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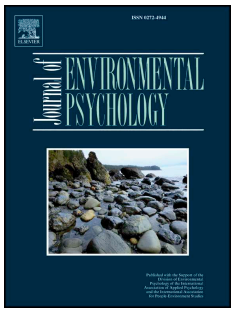

Assessing the Structure of UK Environmental Concern and its Association with Pro-environmental Behaviour

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Assessing the Structure of UK Environmental Concern and its Association with Pro-environmental Behaviour.

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Assessing the Structure of UK Environmental Concern and its Association with Reported Pro-Environmental Behaviour.

Abstract

Understanding the structure and composition of environmental concern is crucial to the study of society's engagement with environmental problems. Here, we aim to determine if components of the VBN model emerge when applying a combination of exploratory and confirmatory factor analysis to a large UK dataset, one designed without a priori commitment to a theoretical model. A three-factor model was confirmed to be the most substantively and methodologically optimal. Two of the factors correspond to the VBN's ecocentric and anthropocentric factors. However, the third factor does not routinely map onto the third factor of the VBN (ecocentric concern). We have called our factor 'denial', as high scorers tend to be responding positively to statements that would suggest inaction. The association between these factors and level of reported pro-environmental behaviour is assessed.

1. Introduction

As a psychological phenomenon, concern for the environment has been continuously investigated for four decades. Its study has provided a greater understanding of how individuals relate to their environment as well as the comprehension and possibly inclination towards pro-environmental behaviour. In the literature, EC is taken to broadly refer to the degree to which people are aware of problems regarding the environment, their support of

efforts to solve such problems and a willingness to contribute personally to their solution (Dunlap & Jones 2002, p. 485). This definition rightly indicates that EC is a very broad concept covering a wide range of phenomena with multiple aspects and dimensions (see also Xiao & Dunlap 2007; Alibeli & White 2011). Both Dunlap and Jones (2002) and Klineberg et al. (1998) emphasise that the broad definition of EC implicitly requires researchers to: "think clearly at the outset about what aspects or facets of environmental concern they want to measure, and then carefully conceptualize them prior to attempting to measure them" (Dunlap & Jones 2002, p. 515), thus avoiding further ambiguity in concept definition and variations or errors in variable measurement.

EC is largely considered to be attitudinal in nature. Minton and Rose (1997) conceptualise EC as constructed from a broad range of environmental attitudes. Similarly, Vining & Ebreo (1992) treat EC and environmental attitudes as synonymous, defining EC as the development of an array of attitudes toward the environment. However, there is only weak consensus on the specific structure of these attitudes and as such the composition of EC varies across studies.

Many researchers such as Yin (1999), Cottrell (2003), Schultz et al. (2004), and Milfont and Duckitt (2010)[1] adhere to the orthodox three-component attitude model as an approach for specifying the broad structure of environmental attitudes. However, some contemporary attitude theorists hold that cognition, affect and behaviour form the *basis* of evaluations of particular psychological objects. For example, Albarracin et al. (2005) states "affect, beliefs and behaviours are seen as interacting with attitudes rather than as being their parts" (p. 5). This contemporary approach suggests that attitudes should be conceptualised as evaluative tendencies that can both be inferred from and have an influence on beliefs, affect and behaviour.

A combination of these two theoretical perspectives is used in this study. Here, EC is considered to be a concept that consists of cognitive and affective components, with which behaviour interacts but is not a part of. Our position is that with EC – as with many other attitudinal constructs – there are many mediating and moderating influences between the internal, latent concern and the outward environmental behaviour and therefore it seems most appropriate to treat behaviour and attitudes as theoretically distinct. However, we also want

[1] *Milfort and Duckit's (2010) approach has much merit, in particular in the comprehensiveness of the set of items that they use. The two-level model that resulted from their survey of 455 undergraduates is not, however, specifically a model of environmental concern, but is more a model of attitudes towards the environment. Whilst this more object orientated attitudinal formulation is related to EC we are not primarily concerned with it here.*

to make a theoretical statement about what EC is. Concern in its relational sense expresses beliefs about negative states or potential outcomes and is associated with specific affective states such as fear and worry. Schultz et al. (2005, p. 458) “use the term environmental concern to refer to the affect (i.e., worry) associated with beliefs about environmental problems". We too aim to incorporate this affect component in our definition of EC.

1.1. The NEP

There is an extraordinary number of measures of environmental attitudes, a fact that led Stern (1992) to describe the situation as an ‘‘anarchy of measurement’’ (p. 279). Three classic environmental concern measures are the Ecology Scale (Maloney & Ward 1973; Maloney et al. 1975), the Environmental Concern Scale (Weigel & Weigel 1978), and the New Environmental Paradigm (NEP) Scale (Dunlap & Van Liere 1978; Dunlap et al. 2000). These three scales examine multiple phenomena or expressions of concern, such as beliefs, attitudes, intentions and behaviours, and they also examine concerns about various environmental topics, such as pollution and natural resources. Hence, according to Dunlap and Jones’ (2002) typology these measures are all multiple-topic/multiple-expression assessment techniques. Although widely used, both the ecology scale and the environmental concern scale include items tapping specific environmental topics that have become dated as new issues emerge (Dunlap and Jones 2002, 2003). The NEP Scale avoids this issue by using only general environmental topics that do not become dated, at least in the short to medium term, to improve the psychometric properties of the scale.

The original NEP Scale was published in 1978 by Dunlap and Van Liere, and consists of 12 items (8 pro–trait and 4 con–trait) responded to on a 4–point Likert scale (anchored by strongly agree to strongly disagree). This was later updated in 2000 by Dunlap et al. (2000) who included additional items to make the scale more psychometrically sound, and updated

the terminology used. The items are intended to tap three main facets of environmental attitudes: a belief in (1) humans' ability to upset the balance of nature, (2) the existence of limits to growth, and (3) humans' right to rule over the rest of nature. The NEP Scale measures the overall relationship between humans and the environment; higher NEP scores indicate an ecocentric orientation reflecting commitment to the preservation of natural resources, and lower NEP scores indicate an anthropocentric orientation reflecting commitment to exploitation of natural resources.

1.2. The VBN value frame

Since the late nineties, a second wave of EC study has asked fundamentally different questions. Rather than investigating general attitudes about environmental issues, this research seeks identify underlying *values* that provide the basis for environmental attitudes (e.g. Schultz & Zelezny 1999). Values are usually theorised as being relatively stable over the life course and allow individuals to subjectively judge what is important (Slimak & Dietz 2006). By contrast, Stern et al. (2000) maintain that attitudes are mutable; they can appear, disappear and change over time. One approach is to view relatively enduring value orientations interacting with more fluid contextual (and life course) factors to produce attitudes. A key theory that embodies this approach is the value-belief-norm theory described by Stern et al. (1995, 1999; Stern 2000).

