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“We don’t know enough”: Environmental education and pro-environmental behaviour perceptions

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Abstract: This study sought to understand environmental knowledge and attitudes among young people to explain the relationship between environmental education (EE) and reported pro-environmental behaviours (PEB). A mixed-methods design was employed: 88 university students in the UK and Nigeria were surveyed and 6 were subsequently interviewed. The findings indicate that the participants believe humans are abusing the earth and are very concerned about the consequences but do not know enough about environmental problems, especially global warming. Also, those who had more environmental knowledge reported more PEB. Generally, participants want more EE content to be taught in schools and in more engaging ways such as field trips. These findings offer important insights for both theory and practice related to the use of education to develop PEB for a healthier environment.

Subjects: Behavioral Sciences; Development Studies, Environment, Social Work, Urban Studies; Education; Social Sciences

Keywords: pro-environmental behaviour; environmental education; global warming; mixed-methods research

1. Introduction

We know for sure that human activity is influencing the global environment, even if we do not know by how much. We might still get away with it: the sceptics could be right, and the majority of the world’s scientists wrong. It would be a lucky break. But how lucky do you feel? (Pearce, 2005, p. 38)

ABOUT THE AUTHORS

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PUBLIC INTEREST STATEMENT

Contrary to popular belief, people do not know enough about global warming and related environmental problems, as well as their solutions. These problems and their solutions have been the focus of many studies for a long time now, but as the science gets more advanced and specific in showing how humans are hurting the planet, positive environmental beliefs and compliance appear to be diminishing. This suggests the need to focus on bridging the gap between climate scientists and the general public, and educators have a significant role to play. Students’ perceptions were sought in this study because they can serve as useful foundations for educators, curriculum developers and policy-makers in the design and implementation of an environmental education curriculum that would be appealing to students while being effective in encouraging pro-environmental attitudes and behaviour.

There is 97% consensus among the world's climate scientists that human activity is contributing to climate change and encouraging an ecological catastrophe (Doran & Zimmerman, 2009). Yet, Green and Armstrong (2007) and Bryson (2005) have shown that there is an increasing number of people who do not believe this evidence and attribute earth's changing climate to natural causes, in the belief that humans cannot obstruct a planet's course. As scientists are intensifying research to show how humans are changing the climate, the general public seem to be divided between belief and scepticism. The introductory quote above implies that the human race cannot afford to gamble with earth's environment; thus, certain questions need to be asked: Do people really understand what the climate scientists are communicating? Is it possible to influence people to adopt pro-environmental behaviours (PEB)? In his editorial comment in the *Climate Change Journal*, Somerville (2011) reported that the general public in many countries is not well informed about the science of climate and climate change. It is therefore necessary to place some focus on people's perceptions of climate science and environmental risks to find out what the current conceptions of climate change and global warming are, the reason for the prevalent poor information and to derive strategies to propagate the essential information.

1.1. Purpose

The overall aim of this study was to examine the relationship between environmental knowledge and reported environmental behaviour, and the impact of secondary school environmental education. Specifically, the objectives were to explore empirical evidence of prevalent environmental beliefs and concerns, especially in the UK and Nigeria, assess secondary school environmental education in the UK and Nigeria based on the opinions of university students and formulate recommendations for environmental education (EE). A cross-cultural study of the UK and Nigeria was decided on because both countries face serious environmental problems, especially pollution. London (England's capital and the most populated city in the UK) has been found to be one of the most polluted places in Europe (Vidal, 2010) and Lagos (Nigeria's commercial capital and most populated city) is said to be one of the most polluted places in Africa (Mayer, 1999). Therefore, this study intends to verify what exists in the literature about youths' perceptions of environmental issues and environmental behaviour while adding the EE component and employing a mix of nationalities. The study's importance lies in the premise that when people's perceptions are sought, more applicable solutions can be found to the current growth of environmental apathy and global warming scepticism.

