People and planet

People *and* planet: Values, motivations and formative influences of individuals acting to mitigate climate change

ABSTRACT

This paper presents results from a survey of 344 individuals who engage in climate change mitigation action, contributing to debates about whether it is necessary to promote 'nature experiences' and biospheric values to encourage pro-environmental behaviour. We investigate three factors – values, motivations, and formative experiences – that underlie such behaviour but have usually been considered in isolation from each other. In contrast to previous studies of significant life experiences of environmentalists, outdoor/nature experiences were not frequently mentioned as influential. Altruistic concerns about climate change impacts on future human generations and poorer/vulnerable people were considered more motivating than other reasons for action. There was no significant difference in how respondents rated altruistic and biospheric values. Variations in responses from those involved in 'biospherically-oriented' (e.g. traditional environmental/conservation) organisations versus climate change groups suggest that there are different routes into climate change mitigation action, and our results show that it is not essential to cultivate biospheric values or love of nature to encourage such action.

KEYWORDS

Climate change mitigation, values, motivations, formative influences, pro-environmental behaviour

1. INTRODUCTION

It is increasingly recognised that values play an important part in motivating sustainable lifestyles (Jonsson and Nilsson 2014; Holmes et al. 2011) and environmental political action (Paloniemi and Vainio 2011), and it has been suggested that it is necessary to promote biospheric (ecocentric) values in order to promote pro-environmental behaviour (de Groot and

Steg 2010; Thompson and Barton 1994). Research on the significant life experiences of environmentalists shows that experiences in natural or wild areas, often in childhood, are frequently cited as important in the formation of respondents' 'environmental sensitivity' (Chawla 1998), and this has been seen as supporting the hypothesis that 'children must first come to know and love the natural world before they can become concerned with its care' (Palmer and Suggate 1996: 109). However, a small-scale mixed-methods study by Howell (2013) found that concern about the environment *per se* was not the main motivator of action for people who have adopted lower-carbon lifestyles, that her interviewees tended to score altruistic values significantly higher than biospheric ones on a survey instrument, and that experiences leading to concern about climate change included engagement with human rights and community issues.

This paper presents a study that builds on that work, reporting the results of a survey of 344 people who are taking action to mitigate climate change through adopting lower-carbon behaviours (e.g. reducing flying) and technologies (e.g. home insulation) and/or campaigning about climate change. The survey sought to understand the values, motivations and formative influences/experiences of respondents, using a mix of open and closed questions. The focus on individuals and the psychological constructs that influence their behaviour has been criticised, particularly by Shove (2010, 2011) in the context of climate change, who argues that it deflects attention from the institutions structuring possible courses of action, and that there are more useful models of social change such as practice theory. However, we believe that there is merit in examining individual behaviour as well as social practices, particularly when such behaviour suggests that different (more sustainable) performances of social practices are possible within similarly structured environments. Moreover, our attention to formative experiences as well as values and motivations allows for recognition of influences such as social relationships, group

activities, and learning experiences that are part of the creation and reproduction of social practices.

As with the previous, smaller-scale study, the research reveals that although biospheric values and concerns are in evidence among the sample respondents, other values, motivations and influences are also very important.

Values

In this paper we follow Schwartz (1994: 21) in defining values as psychological constructs, namely as 'guiding principles in the life of a person or other social entity'. Schwartz's Value Theory (1992, 1994) suggests that there are ten value types. Those that we focus on in this study belong to two oppositional poles: self-enhancement (egoistic) values and self-transcendent – including both altruistic and biospheric (ecocentric) – values. Several studies show that environmental attitudes are related to values (e.g. Schultz and Zelezny 1999), and that environmentally responsible behaviour is negatively correlated with self-enhancement values, and positively correlated with self-transcendent values (e.g. Karp 1996; Klöckner 2013; Nordlund and Garvill 2002; Thøgersen and Ölander 2002).

Although it is recognised that both altruistic and biospheric values can provide a basis for pro-environmental behaviour (e.g. de Groot and Steg 2009), there has been academic debate about whether it is most strongly associated with one or other of these types of values (for details see Howell 2013). Some researchers have argued that it is necessary to promote specifically biospheric values or an ecocentric worldview in order to stimulate 'pro-environmental' behaviour (de Groot and Steg 2010; Thompson and Barton 1994). This view appears to be supported by studies such as Farrell (2013) showing that individuals who hold an intrinsic valuation of nature are more likely to engage in environmentalism than others, although Kaiser et al. (2013) argue that appreciation of nature and appreciation of environmental protection are distinct. De Groot and Steg (2007) found that a feeling of moral

obligation to reduce car use was most strongly and positively correlated with biospheric values in five countries. Altruistic values were also positively correlated with this personal norm, but less strongly, and the relationship was not statistically significant in three of the five cases.

It is important to note also that pro-environmental values do not necessarily lead to action (Verplanken and Holland 2002); other factors, such as locus of control (Jonsson and Nilsson 2014), situational variables (Corraliza and Berenguer 2000), norms (Verplanken and Wood 2006), environmental self-identity (van der Werff, Steg, and Keizer 2013), the influence of habit (Verplanken and Wood 2006), and conflicts with other values (Büchs, Hinton, and Smith forthcoming), are among many issues that enable or constrain such values in influencing behaviour (cf. Klöckner 2013 for a comprehensive model).

Motivations

The distinction we make here between values and motivations for action is that while values are general guiding principles in a person's life, the motivations we have investigated are more specific concerns about climate change that might stimulate mitigation behaviours. While values are motivational, they do not necessarily directly relate to behaviour (Hitlin and Piliavin 2004); hence we were also interested to explore which climate change impacts participants regard as most strongly motivating their action.