The VBN, in an attempt to explain pro-environmental behaviour, links three theoretical models: norm-activation theory, the theory of personal values, and the NEP, into a unified explanation for environmentalism. It postulates that the consequences that matter in activating personal norms are those that are perceived as adverse with respect to whatever the individual values. While the VBN theory is intended to explain behaviour, embedded within

it is a theory of environmental concern, specifically the NEP portion (highlighted in Figure 1).

Much empirical research has been conducted utilising the NEP portion of the VBN model as a theoretical framework to clarify EC composition. Support is mixed for a separate biospheric value orientation. Positive evidence comes from Steg et al. (2005) who reported direct evidence for a distinct biospheric value orientation. Social-altruism has also been distinguished from biospheric attitudes in some studies (Stern et al. 1993; Thompson & Barton 1994). However, in some factor analytic studies, social altruistic and biospheric value items have been found to load on the same factor (Schwartz 1992; Stern et al. 1995; Stern et al. 1999). A consolidation of biospheric concern with social-altruism might suggest a desire to preserve the natural environment because of the benefits this may potentially yield to society, or possibly, as Stern et al. (1995) suggest that the biospheric value orientation may be part of a more general altruistic orientation.

In another permutation, Schultz (2000, 2001) found a distinct biospheric concern, with egoistic and social-altruistic concerns combining into a single factor. This result is in line with Thompson and Barton's (1994) proposition that environmental attitudes may be considered as having either an anthropocentric or ecocentric value focus.

These varied findings challenge the VBN model, in that they do not conform to the notion of three clearly separate and distinct value orientations. Instead attitudes of EC seem to be derived from two possible dichotomised values sets as shown in Figure 2. Both of these dichotomous value orientations allude to how individuals appreciate nature (i.e. for its intrinsic value or its potential benefits) and whether EC attitudes are based on an individual's distinction between the individual self and the outside world, or between society and nature.

These contrasting findings and reflections raise the question of the veridical value/attitude structure for EC. In response to such inconsistencies, both Schultz (2000, 2001) and Snelgar (2006) have tested several different factor structures for EC. As shown in Table 1, Schultz (2000, 2001) tested one, two and three-factor measurement models for EC. The three-factor model (highlighted below) was found to be both theoretically and statistically optimal: adhering to the VBN model and satisfying both the K1 and scree plot tests. Snelgar's (2006) later study tested a total of five models (shown in Table 2). Of the two-factor models examined, the one with a distinct biospheric component had the best fit to the data. Overall however, the best model was a four-factor structure, in which the biospheric attitude split into two separate biospheric concerns for plant and animal life.

Overall therefore, studies suggest that the biosphere is perceived to have an intrinsic value. However Snelgar's (2006) study suggests that there is a distinction between concern for the welfare of species and the preservation of the countryside, opening up the possibility of a fourth value orientation, or possibly that VBN value orientations form the basis for multiplicious attitudes.

A problem of theory driven survey design is that the instrument is not an independent tool for testing the theory. The survey instrument that has been used in many of the above studies is precisely designed to tease out the structure of EC; the likelihood of finding the NEP structure and no other is therefore greatly enhanced. Inductive, secondary data analysis of representative survey data provides at least a partial solution to this problem of circularity. If when using secondary data which, while palpably about environmental concern is not theory-specific, one then finds that the same structure emerges, then the evidence for theory is stronger. If it does not, then modifications to the theory should be considered.

This places the research emphasis on determining whether a population exhibit NEP / VBN components at all. Data generated without an a priori commitment to a specific theoretical framework places fewer limitations on participant responses, potentially reducing bias and allowing for results that are out with the theory. This approach thus has the potential to not only independently test theories of EC but also to possibly reveal alternative EC attitudes. This is not to argue for a purely inductive approach to research. Both inductive and deductive approaches have their strengths and weaknesses. The issue here is that research to date in this area has been heavily biased towards deductive theory testing with the inherent problem that the theory itself is (artificially) part of the data generating process. Some studies have conducted exploratory research that is abductive in nature, such as Milfont and Duckitt's (2010) study on the validity of the environmental attitudes inventory. However the majority or environmental attitude research adopts a deductive approach, which we argue should be balanced with a more inductive research. Of course, there is unlikely to be no relationship between the EC-related survey items in a secondary dataset and those that have been produced in the VBN test set and indeed we are seeking to find specifically non-VBN items; the goal here is not to deliberately produce a different structure. However because the item construction is not primarily theory driven we allow differences and nuances of meaning to emerge and, as we shall see, that is precisely what happens.

A *secondary problem* of theory driven scale implementation is the burden placed on researchers to gather a suitable sample, ideally a representative one. Given the high demand on time and resources required to gather primary data, such a sample often cannot be obtained. For example, conclusions drawn by Schultz (2000) and (2001) cannot be generalised to their respective populations given their use of small and unrepresentative samples: both studies consisted of psychology undergraduate students from the United States (samples of 400 and 1010 respectively). Stern seems to have specialised in idiosyncratic

sampling. For example, in Dietz, Stern et al. (1998), actively *dropped* 10% of his sample who are in other or Jewish categories. Stern et al. (1995) used random digit *dialling* to select 199 *Virginia* households. Snelgar (2006) obtained a convenience sample of 368 participants. Of these participants, 296 were undergraduate students taking psychology modules at the University of Westminster. The remaining 72 participants were recruited with the use of snowball sampling. Snelgar acknowledges that due to these sampling methods, conclusions about larger populations cannot be drawn. Results that cannot be generalised to the wider population are diminished in value: it is uncertain whether the findings exist in the social world or if they are simply characteristics of the sample acquired.

1.3. Environmental concern and pro-environmental behaviour

For over 30 years much social research has explored the roots of direct and indirect environmental behaviour, specifically looking at the relationship between concern for the environment and pro-environmental behaviour. As mentioned in the previous section, pro-environmental behaviour is often defined as behaviour that minimises an individual's negative impact on the natural world (e.g. reducing energy consumption and waste production). The value-action gap, sometimes referred to as the attitude-behaviour gap (Blake 1999), is the gap that can occur when the values or attitudes of an individual do not correlate to his or her actions. Though the extent to which attitudes affect behaviour is not as strong as logic would dictate, the disparity between the two concepts is particularly prominent when engaging with the natural environment (Kollmuss & Agyeman 2002). The outcome is that there is a divergence between the high value people place on the natural environment and the relatively low level of action taken by individuals to counter environmental problems. Related research often focuses on cognitive theories of attitude formation and how this affects individuals' behaviour, endeavouring to explain why high regard for environmental issues does not translate into behaviours to solve environmental issues (such as Cottrell

2003). Results have thus far suggested that there are many internal and external factors that affect behaviour, making it difficult to identify the exact reasons why this gap exists.