2. Literature review

The major terms used in this report will be briefly defined here before the review of pertinent literature. PEB, also known as sustainable behaviour (Clayton & Myers, 2009) and environmentally responsible behaviour (Kaiser, Wöfling, & Fuhrer, 1999), is "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002, p. 240). Examples of these behaviours include the use of clean fuels (e.g. solar and wind energy) instead of fossil fuels for industrial activities, proper refuse disposal and recycling, conservation of power and water, etc.

Climate change and global warming are sometimes used interchangeably, but they ought to be differentiated. Dansgaard et al. (1993) have shown that in the past 250,000 years, there has been climate instability (change) that has sometimes been extreme enough to trigger ice ages. This natural climate change is different from global warming, which is what the earth has been experiencing since the advent of the industrial or technological era and heavy reliance on energy production and consumption. According to the Cambridge Dictionaries Online, global warming is "a gradual increase in world temperatures caused by gases such as carbon dioxide that are collecting in the air around the earth and stopping heat from escaping into space" (*Global Warming*, n.d.). The gases are by-products of the combustion of fossil fuels. Therefore, unlike climate change, global warming is an unnatural and comparatively recent occurrence. This study is concerned with global warming which is influenced by human activities and can be controlled by addressing environmental behaviours, preferably through education. Global warming is focused on because it is predominantly driven by

fossil fuels' combustion, which causes air pollution and is a serious problem in the two countries employed in this study as previously cited. Furthermore, according to King (2004), global warming is the most severe environmental problem the world is faced with today.

EE, also known as Education for Sustainable Development, refers to learning about the environment. Its first definition was by Stapp (1969, p. 30) who stated that EE is aimed at “producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems and motivated to work towards their solution”. A more engaging definition was given by Tilbury (1995, p. 199) who described EE as “an approach to education that seeks to interest and involve students in world problems ... to prepare them for contemporary reality”. Both definitions focus on the utility of EE as an approach for environmental awareness and interest creation in students for positive environmental behaviour. This is important in the context of this study, which seeks to evaluate the role of education on PEB.

Based on these defined concepts, theoretical and empirical contexts emerged as reviewed in the ensuing sections.

2.1. Theoretical framework

EE aims to produce a citizenry that has positive attitudes and behaviour towards earth's environment. Therefore, it is important to focus on how the desired behaviours can be inculcated and several theories have been adapted to this effect. Learning theory, the theory of planned behaviour (TPB) and the Value-Belief-Norm theory are three of these theories that will be focused on because of their relevance to this study.

Learning theory is based on Skinner's theory of operant conditioning and holds that behaviour changes as its antecedents change (Vining & Ebreo, 2002). Environmental psychologists have applied this theory using education (learning) to “condition people”. For example, in a community recycling programme experiment with 240 households in the United States, Hopper and Nielsen (1991) manipulated behavioural antecedents by providing prompts (reminders to recycle) and information (fliers describing the recycling programme and its benefits), which they found to significantly increase recycling. The control group, which did not receive prompts and information, was found to recycle less. However, the researchers acknowledged that many social and institutional factors excluded from their study could also influence household recycling. Similarly, Brandon and Lewis (1999) employed the operant conditioning approach in an energy conservation study of 120 households in the United Kingdom. Participants' energy consumption was monitored over a nine-month period and compared with the previous years' consumption. With the exception of the control groups, participants received feedbacks on their consumption rates as well as financial and environmental costs and leaflets on general energy-saving tips. The feedback was found to be influential in changing participants' consumption during the field study because consumption rates reduced for those who got the feedback but remained the same for the participants who did not receive them.