The literature reveals several different motivations for adopting energy-saving and climate change mitigation behaviours and/or technologies, including ecocentric concerns about natural ecosystems (Clark, Kotchen, and Moore 2003) and social justice concerns about inequitable distribution of resources and a sense of responsibility towards future and poorer people who would be affected by climate change (Wolf 2011; Wolf, Brown, and Conway 2009). Motives are not necessarily linked to self-transcendent values. Other motivations include frugal attitudes (Fujii 2006), desire for a less frantic lifestyle (Shaw and Newholm 2002), to save money (Whitmarsh 2009), desire for improved comfort and living standards (Fawcett and Killip

2014), health benefits (e.g. of cycling; Passafaro et al. 2014), and to signal positive characteristics to oneself and others (an often unrecognised motivation; Noppers et al. 2014).

Significant experiences/formative influences

The study of the significant experiences that lead to the development of 'environmental sensitivity' and action began with the work of Tanner (1980), who found that experiences in 'natural areas' (especially during childhood) were of primary importance. Later studies have replicated this finding among environmental professionals, especially environmental educators, in several countries (Chawla 1998, 1999; Corcoran 1999; Hsu 2009; Palmer, Suggate, Bajd, Hart, et al. 1998; Palmer, Suggate, Bajd, and Tsaliki 1998; Palmer et al. 1999; Sward 1999). Chawla (1999) also found that social justice concerns were a separate route into environmental action.

These studies are not without critics. Both Noel Gough (1999) and Stephen Gough (1999) raise questions about methodology, suggesting that since memory is reconstructive it is not a reliable guide to the experiences that produce environmental activists. We agree with Chawla (2001: 457) that '[a]lthough we probably do not have complete self-understanding of our actions, neither […] are the reasons for our actions usually completely opaque to us.' Even if memories cannot be regarded as objectively 'true', they nonetheless indicate what is important to those who construct and relate them. Payne (1999) criticises the focus on individuals involved in wilderness conservation and political action; this study involves respondents who are taking domestic action, as he recommended. Our interest in significant experiences is to discover whether climate change mitigators report similar formative influences/experiences to environmentalists in previous studies, or whether climate change is an issue attracting people whose stories of engagement are quite different.

Background and aims of this study

A small-scale mixed-methods study by Howell (2013) found that participants who had adopted lower-carbon lifestyles were not motivated primarily by concerns about 'the environment' *per se*. Although some did exhibit biospherically-oriented worries about the impacts of climate change on biodiversity and landscapes, the main motivation for action for many of her interviewees seemed to be concerns about poorer people in developing countries. Concepts of justice and fairness were frequently mentioned in the in-depth narrative interviews she conducted. On a values survey, respondents rated altruistic values as more important than biospheric values as guiding principles in their lives, with the altruistic value 'social justice' having the highest overall score. Howell concluded that climate change 'should not be framed merely as an 'environmental' issue by those who hope to engage the public in dealing with it' (2013: 289), but recommended more research involving larger samples, and noted that the results might have been different had she recruited interviewees through traditional environmental campaign groups and conservation organisations, rather than climate change action groups and events.

This paper presents a study that builds on that work, involving a large-scale survey of individuals who are engaged in a significant level of climate change mitigation because of concern about climate change. This research aims (i) to examine formative influences leading to climate change mitigation action, and whether participants who report 'nature' experiences as formative differ in their values and motivations for action from others; and (ii) to investigate whether the values and motivations of respondents who are involved in climate change action groups and 'biospherically-oriented' groups such as nature conservation organisations differ; as well as (iii) to determine whether the results of Howell's exploratory study, that altruistic motivations and values are more important than biospheric ones in the context of climate change mitigation action, are validated by analysis of a larger sample. We thereby offer a rich

understanding of pro-environmental behaviour by investigating together three factors – values, motivations, and formative experiences – that underlie such behaviour but have hitherto usually been considered in isolation from each other. Since values and 'nature experiences' have both been found to relate to environmental activities, we thought it important to examine both in the specific context of motivations for climate change mitigation action, and to explore relationships between these constructs. We extend the literature through our emphasis on action against climate change, which has not generally been the focus of previous studies operationalising values or significant life experiences. We also contribute to knowledge by comparing values, motivations and formative influences of people involved in different types of organisation.

2. METHOD AND PARTICIPANTS

Recruitment of participants

This paper is based on the results of an online survey (implemented using Qualtrics software) of individuals who engage in climate change mitigation action, conducted between 28 June and 16 October 2013. Participants in the study were recruited via email, electronic newsletters, and social media (Facebook, Twitter and LinkedIn). Although we cannot claim that our sample is representative of 'climate change mitigators', we tried to recruit as varied a sample as possible so as to avoid any potential bias (in terms of values, motivations or formative influences) that might result from focussing on a more homogenous group. We aimed to include not only people who are involved in climate change action groups, but also those who have links to more traditional/general environmental organisations, and individuals who do not belong to such groups. Hence we emailed a wide variety of organisations to ask if they would publicise the survey to their members through email lists, newsletters and/or social media. The complete list of organisations approached is included in Appendix A. Some did notify their members of the

survey; others publicised it only to staff, while a few replied that they would/could not be involved for various reasons. Some organisations did not respond to our emails and therefore we cannot be sure whether or not they publicised the survey in any way.