While most commentators agree that there is no simple correspondence between attitudes and behaviour, different studies have posited various possible explanations for the discrepancy. Taken together, they suggest that the attitude-behaviour relationship is moderated by two primary sets of variables: external / situational constraints, and the formation of attitudes towards the environment (O'Riordan 1981; Guagnano et al. 1995; Hallin 1995; Baron & Byrne 1997).

1.4. Aims

Given the above, this study aims to answer four main questions: first, can and do theoretically familiar EC constructs emerge from large scale environmental attitude and behaviour survey data without the use of strict EC scales? Second, if so, are recognisable NEP / VBN components evident when using a nationally representative British sample, given the originally US basis of the above? As stated, data generated without an a priori commitment to a specific theoretical framework places fewer limitations on participant responses and more fully allows for results that are outwith the model. Exploratory, inductive research thus has the potential to not only independently test theories of EC but also to reveal if there are alternative EC attitudes. Thirdly, what is the value of an ontological distinction between attitudes and reported behaviours in this context? Fourthly, returning to a long-standing theme in the literature, how do environmental attitudes relate to behaviour in such a dataset? Do environmental attitudes influence reported pro-environmental behaviour?

2. Analysis

The results are divided into two parts, with corresponding methods and analysis. First, the optimal number of factors is determined through examination of factor retention criteria,

providing structure for the EC model. The fit of the model is then confirmed before the model factors are interpreted. Second, regression analysis is performed to examine how scores from model factors affect the frequency of reported environmentally friendly behaviour.

2.1. Part 1

2.1.1. Data

Analysis is conducted with data from DEFRA's 'Survey of Public Attitudes and Behaviours towards the Environment' (hereafter EAS – Environmental Attitudes Survey). DEFRA (Department for Environment, Food and Rural Affairs) is the UK government department responsible for policy and regulations on environmental, food and rural issues. The 2009 wave of EAS is used, with a sample size of 2929 British participants. Data was gathered using quota sampling via face to face interviews and a two stage stratified sample design. Interviews were carried out using census output areas as sampling units. Census output areas are small, homogeneous areas, comprising about 125 – 150 households (See Vickers and Rees 2007 for a description of the creation of the Office for National Statistics output area classification). Output areas were also stratified by socio-economic variables within region, to ensure a representative sample of all areas. Finally, quotas were applied in each output area to control for likelihood of selected respondents being at home. These quotas were set on sex, working status and presence of children in the household. Using demographic quotas effectively forms a second level of stratification. Interviewers worked between 2pm and 8pm on weekdays and at weekends to further minimise the response bias which is introduced by only working during standard working hours. Residual non-representativeness is dealt with through the use of population and design weights.

The EAS dataset is explicitly divided into three sections: Household and Respondent Characteristics, Environmental Behaviours, and Environmental Attitudes. Variables for this

analysis were as such selected from those explicitly defined by the dataset as reflections of environmental attitudes. These items were developed to measure British public attitudes towards the environment, without commitment to one specific theoretical framework.

Selection was based on our theoretical understanding of EC, that it is as primarily a cognitive and affective state. Based on this understanding of EC, we independently reviewed the selection and excluded variables that were not compatible with this understanding of EC. Environmental attitude statements that were in part behavioral – that is, statements which commented on the execution, frequency or opinion of environmental behavior – were excluded, so maintaining an ontological divide between attitude and behavior. Statements that remarked on the willingness of participants to incur a financial penalty for engaging in environmentally detrimental activities or pay an increased price for comparatively environmentally friendly products were also excluded. Responses to such statements are indicative of participant willingness to dispense with monetary resources in order to achieve a positive effect (or avoid a negative effect) on the environment. Consequently, responses are potentially influenced by participant income or wealth. To include such variables would be to introduce additional variance into the analysis – constraining EC and potentially producing results relating to income or wealth. It is possible that such variables do have a relationship with environmental concern but they are likely prior rather than constitutive. What remains are raw belief statements un-moderated by extraneous variables. These variables were derived from responses to the statements shown in Table 3, with which participants indicated levels of agreement on a 5-point Likert scale.

2.1.2. Methods

A combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) methods are used. The software package employed was MPLUS. Deciding upon the

optimal number of factors to be retained from EFA is crucial. It is important to distinguish between major and minor factors; specifying too few or too many can distort results. There is no clear consensus for factor retention criteria. The most commonly used method is known as the K1 rule, which retains factors with eigenvalues greater than 1 (see Kaiser 1960). Another, less sophisticated method for retaining factors is through the examination of Cattell's (1966) scree plot for breaks and discontinuities, only retaining factors above a significant inflection. This method suffers from subjectivity and ambiguity, particularly if there is no clear inflection.

A third method is Parallel Analysis (PA), which uses random data with the same number of observations and variables as the original data (see Fabrigar et al. 1999; Hayton et al. 2004). The correlation matrix of random data is used to compute eigenvalues; these eigenvalues are then compared to the eigenvalues of the original data. The optimum number of factors is the number of the original data eigenvalues that are larger than the random data eigenvalues. This method adjusts for sampling error and is a sample-based alternative to the K1 rule and scree plot examination. In most studies, one or two of these methods are used, however in this analysis all three are used to ensure the best possible model fit and accurate interpretation of retained factors.

The production of factors through the use of EFA is generally followed by their rotation so as to improve their interpretability and to simplify the factor structure (Thurstone 1935, 1947). Oblique rotation is used as it allows factors to correlate and given that factors within this model form the EC attitude object, it is highly likely that they will correlate. The maximum likelihood EFA fitting procedure is used for this analysis. Though most research typically uses Principal Components Analysis (PCA) or Primary Axis Factoring (PAF) methods of EFA, maximum likelihood allows researchers to test for the statistical significance of and correlations between factors, as well as generating goodness of fit

statistics. Gorsuch (1990) has shown important differences between PCA and common factor solutions such as principal axis and maximum likelihood factoring. In such cases, the evidence favours the common factor model as the more accurate. Conway and Huffcutt (2003) therefore urge researchers to make greater use of common factor model approaches (maximum likelihood in particular due to the fit indices that can be used to help determine the number of factors).