However, despite its seeming potency, this theory is weakened by the fact that the antecedents may not be clear enough or particularly useful to the targeted recipients. For example, in Brandon and Lewis (1999) study discussed above, feedback coupled with practical conservation advice was effective only when targeted at people who already had positive environmental attitudes. General or vague leaflets were viewed by their sample as not useful. Furthermore, it follows logically that when the antecedents are removed, the conditioned behaviour will diminish. Thus, knowledge alone is not sufficient for behaviour change and this has been the basis for the rejection of EE as a viable tool for PEB (Clayton & Myers, 2009; Whitmarsh, 2011).

The TPB was developed by Ajzen in 1985 to explain factors that are related to intentions to perform behaviours as affected by behavioural controls (Ajzen, 2011). Behavioural control is important because environmental components like outdoor temperature and home characteristics can affect energy consumption, despite intentions as shown by Moore, Murphy, and Watson (1994). Similarly,

storage space, type of residence and availability of recycling alternatives have been shown to have a controlling effect on recycling behaviour (Oskamp et al., 1991). The implication of this is that in the study and promotion of PEB, these behavioural controls (otherwise known as barriers) must be considered in a bid to minimize their effects. Despite its wide acceptance, the theory has been criticized for describing the processes by which attitudes and beliefs determine behaviour but not of the process, whereby other variables like personality influence components of the theory (Conner & Armitage, 1998). Therefore, this theory is also not sufficient in explaining the basis of PEB.

The Value-Belief-Norm Theory, as proposed by Stern, Dietz, Abel, Guagnano, and Kalof (1999), holds that PEB is stimulated by the activation of norms; and these norms stem from three factors: personal values, beliefs that these values are under threat and beliefs that the individual can take action to reduce the threat and restore these values (Cordano, Welcomer, Scherer, Pradenas, & Parada, 2011). This theory has been widely and successfully applied to research on PEB (e.g. Oreg & Katz-Gerro, 2006) and it is especially relevant to this study because of its New Ecological Paradigm (NEP) scale component which measures ecological beliefs, and its Values component on which the Environmental Motives Scale (EMS) employed in this study was created to measure the value basis of concern for the environment. Consequently, this theory acknowledges that values and beliefs are fundamental for PEB, and this takes us back to the learning theory, where education is necessary for the inculcation of desirable environmental values and beliefs.

Therefore, it appears that none of these theories can explain the basis of PEB on its own and a fusion of these theories is necessary for the promotion of PEB through educational interventions. This is because learning in itself may not produce the desired behaviour, but it can be a useful basis on which norms, values and beliefs will motivate people to adopt the desired attitude and behaviour. This means going beyond cognitive learning (knowledge acquisition) to emphasize the affective domain where attitudes are developed through attention to people's feelings and emotions.¹ For example, regular field trips to immerse students in the environment can increase environmental knowledge and attitudes, which can produce the desired environmental behaviour. This was reported in Duerden and Witt's (2010) experimental study where they also found that allowing students direct their own learning about the environment increases interests in the environment and PEB. These theories have been influential in the study of PEB as researchers seek to understand people's beliefs and the basis of public concern and behaviour towards environmental risks, especially global warming. They also form the foundation for most of the empirical studies in the field of PEB, including this study.

2.2. Empirical review

2.2.1. Environmental beliefs and concerns

People hold diverse beliefs about the environment, especially global warming and its associated risks, and recently there have been worries that belief in global warming is declining (Whitmarsh, 2011). People also have different concerns about the environment. Environmental concerns have been categorized as egoistic (concern for self), altruistic (concern for others) and ecocentric (concern for the ecosystem; Schultz, 2001). Similarly, Casey and Scott (2006) categorized environmental concerns as ecocentric (earth-centred) and anthropocentric (human-centred), and this served as the basis for an Australian survey that assessed levels of environmental concern and behaviour. They found that being female, better education and being older were associated with higher levels of ecocentric concerns and ecological behaviour and that the egoistic individual will support environmental protection that benefits them personally but will be reluctant if the personal costs are perceived as being too high. Concerns for the ecosystem tend to develop stronger motivation to act sustainably (pro-environmentally) than egoistic- or altruistic-based concerns, which may be weakened when it is inconvenient for the individual. They however concluded that a combination of anthropocentric and ecocentric values is essential for PEB.