We also publicised the survey using our universities' social media accounts/electronic newsletters, avenues such as a local 'Swap Shop' email list, and LinkedIn messages to contacts whose details suggested interest/involvement in climate change mitigation. For other research purposes, we wanted to gather data from climate change educators, so we sent emails to academics, writers, and academic email lists identified as connected to this area of work, inviting people to complete the survey themselves and to publicise it to colleagues. The responses of participants who take action to mitigate climate change in addition to being involved in climate change education are included in the results reported here.

It is clear from the data on how respondents received the survey, and the organisations with which they are involved (see Appendix B and Table 1 respectively), that a wide variety of avenues for engagement were covered.

As the survey asks about values and we wished to avoid biasing it in favour of those who have strong altruistic values, we offered a financial incentive for participation (the opportunity to be entered into a draw with five £50 vouchers as prizes) and tried to avoid appealing to altruistic motives for completing the survey in the text we used, and which we asked organisations to use, to publicise it. We did not have control over exactly how organisations/individuals chose to present the survey, however.

Measures

The survey began with filter questions: 'Have you reduced your carbon footprint AND/OR been involved in campaigning, because of concern about climate change?' and 'Is teaching AND/OR writing for the general public about climate change a significant part of your work?' (Yes/No). Respondents were then asked to rate their agreement with the statements 'I feel concerned about

climate change', 'I feel motivated to do something about climate change', 'I can make a difference by reducing my carbon footprint' and 'I can make a difference by campaigning about climate change' on a continuous sliding scale (using the Qualtrics 'slider' question type so parametric statistical analysis could be used) from 0 (labelled 'Strongly disagree') to 10 ('Strongly agree').

Participants next indicated actions that they are engaged in primarily because of their concern about climate change, from a list of 18 possibilities in the areas of home energy use, food, transport, purchases, and campaigning/group action. In order to lessen pressure to provide socially-desirable responses, and avoid normative suggestions about behaviour, the question stated that 'We understand that not all these actions will necessarily be possible for you, or that you may not want to do them.'

This was followed by an open question asking respondents to describe the significant life experiences and formative influences that have contributed to their concern about climate change and efforts to do something about it (and their interest in teaching/writing about climate change, in the case of educators).

Next we asked respondents to indicate on a continuous sliding scale from 0 ('Doesn't motivate me') to 10 ('Motivates me most') how much they are motivated to take action on climate change by concern about the impacts of climate change on: 'Wildlife (for its own sake)'; 'Friends/family (incl. own children/grandchildren)'; 'Future human generations'; 'Landscapes'; 'Me personally'; 'Poorer/vulnerable people'. The order in which these options were presented to respondents was randomised to avoid response-order effects.

Values were measured by requesting participants to indicate how important each one of 13 values is 'as a guiding principle in your life' using a nine-point ordinal (not sliding) scale from -1 ('opposed to my values'), through 0 ('not important'), 3 ('important'), to 7 ('of supreme importance'). This instrument was designed by de Groot and Steg (2007, 2008) based on

Schwartz's value theory (1992, 1994) to assess value orientations related to environmental behaviour, and comprises five egoistic values, four altruistic values and four biospheric values (see Table 6). Following de Groot and Steg (2007, 2008), respondents were directed: 'Please try to distinguish as much as possible between the values by using different numbers. Ordinarily there are no more than two values rated as 7 (supremely important guiding principles).'

Socio-demographic data were then collected, along with information about what groups respondents were actively involved in and how they received the survey.

Analysis of open question on formative experiences and influences

To analyse the open question on significant life experiences and formative influences that have shaped respondents' concern and action for climate change mitigation, the first author developed a coding scheme, with categories derived partly from previous studies (Chawla 1999; Corcoran 1999; Palmer and Suggate 1996; Palmer, Suggate, Bajd, Hart, et al. 1998; Palmer, Suggate, Bajd, and Tsaliki 1998; Palmer et al. 1999; Sward 1999; Tanner 1980), and partly from an inductive process of examining the data. Both authors then independently coded the same random sample of ten per cent of the responses, coding a factor only when it was mentioned as an influence on attitudes or action, not when it was solely an outcome of these. This was sometimes difficult to determine as many of the responses were complex and related a series of influential experiences and responses to these, which were sometimes in turn significant in prompting further concern and/or action.

A measure of intercoder agreement, Krippendorff's alpha, was then calculated. Discrepancies in coding were discussed, the coding scheme revised, and new random samples coded and compared until the intercoder agreement coefficient was satisfactory. The third iteration of the coding scheme, comprising 23 single factors arranged into 12 groups, plus two codes identifying social justice or biospheric-oriented comments, was accepted and is shown in Table 3. Intercoder agreement for all the remaining cases was good at over 0.8 for 18 codes,

acceptable (over 0.667 but less than 0.8) for six codes, and 0.639, just below the range considered acceptable, for one code ('N/oth'). These results show that our coding scheme has validity, but for extra confidence regarding our analysis we decided to discuss and resolve all cases of disagreement rather than employing a compromise such as using each researcher's codes for half the contested cases.

Characteristics of respondents

In total, 380 people submitted surveys having responded 'yes' to the question about whether they have reduced their carbon footprint or campaigned about climate change. Thirty responses were incomplete and therefore excluded. Data from six participants who indicated that they were engaged in less than five of the climate change mitigation actions we asked about were also removed as we wished to ensure that participants in the study were clearly demarcated from the general population by being involved in a significant level of climate change mitigation action motivated by concern about climate change. This resulted in a final sample of 344 'mitigators' (of whom 84 were also climate change educators). The socio-demographic characteristics of survey respondents are shown in Table 2. There were more female respondents than males, and participants tended to be more likely to be highly educated and to have a high income than the general population.