Once the optimal number of factors is established and a factor model is generated, this factor structure is specified and tested through CFA. Modification Indices are used to ensure that there are no additional cross loadings that should be accounted for in the model. Goodness of fit indices are also examined to determine how well this model fits the data. Various goodness of fit indices exist and reporting them all would be a hindrance to interpreting the validity of the model. The main index is the chi-square, which should always be reported as it shows the difference between expected and observed covariance matrices (Hu & Bentler 1999). According to various studies (Hu & Bentler 1999; MacCallum et al. 1996; Yu 2002) the TLI, CFI, and RMSEA indices should also be reported alongside the chi-square statistic.

2.1.3. Results

EFA was performed on the nine indicator variables shown in Table 3. Three factor retention criteria are implemented to determine the optimal number of factors. The scree plot shows no single point of inflection and appears to suggest the retention of two-four factors. According to K1 factor retention criteria, factors generated with an eigenvalue >1.0 are to be retained. Parallel analysis produces eigenvalues from randomly generated parallel data. If eigenvalues from this parallel data are smaller than those from the original data, then this is indicative of

an optimal model. As shown in Table 4, both the K1 and parallel analysis methods emphasise a three-factor model.

The rotated factor loadings of the three-factor model are displayed in Table 5. Variables with a coefficient above the minimum criteria of .3 are highlighted to indicate their contribution to that factor. CFA was performed to test this factor structure. High loading variables (coefficient >.3) were allowed to load freely onto their respective factors and all other loadings were restricted to 0. The final model displayed in Table 6 reports variable loadings for the CFA model as well as correlations between factors. Maximum likelihood method of parameter estimation was used to produce this Table 6. These factors are named and interpreted below.

Factor 1 – *Denial*

This factor contains the following key components:

- Scepticism (positive loading of the exaggerated crisis variable)
- Belief that there is no need to respond to environmental problems at present (positive loading of both the low priority and too far in the future variables)
- The belief that it is not too late to do something about the environment, that problems can be controlled as necessary (negative loading of the control variable)

Factor 2 – *Human-Centric Concern*

The Over Populated and Limited Resources variables together indicate an EC with respect to the human population, specifically their impact on the planet and its ability to sustain them.

Factor 3 – *Ecocentric Concern*

This factor demonstrates a distinct ecocentric component, capturing concern for both animal species and countryside.

Figure 3 shows the final diagram and its goodness of fit statistics. The CFI and TLI are both >0.9, the RMSEA is <.05, and SRMR is <.08, all of which indicate that the model is a good fit for the data.

2.2. Part 2

2.2.1. Data

The environmental behaviour portion of the EAS contains items relevant to four categories of behaviour: food, home, travel and recycling. From of these behavioural categories, two – six items are selected. The selected variables not only capture environmental behaviour but have a low proportion of missing cases. Some items have a high proportion of missing cases as they attempt to capture a form of environmentally friendly behaviour that is conditional upon the participant owning property and / or owning land, i.e. composting, growing vegetables and buying household appliances. For each question, participants indicate the level at which the behaviour in question is performed on a 5-point Likert scale.

2.2.2. Results

Ordered logistic regression analysis was performed to determine how environmental attitudes are associated with reported environmental behaviour. 16 measures of pro-environmental

behaviour are used to make this assessment. Factors scores for the environmental attitudes displayed in Figure 3 were entered simultaneously as independent variables into each regression, with one of the behaviour measures as the dependant variable. This produced a total of 16 regressions, the results of which are displayed in Table 7. Age and gender were accounted for in each model.

Table 8 shows that human-centric concern is not a significant predictor of concern, but that both ecocentric and denial attitudes are largely significant predictors of reported environmental behaviour. Thus greater ecocentricity is associated with an increase in the frequency of environmental behaviour, while higher denial is associated with a decrease in the frequency of reported environmental behaviour.

3. Discussion

3.1. The model of Environmental Concern

We have been concerned here with uncovering latent components of EC from the EAS dataset, a large, nationally representative British dataset complied from a survey without an explicit, particular theoretical basis. Indicator variables corresponding to our specified theoretical understanding of EC were selected from the environmental attitudes section of the dataset. Both exploratory and confirmatory factor analysis were performed and a three-factor model of EC was produced. This model has similarities with those produced by Stern and Dietz (Stern & Dietz 1994) as well as some important differences.

Regarding these differences, the denial factor could be interpreted as mapping onto the egoistic component of the VBN; indeed, previous research has suggested a relationship between egoistic value orientation and denial (Hansla et al. 2008). It could be that the drivers of denial and those of concern co-occur, and it would certainly be an interesting study to

establish if this was so. Here we simply suggest that those who score highly on this factor may be exhibiting a form of denial or resignation, where an expressed lack of EC is used as a coping mechanism in the face of numerous environmental problems. It is worth noting that denial as an explanatory concept has a long history in the political and psychological literature. In particular respect of environmental concern we note Gifford's (2011) formulation and his observations about its high prevalence in the US population. Although that observation is not directly confirmed here we note that the denial factor has the most explanatory power of the three that we have extracted.

Factor two corresponds to the social altruistic component of the VBN model. The variable loadings of this factor suggest recognition of society's environmental impact, though the focus is on the Earth's ability to continue meeting the growing needs of this population. Due to the limitations of the data, this factor is not altruistic in the sense intended by Stern (1994); the variables that have loaded onto this factor appear to indicate a concern for the Earth's ability to continue meeting the needs of human society rather than a concern for the welfare of society. Therefore due to the lack of solely altruistic variables in the EAS data, this factor has been labelled here as Human Centric. The final factor reflected an ecocentric concern in that it concerns the impacts on the non-human parts of the biosphere.

Overall therefore, the factors extracted do broadly align with the VBN model, though the denial factor does need to be considered in more detail.

What is of interest is the significant minority of respondents who record high scores on both the denial factor and one or both of the other factors. As Table 8 shows, whilst over 50% of the sample are consonant with how one might expect the factors to relate psychologically, 9.5% of the sample are high scorers (above the mean) on the denial factor whilst also being high scorers on both of the other factors. This appears paradoxical since

such respondents are both expressing and denying concern. This would tend to route interpretations away from a simplistic equation of denial and egocentrism suggested above. Though it is too soon to determine if this is an improvement on the VBN, further examination of combinations of the different varieties of EC and their relationship with the VBN theoretical model is required. From a policy making point of view, understanding the holders of such apparently contradictory beliefs might be important in achieving a shift in norms away from relative lethargy to proactive concern.