This conclusion is important because in reality, people do not fall into very distinct categories with regard to the possession of egoistic, altruistic and ecocentric values and as Snelgar (2006) believes, an individual can have all three of the value orientations in differing proportions. Since previous research has suggested that environmental attitudes and behaviour are rooted in the degree to which people believe that they are part of the natural environment (Schultz, Shriver, Tabanico, & Khazian, 2004), PEBs are likely carried out if the individual believes that non-compliance will result in adverse consequences for valued objects (whether self, others and/or nature). In addition, Göckeritz et al. (2010) replicated the well-established finding of a positive correlation between descriptive normative beliefs and behaviour. Their result revealed that efforts to conserve energy are significantly related to one's belief about how often others conserve energy. Verification of the level of belief in environmental risks, especially global warming, and the nature of concerns people have for earth's environment constituted this study's focus. It was predicted that people have high beliefs in global warming and associated environmental risks and they are more concerned for themselves than for the environment.

2.2.2. Environmental education

In the campaign for PEB, its relationship with education has not been given adequate consideration and investigation; only a handful of studies exist in this category. Surprisingly, some researchers like Whitmarsh (2011) have concluded that education is not an effective approach in promoting PEB. Yet, she acknowledged that climate change communication (education) could be effective if there is less reliance on the hype and alarmism that currently characterize communication. This lends even more credence to the effectiveness of education as an approach to the inculcation of PEB and implies that education has to take cognizance of students' knowledge and beliefs to build on them effectively.

An experimental study conducted by Duerden and Witt (2010) to assess the impact of direct (field) and indirect (classroom) experiences on the development of environmental knowledge, attitudes and behaviour revealed that indirect (or classroom) experience was a significant, positive predictor of environmental behaviour among the middle and high school students in the experimental group. However, they also inferred from their qualitative data that environmental knowledge remained dormant until the direct experience (nature immersion), where it transformed into something powerful enough to influence attitudes and future behaviour. Thus, it is likely that the sceptics exist because they do not have the requisite education (direct and indirect experiences) that will inculcate positive environmental values necessary for the appreciation of global warming and other environmental risks.

Still arguing for education as a sufficient tool for the promotion of PEB, the American Pew Research Center's polls also revealed that ignorance is a barrier to PEB, with ranges of categories from those who do not know what global warming is about to those who know but do not know what specific action to take and which will have the most beneficial impacts (Pew, 2006). Uncertainty has also been shown to hinder PEB (Kwaadsteniet, Dijk, Wit, Cremer, & Rooij, 2007), as well as limited cognition about the problem (Gifford, 2011). Ignorance, uncertainty and limited cognition can be dispelled by education, whose aim is to increase knowledge.

However, the educational approach has been discredited by Uzzell (2000) who conducted a study on the effectiveness of a one-week educational intervention on PEB in England. He found that the intervention did not lead to a lasting change in children's environmental attitudes or values, as they were less concerned six weeks after the programme than they were at the beginning. But the duration of this intervention was merely a week. De Young (2011) reported that durable change happens only slowly and Iizuka (2000) showed that education as an informative tool for behaviour change has a slow speed of change but more importantly, it has a low cost of implementation and the duration of its effects are long and strong. Therefore, one week is too short to produce the long-term concern and behaviour the researcher sought; so, this intervention should not be the basis on which all other educational interventions are discarded. Perhaps what is evident here is that education has not been employed in a suitable way as to produce the desired results, and this is the focus of this

study. Emphasis has been on knowledge (cognitive domain), and not attitudes and behaviour (affective and psychomotor domains).