Respondents' involvement in various types of organisation that might relate to or influence the values/motivations associated with climate change mitigation action is noted in Table 1.

3. RESULTS

Climate change concern and action

As expected, respondents expressed very high levels of concern about climate change (mean score 9.4 out of 10; SD 1.0) and motivation to act (mean 8.9; SD 1.2). They also tended to have

a sense of agency/efficacy, though this was felt somewhat less strongly: mean score for agreement that 'I can make a difference by reducing my carbon footprint' was 7.8 (SD 1.9) and for 'I can make a difference by campaigning about climate change' was 7.6 (SD 1.9). The mean number of actions participants stated they engage in primarily because of concern about climate change (out of 18) was 11.8 (SD 3.2).

Significant life experiences leading to concern and action

The number of single factors coded in responses to this question ranged from 0 to 11, with a median of 3. Half of all responses mentioned between 2 and 5 coded factors (inclusive). Table 3 shows the percentage of responses that were coded with each single factor. Figure 1 shows the frequency with which each *group* of factors was coded. From this it can be seen that the most frequently cited influences, and the only ones coded in over 20 per cent of responses, were the media (including books; mentioned by 41.6 per cent of the respondents), people (38.7 per cent), education (36.9 per cent), groups/organisations (32.8 per cent) and work (29.4 per cent), while outdoor experiences (found in previous studies of environmentalists to be very influential), were mentioned by only 13.7 per cent of the sample, making this factor tenth out of 12. The proportion of responses coded as including social justice- or biospheric-oriented comments was 21.2 and 22.4 per cent respectively.

Comparing respondents involved in 'biospherically-oriented' groups (n = 100) and climate change groups (n = 39) (excluding 41 who are involved in both), we found that the top five most frequently cited influences were the same as for the sample as a whole, though the order differed in each case. Outdoor/nature experiences were mentioned by 14 per cent of respondents involved in biospherically-oriented groups and by 15.4 per cent of respondents involved in climate change groups (respectively ninth and tenth most frequently mentioned, out of 12 groups of factors). Despite these similarities, 23.1 per cent of responses from people involved in climate change groups were coded as including social justice-oriented comments,

while only 15.4 per cent made biospheric-oriented comments; for members of biospherically-oriented groups the proportions were 18 per cent and 27 per cent respectively. (We were unaware at the time of coding which groups, if any, respondents belonged to.)

Motivations for climate change action

We asked directly about the motivations underlying participants' climate change action, intending to combine the results regarding concern about impacts on future human generations and poorer/vulnerable people into a 'social justice' scale; on wildlife and landscapes into a 'biospheric concerns' scale; and on friends/family and self into a 'personal' scale for the purposes of analysis. However, we found that concerns about climate change impacts on future generations correlated only weakly with concerns about impacts on poorer/vulnerable people (and other motivations). Hence we compared the mean scores for each motivation individually. Descriptive statistics for each motive are shown in Table 4.

There were significant differences between the mean scores for different motivations, $F(4.151, 1423.818) = 138.806$, $p < .0005$, partial $\eta^2 = .288$ (Huynh-Feldt correction applied as the assumption of sphericity was violated). Post hoc analysis using paired samples t-tests was conducted with a Holm-Bonferroni adjustment applied to ensure the familywise error rate was controlled at $\alpha = 0.05$. There was a significant difference between the scores for every pair of motivations. Therefore we can conclude that concerns about climate change impacts on future human generations and poorer/vulnerable people were rated as more motivating by study participants than the other reasons for action, with concerns about impacts on wildlife a close third.

Concern about impacts on wildlife was rated a stronger motivation for action by respondents who cited outdoor/nature experiences as a formative factor (mean = 8.4, SD = 1.7) than those who didn't (mean = 7.6, SD = 2.5), p = .007. With a Holm-Bonferroni adjustment

applied to ensure the familywise error rate was controlled at $\alpha = 0.05$, there were no other significant differences relating to this factor, for any of the other five motivations investigated.

We were also interested in potential differences in how motivations for action were rated depending on which organisations respondents belonged to. Based on the findings of Howell (2013) we formulated the following hypotheses:

H_1: members of 'biospherically-oriented' groups (see Table 1 for examples) would rate impacts on wildlife and landscapes as stronger motives for action than the rest of the sample;

H_2: members of climate change action groups would rate concern about impacts on future human generations and poorer/vulnerable people as stronger motives for action than the rest of the sample.

Welch t-tests (for independent samples of substantially unequal sizes and unequal variances), with a Holm-Bonferroni adjustment applied to ensure the familywise error rate was controlled at $\alpha = 0.05$, showed that both hypotheses should be accepted. See Table 5 for the p-values and differences in the mean scores for these motivations comparing each sub-sample with the rest of the respondents.

Values of respondents

The mean score (for the whole sample) for each of the 13 values that respondents were asked to rate as guiding principles in their lives is shown in Table 6. There were no significant differences between the mean scores for the top six ranked values, which included three biospheric and three altruistic values. Cronbach's alpha for the biospheric, altruistic, and egoistic scales was .806, .724 and .731 respectively, indicating good internal consistency, and therefore reliability, for each scale. There were significant differences between the mean scores for the three value scales, $F(1.897, 644.427) = 1285.773$, $p < .0005$, partial $\eta^2 = .789$ (Huynh-Feldt correction applied as the assumption of sphericity was violated). Post-hoc pairwise t-tests confirmed that respondents consider both biospheric and altruistic values more important than

egoistic values ($p < .0005$ for both tests), but that there is no significant difference between respondents' mean scores for the biospheric and altruistic value scales. As this particular case is a closed testing procedure there is no need to apply a correction for multiple testing.