3.2. Reflections on the data

DEFRA's Environmental Attitude Survey is intended to measure environmental attitudes, norms, values and behaviours, including barriers to pro-environmental behaviour. The survey is not intended to embody a particular theoretical commitment but nonetheless does appear to be influenced by the dominant models. The results produced from the analysis of the EAS provide broad support for the VBN, in that the factors found could conceivably be attitudes of EC derived from the three value orientations outlined by the VBN.

Our analysis suggests that there is value to this dataset in terms of its ability to characterise EC in the UK. However, while the 2009 EAS is part of a series of public attitude surveys run by DEFRA, data from the majority of previous waves can no longer be obtained by the commissioning government department and those cohorts for which data is available, has been conducted rarely and infrequently. In light of this and the nuances in the results presented here and meriting follow-up work, we would recommend that serious consideration be given to longitudinal maintenance of the EAS. Longitudinal methods of data analysis are particularly appropriate, given that attitudes are subject to change, particularly environmental attitudes, as previously noted (Stern 2000).

3.3. Further research

There are initially two ways in which the work presented here could be extended. First, alternative statistical methods could be employed. Bayesian Structural Equation Modelling (BSEM) is a new method of performing CFA, one more nuanced and reflective of the data. The approach uses Bayesian estimation and prior information from EFA to increase the variance of certain cross-loadings while keeping the mean at 0. However, factor analysis more broadly is only one possible method for analysing and understanding EC. Using factor analysis imposes the assumption that attitudes are continuous in nature and exist on a scale. The strength of an individual's attitude is dictated by the position on the scale. Individuals can therefore hold a combination of attitudes in varying quantities. An alternative approach is to assume that attitudes towards a particular concept have a higher level of mutual exclusivity. Or that values, given their high level of stability, can be used as a classification system. In either case, individuals could potentially be segmented according to their attitudes and / or values. If this were the case, a better method of analysing EC may be Latent Class Analysis (LCA). LCA models identify a categorical latent variable measured by a number of observed response variables. The objective is to categorise people into classes using the observed items, and identify items that best distinguish between classes.

A second means of extending the work is through qualitative research. It is acknowledged that quantitative methods of analysis may not be able to fully capture all aspects of EC. Qualitative research could provide a greater level of insight into the mechanisms of EC and justifications for why sections of the population adhere to the EC components uncovered in the paper. In particular, it would seem of value to investigate the psychological processes leading to a high score on the denial factor.

4. Conclusion

In this paper we have examined the concept of environmental concern and its structure through inductive means. We have initially defined concern as based on a two component

attitudinal model based upon relevant affect, keeping behaviour theoretically distinct. Through a series of analyses of a representative sample of UK residents focusing particularly on those questions that express environmental concern defined as above, a three factor solution emerges. That structure has some overlap with the VBN model of environmental concern in that two of the factors correspond to the VBN's ecoentric and anthropocentric factors. To the extent that these emerge from a different set of items to those contained in the NEP questionnaire this can be interpreted as an affirmation of that component of the VBN model. Though the third factor (denial) may not routinely map onto the third factor of the VBN (egocentric concern), some previous research suggests that denial is related to an egoistic/self-enhancement value orientation (Hanlsa et al. 2008). While a psychological relationship between egocentrism and denial is intriguing, it is not one that we are able to explore directly here, but which merits follow-up work.

We also found that ecocentric concern was predictive of increased reported pro-environmental behaviour, and that denial has a negative relationship with said behaviour. Human-centric concern is not a significant predictor of reported pro-environmental behaviour. Therefore, results indicate that those in denial of environmental problems are less likely to engage in pro-environmental behaviour, and of those who are concerned about the natural environment, it is only concern regarding plants and animal species (rather than the welfare of the human race) which motivates pro-environmental behaviour. The different relationships between human-centric and ecocentric concern, with reported pro-environmental behaviour, merits further work. For example, this is somewhat suggestive that a more advanced moral development such as an individual at Kohlberg's (1981) principles stage is required before belief is translated into action, but again this is speculation and would require different data to what we have available here. Further work to address these questions directly is needed.

5. References

Albarracín, D., & Zanna, M. P. (n.d.). Johnson; BT & kumkale, GT (2005). Attitudes: Introduction and scope. *The Handbook of Attitudes*, 3-19

Alibeli, M., & White, N. (2011). The structure of environmental concern. *International Journal of Business and Social Science*, *2*(4), 1-8.

Attfield, R. (1981). The good of trees. *The Journal of Value Inquiry*, *15*(1), 35-54.

Baron, R. A., & Byrne, D. (1997). *Social psychology. 8 utg*. London: Allyn & Bacon.

Blake, J. (1999). Overcoming the value-action gap in environmental policy: Tensions between national policy and local experience. *Local Environment*, *4*(3), 257-27

Buttel, F. H., & Flinn, W. L. (1974). The structure of support for the environmental movement, 1968-1970. *Rural Sociology*.

Buttel, F. H., & Flinn, W. L. (1978). Social class and mass environmental beliefs: A reconsideration. *Environment and Behavior*, *10*(3), 433-450.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, *1*(2), 245-276.

Conway, J. M., & Huffcutt, A. I. (2003). A review and evaluation of exploratory factor analysis practices in organizational research. *Organizational Research Methods*, *6*(2), 147-168.

Cottrell, S. P. (2003). Influence of sociodemographics and environmental attitudes on general responsible environmental behavior among recreational boaters. *Environment and Behavior*, *35*(3), 347-375.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. American Psychologist, 66(4), 290

Duhem, P. (1906). *La théorie physique: Son objet et sa structure.* Paris: Chevalier and Rivière.

Dunlap, R. E., & Dillman, D. A. (1976). Decline in public support for environmental protection evidence from a 1970-1974 panel study. *Rural Sociology*, *41*.

Dunlap, R. E., & Gale, R. P. (1972). Politics and ecology: A political profile of student eco-activists. *Youth and Society*, *3*(4), 379-397.

Dunlap, R., & Jones, J. (2002). Environmental concern: Conceptual and measurement issues. In D. Dunlap & M. Michelson (Eds.), *Handbook of environmental sociology* (pp. 482 – 542). London: Greenwood Press.

Dunlap, R. E., & Jones, R. E. (2003). Environmental attitudes and values. *Encyclopedia of Psychological Assessment*, *1*, 364-369.

Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm". *The Journal of Environmental Education*, *9*(4), 10-19.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues*, *56*(3), 425-442.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*(3.272-299), 272-299.

