1.46	0.862	.665
- Recycle	2.52	0.815	.662
- Reuse or repair items instead of throwing them away	1.88	0.941	.611
- Compost your kitchen waste	1.36	1.326	.486
- Save water by taking shorter showers	1.59	1.138	.597
- Turn off the tap while you brush your teeth	2.15	1.077	.574
- Write to your MP about an environmental issue	0.11	0.383	.301
- Take part in a protest about an environmental issue	0.11	0.385	.362

[1] Response options: never (0), 5 or more years ago (1), 1-3 years ago (2), In the last year (3)
[2] Response options: never (0), occasionally (1), often (2), always (3)
[3] Unrotated PCA indicated one component solution, accounting for 21.7% of variance

Table 3. Regression analysis for carbon offsetting intention

Model		B	SE	*B*	t	Sig.
1	(Constant)	-.178	.505		-.353	.724
	Positive attitude (offsetting)	.045	.009	.249	5.239	.000
	Negative attitude (offsetting)	-.025	.013	-.093	-2.000	.046
	Perceived behaviour control (offsetting)	.003	.009	.011	.290	.772
	Subjective norm (offsetting)	.000	.000	-.021	-.570	.569
2	Offsetting Identity	.201	.028	.327	7.156	.000
3	Past offsetting behaviour	.605	.124	.165	4.870	.000
4	Pro-Environmental Self-Identity score	.043	.017	.101	2.489	.013
	Pro-Environmental Behaviour score	.008	.004	.072	1.914	.056
	Pro-Environmental Values (NEP) score	.014	.011	.049	1.306	.192

Table 4. Rotated PCA of pro-environmental behaviours

	Component							
	1	2	3	4	5	6	7	8
Cronbach's alpha of positive loadings	0.73	0.73	0.71	0.55	0.58	0.66	0.53	-
Installed insulation products in your home	.349			.481				
Bought or built an energy-efficient home				.649				
Installed a more efficient heating system	.310			.572				
Installed a renewable energy system (e.g. solar panels, wind turbine) in your home				.383			-.406	
Changed to a 'green' energy tariff for your home				.534				
Bought a low-emission vehicle (e.g. hybrid, electric, biofuel,< 1.4l engine)								
Bought a product to save water (e.g. water butt, water 'hippo', low-flush toilet)	.485			.316				
Save water by taking shorter showers	.458		.506					
Turn off the tap while you brush your teeth		.316	.610					
Turn off lights you're not using			.765					
Eat food which is organic, locally-grown or in season	.349	.631						
Avoid eating meat		.664						
Buy environmentally-friendly products		.709						
Buy products with less packaging		.624						
Recycle	.555		.436					
Reuse or repair items instead of throwing them away	.556							
Compost your kitchen waste	.751							
Write to your MP about an environmental issue						.826		
Take part in a protest about an environmental issue						.806		
Drive economically (e.g. braking or accelerating gently)					.705			
Walk, cycle or take public transport for short journeys (i.e. trips of <3 miles)					-.566		.475	
Use an alternative to travelling (e.g., shopping online)							.636	
Share a car journey with someone else							.570	
Cut down on the amount you fly							.392	-.422
How often do you personally use a car or van to travel (as driver or passenger)?					.820			
Did you take any flights in 2007 for leisure, holidays or visiting family or friends?								.832

Table 5. Regression analysis of all pro-environmental behaviours (PEB score)

	B	SE	*B*	t	Sig.
Pro-environmental Identity score	**1.094**	**.191**	**.297**	**5.715**	**.000**
Pro-environmental values (NEP score)	.140	.124	.057	1.126	.261
Age	-.117	.459	-.012	-.256	.798
Gender	-.183	.328	-.024	-.556	.579
Household income	-.247	.157	-.073	-1.578	.115
Qualifications (general)	.126	.240	.027	.524	.600
Qualifications (scientific subject)	.344	.268	.066	1.284	.200
Political preference	.144	.125	.048	1.150	.251
No of adults in household	.440	.407	.049	1.082	.280
No of children in household	**1.341**	**.464**	**.126**	**2.888**	**.004**
Area density	-.536	-.423	-.055	-1.268	-.206
Knowledge about climate change	.649	.645	.045	1.006	.315
Belief about causes of climate change	.132	.492	.012	.269	.788
Personal importance of climate change	**3.029**	**.610**	**.253**	**4.964**	**.000**
Perceived risk from climate change	-.142	.113	-.054	-1.255	.210
(Constant)	-1.099	4.233		-.260	.795