There was also no significant difference in how those who mentioned outdoor/nature experiences as formative (n = 47) rated biospheric values compared to altruistic ones.

Examining sub-samples of respondents involved in different types of organisations revealed that people involved in 'biospherically-oriented' groups (n = 100) rated biospheric values (mean = 5.9, SD = 1.0) as slightly more important than altruistic values (mean = 5.5, SD = 1.0), $p = .005$. There was no significant difference in how those involved in climate change action groups (n = 39) and in both types of group (n = 41) rated biospheric versus altruistic values.

4. DISCUSSION AND CONCLUSIONS

This research contributes to understanding the values, motivations, and formative influences underlying climate change mitigation action; the influence of 'outdoor/nature experiences' on values and motivations; and the similarities and variations in values, motivations, and formative experiences of members of different types of organisations. These findings suggest some important considerations for climate change mitigation engagement strategies, and also for researchers investigating the influence of values on sustainable/environmental behaviour.

Examining significant experiences and formative influences that lead to climate change mitigation action (our first research aim), outdoor experiences 'in nature' emerge as a much less significant influence on our study participants than they are in the accounts of environmentalists surveyed previously (cf. Chawla 1998). This could be because children nowadays have fewer opportunities to enjoy such experiences than previously (Louv 2010), or because acting on climate change relates less to biospheric concerns than was the case with the

environmental action participants in previous studies were involved in (often nature conservation or environmental education). The important point is that climate change appears to be attracting concern and action from people who are not necessarily acting in response to a deeply-felt connection to nature developed during childhood. This is not to suggest that nature experiences should not be encouraged; MacKerron and Mourato (2013) found that being outdoors promotes wellbeing, and Weinstein, Przybylski, and Ryan (2009) show that immersion in nature inspires pro-social/other-focussed aspirations, both of which could lead to greater engagement with climate change mitigation. Respondents who reported formative outdoor/nature experiences rated concern about the impacts of climate change on wildlife as a stronger motivation for action than other participants did, suggesting that such experiences encourage sensitivity to the effects of climate change on plants and animals.

When asked about six potential motivations for action, respondents generally viewed concern about impacts on other people as more motivating than biospheric concerns. This seems to be particularly an issue of social justice, as concern was focussed more on future generations and poorer/vulnerable people than on potential impacts on family and friends (and concern for the future of children/grandchildren was one of the least frequently coded influences mentioned in the open question, perhaps because of the psychological distance often associated with climate change; cf. Lorenzoni and Pidgeon 2006). This echoes the distress and/or compassion expressed in interviews with Howell (2013) and Wolf (2011) about the disproportionate effects of climate change suffered by people in developing countries, and interviewees' sense of responsibility to try to mitigate the problem. Concerns for 'future generations' were not so explicitly raised in those interviews, but are likely to have been implicit in worries about climate change impacts on developing countries, since the problem will be ongoing. This 'social justice' motivation also reflects the finding by Chawla (1999) of a 'social justice' path into environmental action distinct from a path born of concern about the environment in and of itself.

Our second aim was to explore whether the values and motivations of individuals involved in different types of groups differ. Analysis of the open question showed that members of 'biospherically-oriented' organisations such as traditional environmental, nature conservation and animal rights groups were more likely to make ecocentric comments than social justice-oriented ones, while the reverse was true for respondents involved in climate change groups. As we hypothesised, members of 'biospherically-oriented' groups rated biospheric concerns about impacts of climate change on wildlife and landscapes as more motivating than the rest of the study respondents did, while members of climate change action groups rated social justice concerns about impacts on future generations and poorer/vulnerable people as more motivating than did the other participants. These results suggest that although members of biospherically-oriented groups certainly are taking climate change mitigation action, and are inspired to do so by the kind of ecocentric concerns traditionally associated with 'pro-environmental behaviour', there is a separate, distinct route into climate change mitigation action which attracts people who are not associated with such groups, and who are motivated by different concerns. Of the 80 respondents who were involved in climate change groups, almost half (39) were not involved in any biospherically-oriented groups.

When it came to the analysis of respondents' values, the results differed from those of the earlier small-scale study by Howell (2013), in that there was no significant difference in how respondents rated the altruistic and biospheric value scales. We also found that there was no significant difference between how members of climate change action groups rated biospheric and altruistic values, though members of biospherically-oriented groups rated biospheric values as more important than altruistic values.

Various explanations are possible for this seeming mismatch between values and motivations for action for some respondents. Perhaps becoming concerned about climate change for altruistic or social justice reasons leads people to value the environment more,

though an intrinsic valuation of nature is not the most motivating factor. It is also possible that when rating the values some respondents viewed even the biospheric ones through an altruistic lens; for example, scoring 'protecting the environment (preserving nature)' highly not because they have a strong sense of the intrinsic worth of nature for its own sake, but because they believe that preserving nature is necessary for human well-being. But it may also indicate that biospheric values do not necessarily translate into the sole or most motivating reasons for action. Values, as conceptualised and operationalised in this study, are more general principles than the specific concerns that we used to measure motivations for action. It might be that although some respondents rate biospheric values as equally or more important than altruistic ones in principle, a question about motivations framed in terms of concern brings to light more visceral, affective responses to climate change that reveal a greater sense of connection to other humans than to non-human nature. Equally, given that media and education both emerged as important themes in response to the question about formative influences that have led to action, it could be that these are better at operationalizing altruistic concerns than biospheric ones in relation to this problem.