Feyerabend, P. K. (1962). *Explanation, reduction and empiricism*.

Gagnon Thompson, S. C., & Barton, M. A. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, *14*(2), 149-157.

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, *66*(4), 290.

Gorsuch, R. L. (1990). Common factor analysis versus component analysis: Some well and little known facts. *Multivariate Behavioral Research*, *25*(1), 33-39.

Guagnano, G. A., Stern, P. C., & Dietz, T. (1995). Influences on attitude-behavior relationships: A natural experiment with curbside recycling. *Environment and Behavior*, *27*(5), 699-718.

Hallin, P. O. (1995). Environmental concern and environmental behavior in foley, a small town in minnesota. *Environment and Behavior*, *27*(4), 558-578.

Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). Psychological determinants of attitude towards and willingness to pay for green electricity. *Energy Policy*, *36*(2), 768-774.

Hayton, J. C., Allen, D. G., & Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods*, *7*(2), 191-205.

Hu, L. –T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement.*

Klineberg, S. L., McKeever, M., & Rothenbach, B. (1998). Demographic predictors of environmental concern: It does make a difference how it's measured: Research on the environment. *Social Science Quarterly*, *79*(4), 734-753.

Kohlberg, L. (1981). The philosophy of moral development: Moral stages and the idea of justice (essays on moral development, volume 1). *San Fancisco: Harper & Row*.

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.

Kuhn, T. (1962). *The structure of scientific revolutions* (2nd ed.). Chicago: University of Chicago Press.

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modelling. *Psychological Methods*, *1*(2), 130-149.

Maloney, M. P., & Ward, M. P. (1973). Ecology: Let's hear from the people: An objective scale for the measurement of ecological attitudes and knowledge. *American Psychologist*, *28*(7), 583.

Maloney, M. P., Ward, M. P., & Braucht, G. N. (1975). A revised scale for the measurement of ecological attitudes and knowledge. *American Psychologist*, *30*(7), 787.

Merchant, C. (1992). *Radical ecology*. New York: Routledge.

Milfont, T. L., & Duckitt, J. (2010). The environmental attitudes inventory: A valid and reliable measure to assess the structure of environmental attitudes. *Journal of Environmental Psychology*, *30*(1), 80-94.

Milfont, T. L., & Gouveia, V. V. (2006). Time perspective and values: An exploratory study of their relations to environmental attitudes. *Journal of Environmental Psychology*, *26*(1), 72-82.

Minton, A. P., & Rose, R. L. (1997). The effects of environmental concern on environmentally friendly consumer behaviour: An exploratory study. *Journal of Business Research*, *40*(1), 37-48.

Naess, A. (1984). A defence of the deep ecology movement. *Environmental Ethics*, *6*(3), 265-270.

O'Riordan, T. (1981). Environmentalism. In *Environmentalism.* Pinon limited.

Oberheim, E., & Hoyningen-Huene, P. (2009). The incommensurability of scientific theories.

Schultz, P. W., (2000). Empathizing with nature: Toward a social-cognitive theory of environmental concern. *Journal of Social Issues*, *56*, 391-406.

Schultz, P. W., (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, *21*(4), 327-339.

Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Fran\vek, M. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of Cross-cultural Psychology*, *36*(4), 457-475

Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, *24*(1), 31-42.

Schultz, P.W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, *19*(3), 255-265.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, *25*(1), 1-65.

Slimak, M. W., & Dietz, T. (2006). Personal values, beliefs, and ecological risk perception. *Risk Analysis*, *26*(6), 1689-1705.

Snelgar, R. S. (2006). Egoistic, altruistic, and biospheric environmental concerns: Measurement and structure. *Journal of Environmental Psychology*, *26*(2), 87-99.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology*, *25*(4), 415-425.

Stern, P. C. (1992). Psychological dimensions of global environmental change. *Annual Review of Psychology*, *43*(1), 269-302

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

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, *50*(3), 65-84.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review*, *6*(2), 81-98.

Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, *25*(5), 322-348.

Stern, P. C., Kalof, L., Dietz, T., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects1. *Journal of Applied Social Psychology*, *25*(18), 1611-1636.

Thurstone, L. L. (1935). *The vectors of mind*.

Thurstone, L. L. (1947). *Multiple factor analysis*.

Vickers, D., & Rees, P. (2007). Creating the UK national statistics 2001 output area classification. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 170*(2), 379-403.

Vining, J., & Ebreo, A. (1992). Predicting recycling behavior from global and specific environmental attitudes and changes in recycling opportunities1. *Journal of Applied Social Psychology*, *22*(20), 1580-1607.

Weigel, R., & Weigel, J. (1978). Environmental concern the development of a measure. *Environment and Behavior*, *10*(1), 3-15.

Wurzinger, S., & Johansson, M. (2006). Environmental concern and knowledge of ecotourism among three groups of Swedish tourists. *Journal of Travel Research*, *45*(2), 217-226.

Xiao, C., & Dunlap, R. E. (2007). Validating a comprehensive model of environmental concern cross-nationally: A us-canadian comparison*. *Social Science Quarterly*, *88*(2), 471-493.

Yin, J. (1999). Elite opinion and media diffusion exploring environmental attitudes. *The Harvard International Journal of Press/Politics*, *4*(3), 62-86.

Yu, C. –Y. (2002). *Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes.* Thesis.

6. List of Figures

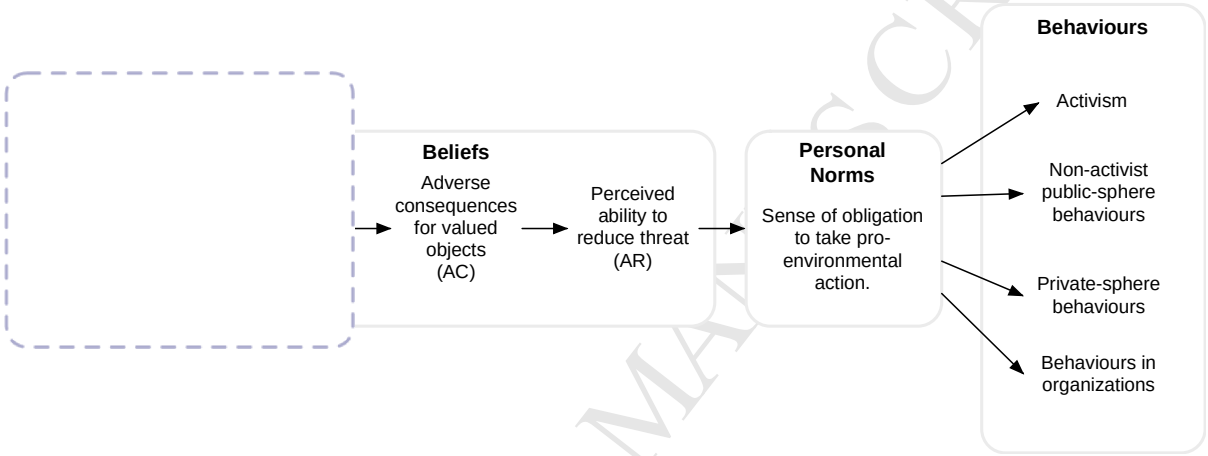


Figure 1: Representation of Components within the VBN Theory of Environmentalism

(Stern et al. 1999)