Table 6. Regression analyses for PEB components

	1. Waste reduction (R^2= 0.14)		*2. Eco-shopping and eating* (R^2= 0.24)		*3. Regular water and domestic energy conservation* (R^2= 0.13)		*4. One-off domestic energy conservation actions* (R^2= 0.08)		*5. Eco-driving* (R^2 = 0.17)		*6. Political actions* (R^2=0.09)		*7. Reducing car use and flights* (R^2=0.18)	
	B	t	*B*	t	*B*	t	*B*	t	*B*	t	*B*	t	*B*	t
Pro-environmental Identity score	**.156**	**2.608****	**.279**	**4.988****	**.129**	**2.160***	.067	1.088	-.066	-1.132	.081	1.327	-.004	-.073
Pro-environmental values (NEP score)	-.033	-.571	.098	1.808	.044	.766	-.008	-.135	.046	.818	.005	.085	-.018	-.314
Age	**.116**	**2.106***	-.067	-1.291	-.023	-.422	.098	1.720	**.110**	**2.037***	.090	1.587	**-.284**	**-5.272****
Gender	**-.103**	**-2.111***	-.084	-1.834	.077	1.563	**.131**	**2.600****	.015	.317	-.026	-.520	-.021	-.436
Household income	-.027	-.506	-.084	-1.693	-.048	-.899	.032	.574	.032	.611	-.078	-1.420	.054	1.041
Qualifications (general)	-.081	-1.363	**.178**	**3.177****	**-.160**	**-2.674****	-.054	-.880	.103	1.770	.044	.714	**.122**	**2.099***
Qualifications (scientific subject)	.095	1.620	-.042	-.758	.011	.182	.037	.601	.017	.294	.046	.758	.027	.473
Political preference	.063	1.319	.055	1.229	-.007	-.156	.009	.173	-.030	-.637	-.030	-.617	.021	.449
No of adults in household	**.146**	**2.819****	-.045	-.929	-.007	-.130	.020	.367	.025	.489	.007	.123	-.061	-1.205
No of children in household	**.106**	**2.113***	-.004	-.091	.039	.774	**.106**	**2.044***	**.099**	**2.006***	.016	.314	.025	.504
Area density	**-.199**	**-3.987****	-.048	-1.028	**.126**	**2.514***	-.031	-.595	**-.324**	**-6.623***	.077	1.503	**.136**	**2.791****
Knowledge about climate change	.040	.798	.067	1.406	-.062	-1.218	-.034	-.652	.068	1.373	**.111**	**2.123***	-.003	-.051
Belief about causes of climate change	-.016	-.325	.019	.408	-.038	-.766	.038	.734	.071	1.460	-.071	-1.397	.079	1.639
Personal importance of climate change	.098	1.669	.089	1.619	**.178**	**3.035****	**.164**	**2.707****	-.012	-.214	**.146**	**2.420***	.056	.972
Perceived risk from climate change	-.052	-1.056	-.021	-.447	.000	-.013	.030	.593	.017	.352	-.020	-.394	-.068	-1.420
(Constant)		-3.847**		-5.668**		-1.055		-2.401*		-3.246**		-2.045*		1.191

* Sig. < 0.05 ** Sig. < 0.01

[i] This is consistent with the economic literature on 'rebound effects', where material or energy efficier measures free up resources that can be spent on other consuming activities thus reducing the net decrease overall consumption (e.g., Herring & Sorrell, 2008).

[ii] Carbon offsetting is defined as "the purchase of credits from greenhouse gas emission reduction proje in one place to counter the emissions of greenhouse gases in another place" (POST, 2007). Although th is debate about its efficacy as a climate change mitigation strategy, it is considered one way in wh corporate and private consumers can help tackle climate change (Lovell, Bulkeley, & Liverman, 200 There has been significant growth in the offset market, which is currently worth over US$91m (Hamilt Bayon, Turner, & Higgins, 2007); approximately 15% of the market are individual/ private consumers (of UK population; DEFRA, 2007).

[iii] This response rate is relatively low since (due to budgetary constraints) we did not use reminders prompts to boost response rates. Although the sample is demographically representative, we note likelihood that respondents had stronger opinions (and, specifically, may be more pro-environmental) th the general public. Nevertheless, since our findings are consistent with those of a recent nation-wi representative survey of English pro-environmental attitudes, behaviours and identity (N=3,618; DEFR 2007, 2008a), as well as the wider literature reviewed earlier, we do not feel our response rate undermi the validity of our findings.

[iv] Previous research indicated that a number of people had difficulty interpreting nine of the fifteen N items, so these items were excluded from the final questionnaire. The shortened version included statements: 'Humans have the right to modify the natural environment to suit their needs'; 'Humans severely abusing the planet'; 'Plants and animals have the same rights as humans to exist'; 'Nature is stro enough to cope with the impact of modern industrial nations'; 'Humans were meant to rule over the rest nature'; 'The balance of nature is very delicate and easily upset'. This shortened scale was used in previ research (Whitmarsh, 2009), when it was also found to be reliable (Cronbach's alpha=0.72). It should a be noted that the NEP technically measures environmental worldview rather than environmental valu relative to other values, in the sense of Schwartz' Value Inventory (e.g., Schwartz & Bilsky, 199 nevertheless, since the NEP is widely used as a measure of environmental values, and does indic whether individuals consider nature/environment to have intrinsic or extrinsic value, we use it here a measure of environmental values.

[v] In fact, we found flying to be *positively* associated with knowledge of the human influences on clim change, and noted a significant positive correlation between high number of flights and green self-ident (reported elsewhere; see Whitmarsh, 2008b).