What is important to note as a result is that although studies may show a correlation between biospheric values and 'pro-environmental' behaviour (cf. Farrell 2013), this does not necessarily mean that it is specifically biospheric motivations that prompt that behaviour. Researchers investigating the influence of values on pro-environmental behaviour might be well-advised to consider whether they should also examine specific motivations for action.

We should not play up too strongly the differences we observed in biospheric/altruistic motives and values, however, either within the whole sample or between subsamples. Although the differences we have reported are statistically significant, the effects are relatively small. Biospheric and altruistic values tend to be linked, and factors influencing action are complex and multifaceted (Moisander 2007; Stern 2000). Although some respondents did make

statements that indicated a strong value-orientation in a particular direction (e.g. 'Motivated by species protection and mass extinctions as a result of CC. Messages about human impacts of CC do not motivate me.'), these appear to be rare in respondents' accounts, in which ecocentric and altruistic views and concerns were often synergistically related.

With reference to our third research aim, although our findings regarding values differ from those of Howell (2013), our results validate hers insofar as they provide further evidence that climate change mitigators are inspired by altruistic values and social justice concerns as well as ecocentric worldviews. The overall point to be made is that there are different routes into, and motivations for, climate change action, and it would be mistaken for climate change campaigns to focus on cultivating or appealing too strongly to one particular value orientation over another (except in cases where the campaigns are being run by organisations for their own members, and they know what messages their members respond to). In particular, it does not seem to be essential to cultivate biospheric values or love of nature to encourage climate change action, as some have suggested is the case for 'pro-environmental behaviour'. Our results may differ from studies which find biospheric values to be particularly important due to variations in the types of pro-environmental behaviour considered or the concerns underlying the behaviour (e.g. local pollution *versus* climate change). If this is so and climate change mitigation action is inspired by different values/motivations to other environmentally-responsible behaviour, this suggests that it shouldn't necessarily be framed as 'pro-environmental behaviour'. In some cases, for example, it may be more correct to regard it as 'pro-social behaviour', and this framing might prove more engaging to people who do not regard themselves as 'environmentalists'. We recognise that exploring the influences shaping the action of our particular sample does not necessarily tell us which values and motivations would be most important in supporting climate change mitigation action in the general population, but if biospheric values and motivations are not more important than others for most

people who are already acting, it seems unlikely that they will prove essential to activate a general population which is not composed of 'environmentalists'.

Perhaps the most notable difference in value orientations observed in this study is the very much lesser importance accorded to egoistic values than either altruistic or biospheric ones, which mirrors the findings of Howell (2013). The low value given to 'wealth', and the narratives about the importance of a frugal/waste conscious orientation preceding and influencing climate change mitigation action – mentioned by 16.3 per cent of the sample in response to the open question – echo the results of research by Hards (2011) and Fujii (2006) as well as the earlier study by Howell (2013). They also relate to findings of Brown and Kasser (2005) that people who live a life of voluntary simplicity exhibit more environmentally responsible behaviours, and a meta-analysis by Hurst et al. (2013) that found a negative correlation between materialistic values and environmentally responsible behaviours. This would seem to suggest that encouraging climate change mitigation action would be easier in a society that does not also promote and celebrate conspicuous consumption, but instead values frugality. UK government campaigns such as 'Act on CO2' have for some time now been stressing the financial benefits of saving energy. While these messages may influence some people to take some action, they are not mentioned by our respondents, suggesting that they do not have a significant influence on people who are seriously engaging in climate change mitigation. There is a strong argument now being made that appealing to self-enhancement values in this way reinforces those values, making it more difficult in the long-term to promote the necessary behavioural changes (Crompton and Kasser 2010; Evans et al. 2013; Holmes et al. 2011). Instead, it is argued that we need to prevent the known causes of materialistic values and promote the self-transcendent and intrinsic values that stand in opposition to them (Kasser 2011). Chilton et al. (2012) show that even individuals who hold strong materialistic values display a sense of moral duty to act to deal with bigger-than-self problems such as climate

change when they are primed, and therefore encouraged to engage, with intrinsic values. Promoting frugality as well as altruistic and biospheric values should hopefully help to create a society in which the values and concerns that are strong motivators for climate change mitigation action can thrive.

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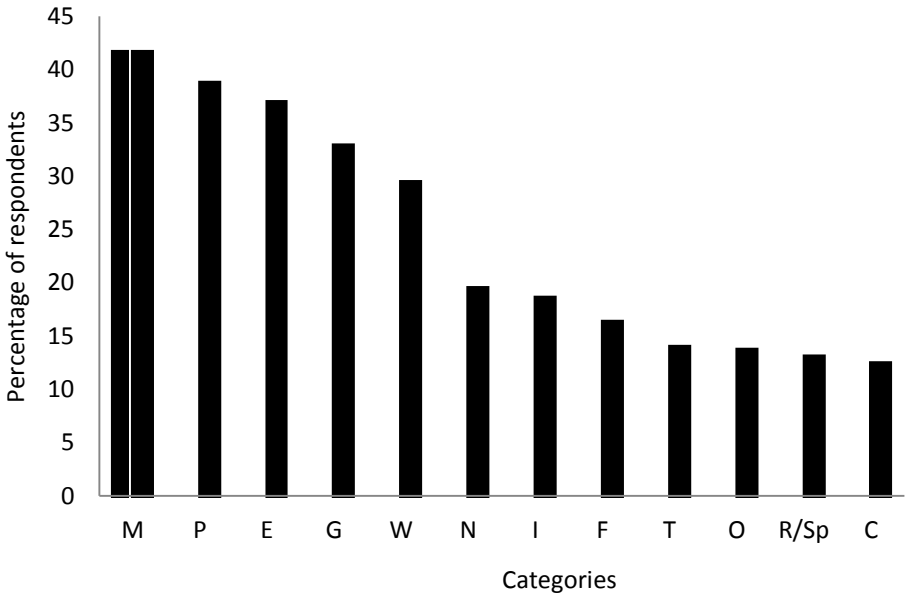