The literatures reviewed here have shown that there is a gap in existing research with the absence of students' perspectives on EE and PEB. Also, research on environmental beliefs and behaviour has been focused on the US, UK and Australia, as Reser et al. (2011) have documented. Therefore, this study attempted to accentuate an inadequately researched country (Nigeria) and compare with the UK, with a focus on the role of secondary education on the current environmental knowledge and attitudes university students have. It was predicted that EE is not adequately featured in secondary schools, and these schools have not been effective in increasing students' environmental knowledge and fostering positive environmental attitudes and behaviour.

2.4. Research questions

Based on the stated objectives of this study and the reviewed literature, the major research question was:

What is the relationship between levels of environmental knowledge, reported environmental behaviour and education among university students in the UK and Nigeria?

To answer this question effectively, it has been disaggregated into four subquestions:

- (1) How do the UK and Nigerian university students perceive the claim that humans are abusing earth's environment?
- (2) On what values are the UK and Nigerian university students' concerns about the environment based: egoistic, altruistic or ecocentric?
- (3) How does environmental knowledge and attitudes influence perceptions of global warming and PEB among the UK and Nigerian university students?
- (4) What are the UK and Nigerian university students' views on the effectiveness of their secondary education in increasing their environmental knowledge and attitudes?

3. Methodology

This study employed the mixed-methods research design, which has been described as an attempt to legitimate the use of multiple approaches in answering research questions (Johnson & Onwuegbuzie, 2004). The quantitative and qualitative data collection and analyses were performed separately. The participants who comprised the sample for the study were university students in two prestigious universities in the UK and Nigeria at the time of this study. Pilot tests were run with six students who were exempted from the actual study. Eighty-eight students responded to the online survey and Table 1 shows their general description.

The response rate for this study is estimated at 15%. This is fairly typical for online surveys (Vicente & Reis, 2010) and can be a cause for bias in survey estimates. The low response rate is suspected to be due to the occurrence of students' examinations in both institutions during the period of this study, as well as lack of response incentives. However, the 88 responses retrieved are sufficient for the purpose of this small-scale study. The participants for the qualitative study were 6 of the 88 participants, selected after the analysis of the survey. Table 2 shows the details of the interview participants in the order they were interviewed, and real names have been replaced with pseudonyms.

Convenience sampling was used to select the groups who received the links to the online survey. This means the participants were not chosen at random and the claims on the generalizability of the study are limited, and this will be discussed subsequently. For the interviews, quota and convenience sampling were combined. It was decided beforehand that six people will be interviewed, three from each country, and they were selected based on their responses on the survey, provision of email

Table 1. Profile of survey participants (n = 88)

| | Frequency | Percentage |
|-----------------------------|-----------|------------|
| <i>Country of residence</i> | | |
| UK | 65 | 73.9 |
| Nigeria | 23 | 26.1 |
| <i>Age groups</i> | | |
| 18–23 | 32 | 36.4 |
| 24–29 | 43 | 48.9 |
| 30–40 | 13 | 14.8 |
| <i>Gender</i> | | |
| Female | 47 | 53.4 |
| Male | 40 | 45.5 |
| Other | 1 | 1.1 |

Table 2. Details of the interview participants

| Pseudonym | Gender | Age group | Level of environmental knowledge | Country of residence | Country of secondary education |
|-----------|--------|-----------|----------------------------------|----------------------|--------------------------------|
| Cynthia | F | 18–23 | Low (35) | Nigeria | Nigeria |
| David | M | 18–23 | Low (32) | Nigeria | Nigeria |
| Peter | M | 24–29 | High (63) | Nigeria | Nigeria |
| Sam | M | 30–40 | High (65) | UK | USA |
| Irene | F | 18–23 | Low (35) | UK | Tunisia |
| Juliet | F | 24–29 | High (64) | UK | UK |

Notes: The values in brackets are their individual NEP scores on the survey (these scores were combined with other factors to classify participants into the low knowledge and high knowledge groups).

addresses and availability for the interview. Ethical considerations were observed throughout the conduct and report of this study, as Cohen, Manion, and Morrison (2007) recommended, involving a balance between the pursuit of truth and the protection of participants' rights.