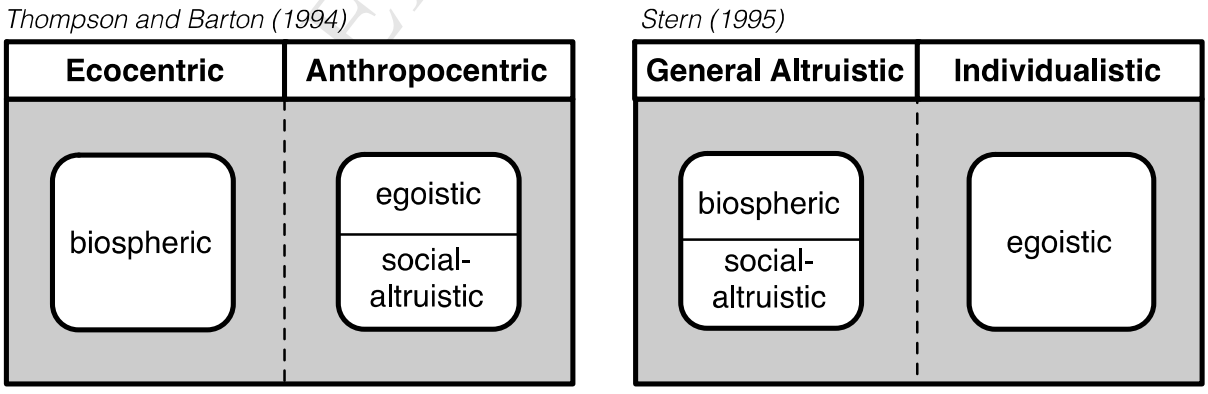
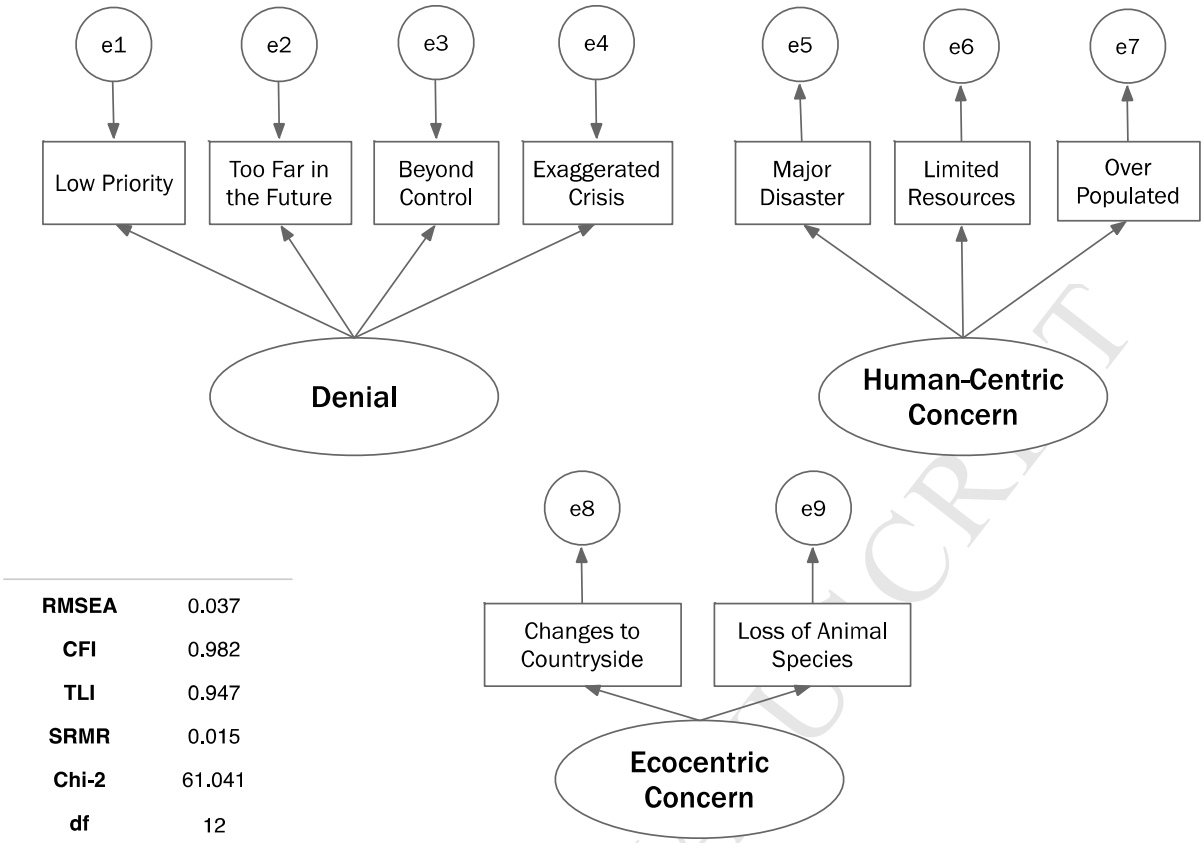


Figure 2: Dichotomous Value Orientations



RMSEA	0.037
CFI	0.982
TLI	0.947
SRMR	0.015
Chi-2	61.041
df	12

Figure 3: Diagram of the Final E nvironmental Concern Model and Goodness of Fit Indices

7. List of Tables

Table 1: Environmental Concern Models Tested by Schultz (2000, 2001)

Model 1	**One-factor model:** Uni-dimensional EC
Model 2	**Two-factor model:** Biospheric items loading onto one factor with both egoistic and altruistic items loading on another factor. This is consistent with Thompson and Barton's (1994) classification of environmental attitudes.
Model 3	**Three-factor model:** Egoistic, altruistic, and biospheric concerns fitted the data well, providing support for the notion that three value-orientations underlie EC.