M Media	W Work	T Travel/living abroad
P People	N Negative experiences/events	O Outdoor/nature experiences
E Education	I Impacts of climate change	R/Sp Religion/spirituality
G Groups	F Waste/frugality	C Grand/children

Figure 1. Factors influencing respondents' climate change concern and action

Table 1. Groups and organisations that respondents are actively involved in

Type of group/organisation	No.	% (n = 344) of respondents
Groups we classed as 'biospherically-oriented'		
Environmental (e.g. Friends of the Earth, Greenpeace, WWF)	93	27.0
Nature conservation (e.g. RSPB, Wildlife trusts)	50	14.5
(Organic) growing oriented (e.g. allotment association, permaculture group, community farm, Soil Association)	28	8.1
Animal rights (e.g. RSPCA)	4	1.2
Other groups		
Religious (predominantly Quakers – 25.6% of the sample)	112	32.6
Climate change/Transition town (local or national)	80	23.3
Human rights/development-oriented (e.g. Oxfam, Amnesty, Red Cross)	72	20.9
Local sustainability (e.g. Sustainable Carlisle)	29	8.4
Other groups (e.g. cycle campaigns, Avaaz)	64	18.6

Note: This was an open question and the analysis presented only takes into account whether each respondent mentioned being involved in a particular type of group, not how many such groups they were involved in (e.g. a respondent involved in three different environmental groups is only counted once in the 'environmental groups' class). Percentages do not sum to 100 as respondents could state membership of more than one group.

Table 2. Socio-demographic characteristics of respondents (n = 344)

	No.	%		No.	%
Gender			*Highest level qualification*		
Female	207	60.2	None	1	0.3
Male	136	39.5	GCSE or equivalent	2	0.6
Not given	1	0.3	A Level or equivalent	16	4.7
			Undergraduate degree	101	29.4
Age			Postgraduate degree	196	57.0
18-19	3	0.9	Other	27	7.8
20-29	40	11.6	Not given	1	0.3
30-39	68	19.8			
40-49	68	19.8	*Net household income*		
50-59	56	16.3	< £10,000	28	8.1
60-69	72	20.9	£10,000-£19,999	56	16.3
70-79	28	8.1	£20,000-£29,999	64	18.6
80+	5	1.5	£30,000-£39,999	67	19.5
Not given	4	1.2	£40,000-£49,999	38	11.0
			>£50,000	73	21.2
Place of residence			Prefer not to say	18	5.2
England	198	57.6			
Wales	54	15.7			
Scotland	47	13.7			
Other European countries	21	6.1			
North America	16	4.7			
Australia & New Zealand	3	0.9			
Global South	2	0.6			
>1 place	2	0.6			
Not given	1	0.3			

Table 3. Coding scheme for open question on formative influences leading to climate change concern and action

Category	Sub category	Code	Notes and examples	% responses
People (with whom have direct personal contact)	Family	P/fam	Parents, siblings, children if they have taught/influenced (grand)parents directly; partners/spouses are not included in this category, intended to represent birth family.	19.5
	Educators	P/ed	Teachers, lecturers, academic supervisors.	5.2
	Other people	P/oth	Partners/spouses, friends, colleagues, people in church/Quaker/other groups. Also e.g. 'discussions with vegans'. Authors/speakers not included (unless personal contact).	23.0
Media	Books/scientific reports/magazines	M/read	All non-online reading material except newspapers even if not about climate change.	25.0
	News media	M/news	Newspapers or TV/radio news, also online news media if specified.	8.4
	TV/radio programmes (except news)	M/TV	Documentaries, discussions etc on TV or radio.	8.1
	Films	M/film	Any kind of film mentioned (fiction as well as films like An Inconvenient Truth).	10.5
	Internet	M/web	All online material except online news media e.g. blogs, social media.	2.6
	Media general	M/gen	Other/unclear media e.g. 'reading/reading the science' when medium is not stated.	11.0
Formal & informal education	School	E/sch	Lessons, fieldtrips etc. If a teacher is specified, code as P/ed, not E/sch.	8.7
	Tertiary education	E/3	University all levels including PhD research; professional education.	21.2
	Events/talks	E/oth	Green fair/ peak oil talk/visit to CAT. Planned (educational) events, not life events.	15.4
Outdoor/nature experiences		O	One-off or long-term; e.g. being brought up on a farm/smallholding; camping, playing outdoors, walking, bird spotting.	13.7
Work (paid or voluntary)		W	All work including academic research or for book/profession etc but not PhD research. Include voluntary work /internships; not colleagues (code as P/oth).	29.4
Negative experiences/events	Related to the environment	N/env	Habitat/rainforest loss, loss of green space; disasters such as floods/typhoons (not necessarily experienced personally).	13.4
	Other negative happenings	N/oth	e.g. economic crash in Ireland; illness due to pesticides.	8.1
Impacts of CC		I	Concern about, or observations of, specific impacts of climate change on weather patterns, seasons, people, animals etc.	18.6
Organisations/ campaigns/groups	Climate change/transition group	G/CC	Involvement in direct action/campaigns/climate change related groups e.g. climate camp, local action group; influence of their campaigns even if not involved.	18.3
	Other groups/campaigns	G/oth	e.g. Greenpeace, road protests, anti-nuclear campaigns. Use for unspecific 'rallies' and non-CC campaign influences (unless it's a one-off educational event – code E/oth).	21.8
Grand/children		C	Having children/grandchildren, or concern for their future. Concern about particular people, not general concern about future generations.	12.5
Travel/living abroad		T	e.g. working abroad led to concern about impacts of climate change on other societies.	14.0
Religion/spirituality		R/Sp	Concern/action inspired by faith or participation in religious group.	13.1
Waste/frugality		F	Frugal/waste-conscious/DIY upbringing (should also be coded P/fam); concern about rubbish/recycling; dislike of sight of waste.	16.3
Social justice theme present		SJ	e.g. comments re fairness, climate justice, concerns re poor facing worst impacts of climate change, environmental concern developing out of peace/justice concerns etc.	21.2
Biospheric-oriented theme present		BIO	e.g. comments re connection to nature, biodiversity, animal welfare, environment valuable for its own sake, looking after animals as a child etc.	22.4

Table 4. Mean and standard deviation of the response values for motivations for action

Motivated by concern for	Mean	SD
Future human generations	8.3	2.0
Poorer/vulnerable people	8.0	2.0
Wildlife (for its own sake)	7.7	2.5
Family/friends (incl. own children/grandchildren)	7.1	3.0
Landscapes	6.4	2.9
Me personally	4.6	3.0

Table 5. Results of t-tests of differences in mean scores for motivations for action

Motivation: concern about impacts on…	Mean (SD) for members of 'biospherically-oriented' groups	Mean (SD) for rest of sample	*p* value (one-tailed)	Adjusted *p* value with which to compare *p*
Landscape	7.0 (2.7)	6.0 (2.9)	.001	.025
Wildlife	8.2 (2.2)	7.3 (2.6)	.0005	.0125
	Mean (SD) for members of climate change action groups	Mean (SD) for rest of sample	*p* value (one-tailed)	Adjusted *p* value with which to compare *p*
Future generations	8.9 (1.5)	8.1 (2.1)	.0005	.0167
Poorer/vulnerable people	8.4 (1.5)	7.9 (2.2)	.0085	.05

Table 6. Value scores for all respondents

Value and definition used in the survey	Rank (for 344 respondents)	Mean score
Biospheric values		
Respecting the earth (harmony with other species)	1	5.8
Protecting the environment (preserving nature)	2	5.7
Preventing pollution (protecting natural resources)	6	5.5
Unity with nature (fitting into nature)	7	5.1
Altruistic values		
Social justice (correcting injustice, care for the weak)	=3	5.6
Equality (equal opportunity for all)	=3	5.6
A world at peace (free of war and conflict)	=3	5.6
Helpful (working for the welfare of others)	8	4.9
Egoistic values		
Ambitious (hard working, aspiring)	=9	3.1
Influential (having an impact on people and events)	=9	3.1
Wealth (material possessions, money)	11	1.2
Authority (the right to lead or command)	12	0.9
Social power (control over others, dominance)	13	0.7

Appendices

Appendix A: Organisations approached to publicise the survey

A Rocha	Plantlife International
Aberystwyth University (weekly bulletin)	Portsmouth Climate Action Network
Association for the Conservation of Energy	Public Interest Research Company/Common
Cambridge Carbon Footprint	Cause
Campaign Against Climate Change	Royal Society for the Protection of Birds
Carbon Conversations	Socioenergie email list
Climate Camp	Stop Climate Chaos
Climate Friendly Bradford on Avon	Stop Climate Chaos Scotland
Climate Outreach and Information Network	Sustainable Carlisle
Climate Rush	Sustainable Lifestyles Research Group
Fife Diet	Swindon Climate Action Network
Friends of the Earth	Talking Climate
Friends of the Earth Cymru	Transition Movement
Friends of the Earth Scotland	Transition Linlithgow
Greenpeace UK	Tyndall Centre for Climate Change Research
Living Witness Project	Winchester Action on Climate Change
Low Carbon Communities Network	Women's Environmental Network
Machynlleth SwapShop	Woodland Trust
New Environmentalist	World Development Movement Scotland
Northfield Ecocentre	World Wildlife Fund
Plane Stupid	World Wildlife Fund Scotland

Appendix B: How respondents received the survey

	Number		% (n = 344)	
Direct from one of the researchers	60		17.4	
Sent by a friend/colleague	86		25	
Via social media/newsletter/email list/website	191		55.5	
related to: Climate change or transition group/concerns		72		20.9
Environmental group/concerns		21		6.1
Other environment-related organisation[a]		29		8.4
Other organisation (not environment or climate change related)[b]		34		9.9
Not specified		35		10.2
Can't remember	7		2.0	

[a] Not environmental organisations as such, but have some connection to environmental concerns. Socioenergie email list, Machynlleth SwapShop, and Common Cause.

[b] Includes sources such as Aberystwyth University weekly bulletin, Quakers, and an international women's group (IWAP) that picked up the link.