Table 2: Environmental Concern Models Suggested by Snelgar (2006)

Model 1	**One-factor model:** Uni-dimensional EC.
Model 2	**Two-factor model:** Egoistic items load onto one factor, both altruistic and biospheric items load onto a second. This is based on Stern et al.'s (1995) suggestion that biospheric value may be part of a general-altruistic cluster.
Model 3	**Two-factor model:** Egoistic and altruistic items load onto one factor, biospheric load onto a second. This provided a better fit of the data than Model 2, supporting Thompson and Barton's (1994) dichotomous value orientation.
Model 4	**Three-factor model:** Separate biospheric, egoistic and social-altruistic components, as suggested by the VBN model.
Model 5	**Four-factor model:** Distinct egoistic and social-altruistic components, as well as two separate biospheric components for plant and animal life. This model provides the best fit to the data.

Table 3: Indicator Variables for Subsequent Latent Variable Analysis

Variable Name	Statement
Major Disaster	If things continue on their current course, we will soon experience a major environmental disaster.
Limited Resources	The Earth has very limited room and resources.
Crisis Exaggerated	The so-called 'environmental crisis' facing humanity has been greatly exaggerated.
Too Far in Future	The effects of climate change are too far in the future to really worry me.
Over Populated	We are close to the limit of the number of people the earth can support.
Changes to Countryside	I do worry about the changes to the countryside in the UK and the loss of native animal and plants.
Loss of Animal Species	I do worry about the loss of animal species and plants in the world.
Beyond Control	Climate change is beyond control – it's too late to do anything about it.
Low Priority	The environment is a low priority compared to other things in my life.

Table 4 : Eigenvalues for Original and Parallel Data

	Eigenvalues	
Factors	*Original Data*	*Parallel Data*
1	2.76	1.11
2	1.48	1.08
3	1.12	1.05
4	0.77	1.03
5	0.67	1.02
6	0.62	1.00
7	0.57	0.98
8	0.53	0.96
9	0.49	0.93

Table 5: Variable Loadings for Three-factor Model produced from EFA

Variable	Factor		
	1	**2**	**3**
Exaggerated Crisis	**0.61**	0.19	-0.05
Over Populated	-0.10	**0.66**	0.00
Limited Resources	0.02	**0.60**	0.02
Too Far in Future	**0.74**	-0.01	0.00
Major Disaster	0.22	**0.42**	0.04
Changes to Countryside	0.00	0.04	**0.64**
Beyond Control	**-0.52**	0.18	-0.05
Low Priority	**0.49**	0.00	0.16
Loss of Animal Species	0.01	-0.01	**0.73**
Mean	.01	.00	.01
Std. Dev	.65	.44	.58
F1	**1**		
F2	0.26	**1**	

F3	0.36	0.43	**1**

Table 6: Standardised CFA Results of Final EC Model

	Variable	Estimate	S.E.
F1	Exaggerated Crisis	0.63*	0.02
	Too Far in Future	0.74*	0.02
	Beyond Control	-0.46*	0.03
	Low Priority	0.57*	0.02
F2	Major Disaster	0.53*	0.03
	Limited Resources	0.62*	0.03
	Over Populated	0.57*	0.03
F3	Changes to Countryside	0.67*	0.03
	Loss of Animal Species	0.71*	0.03
F1	F2	0.38*	0.04
F2	F3	0.49*	0.04
F3	F1	0.42*	0.03

- $p < .001$

Table 7: Ordinal Logistic Regression Analysis to show the Association between Environmental Attitudes and Pro-environmental Behaviour

Category	Item Statement	Odds ratios			F	Design df
		Denial	Human-Centric	Ecocentric		
Travel	Taking fewer flights	0.67*	1.12	1.31*	13.17**	1951
	Driving in a fuel efficient way	0.77	1.03	1.37	13.51**	1938
	Switching to public transport instead of driving for regular journeys	0.71*	1.05	1.23	13.66**	1819
	Switching to walking or cycling instead of driving for short, regular journeys	0.57*	1.14	.99	11.26**	1879
Home	Cutting down on the use of gas and electricity at home	0.61*	1.07	1.33	17.53**	2891
	Turning down thermostats (by 1 degree or more)	0.54*	0.96	1.06	15.83**	2668
	Wash clothes at 40 degrees or less	0.71*	1.20	1.08	9.69**	2624
	Make an effort to cut down on water usage at home	0.73*	1.23	1.34*	34.52**	2881
	Cut down on the use of hot water at home	0.79*	1.29*	1.35*	31.58**	2863
	Leave your TV or PC on standby for long periods of time at home	1.12	0.87	0.84	11.23**	2907
Food	Checking whether the packaging of an item can be recycled, before you buy it	0.61*	1.24	1.26*	29.60**	2782
	Take your own bag when shopping	0.70*	1.09	1.33*	55.29**	2871

	Buying fresh food that has been grown when it is in season in the country where it was produced.	0.67*	1.24	1.52*	31.40**	2763
	How much effort do you and your household go to in order to minimize the amount of uneaten food you throw away?	1.46*	0.93	0.71*	42.38**	2899
Recycling	Recycle items rather than throw them away	0.71*	1.00	1.43*	27.66**	2915
	Reuse items like empty bottles, tubs, jars, envelopes or paper	0.63*	1.05	1.27*	27.28**	2900

* p < 0.05 **prob > F

Table 8: Proportion of Respondents in Each Combination of High and Low Scores of Each of the Factors

Denial	**Human Centric**	**Ecocentric**	
		Low	**High**
Low	**Low**	8.70%	7.80%
	High	7.10%	26.80%
High	**Low**	27.30%	5.50%
	High	7.30%	9.50%

Table 5: Variable Loadings for Three-factor Model produced from EFA

Variable	Factor		
	1	**2**	**3**
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Over Populated	-0.10	**0.66**	-0.00
Limited Resources	-0.02	**0.60**	0.02
Too Far in Future	**0.74**	-0.01	0.00
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Low Priority	**0.49**	-0.00	-0.16
Loss of Animal Species	-0.01	-0.01	**0.73**
Mean	.01	.00	.01
Std. Dev	.65	.44	.58
F1	**1**		
F2	-0.26	**1**	
F3	-0.36	-0.43	**1**

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F1	F2	-0.38*	0.04
F2	F3	0.49*	0.04
F3	F1	-0.42*	0.03

- $p < .001$

Highlights

- We investigate the components of environmental concern and how these are associated with measures of reported pro-environmental behaviour.
- Findings are similar to NEP / VBN model but a new denial component of environmental concern is extracted.
- Only concern for nature is associated with reported environmental behaviour.