3.1. Quantitative methodology

The quantitative data were collected through a survey that comprised the following:

- (1) two standardized sets of scales to measure environmental beliefs and concern, namely the NEP revised scale (Dunlap, Van Liere, Mertig, & Jones, 2000) and the EMS (Stern, Dietz, & Kalof, 1993);
- (2) three items to evaluate knowledge of global warming and EE; and
- (3) a set of socio-demographic questions.

The two scales adopted for this study were chosen because they suit the study's objectives and have been widely and successfully applied in the study of PEB due to their high reliability and validity. Dunlap et al. (2000) reported a Cronbach's alpha² of .83 for the NEP revised scale and even though this study reports a lower alpha of .78, it is an acceptable level of internal reliability (Field, 2009) and signifies internal consistency of the scale's items. A .93 Cronbach's alpha reveals that there is a very high level of internal consistency of the EMS's items and this is similar to the results of many other studies (Milfont, Duckitt, & Cameron, 2006). Descriptive statistics, independent sample *t*-test and

analysis of variance (ANOVA) were employed for the first research question. Research question two was analysed with descriptive statistics and Pearson's product-moment correlation coefficient.

3.2. Qualitative methodology

In choosing the interview participants, three with the highest and three with the lowest environmental knowledge were sought from the general sample. The interviews were audio-recorded, with the consent of participants, transcribed verbatim in English and analysed by thematic coding. The analysis was guided by the grounded theory methodology as outlined by Corbin and Strauss (2008). This process involved reading the transcripts to identify themes and coding them accordingly, enabling the development of themes that were grounded in the data themselves towards a coherent response to the research questions. A peer researcher was asked to act as an external auditor to ensure that the interview transcripts, codes and analyses were objectively produced. A short summary of interpretations of participants' responses was sent to them too, to verify that those are their perceptions and certify that all analyses remained true to the raw data, as given by respondents.

4. Findings

4.1. Quantitative findings

4.1.1. Perceptions on humans' influence on earth's environment

The result of the statistical analysis of participants' responses on the NEP scale showed that there is a general positive endorsement of the scale, with the overall mean response of 3.43. It is generally accepted that a NEP mean score of 3 is the boundary between a human-centred (<3) and an environment-centred (>3) worldview on the five-point scale (Ogunbode, 2013; Rideout, Hushen, McGinty, Perkins, & Tate, 2005). Eleven of the 15 items on the scale had mean scores above 3, and 3 scores were very close to 3 (2.65, 2.83 and 2.94) and only one significantly below the average at 1.93. However, the scores that are greater than 3 are very close to the average (eight items), with only three items having means greater than 4 (see Table 3). This implies that even though belief in man-made ecological catastrophe exists, it is not strong; caution must be made in asserting that participants generally endorsed the scale positively.

It was also necessary to find out if socio-demographic factors influence beliefs in ecological catastrophe since previous studies have shown that age, gender and nationality can determine environmental beliefs and concerns (Fransson & Gärling, 1999; Kimmelmeier, Krol, & Kim, 2002). Thus, independent samples *t*-tests were run on the data for the country of residence and gender variables, while a one-way ANOVA was carried out on the age variable. These statistics were appropriate because the data met their assumptions. The results showed that the UK respondents held stronger earth-centred beliefs than the Nigerian respondents who were more human-centred ($t = 5.81$, $p < .001$, $\eta^2 = .28$) and female respondents held stronger earth-centred beliefs than the male respondents who were more human-centred ($t = 3.67$, $p < .001$, $\eta^2 = .14$).

As participants were grouped into three age categories, one-way between-groups ANOVA was conducted to explore the impact of age on nature of beliefs as measured by the NEP scale. There was a statistically significant difference at the $p < .05$ level in NEP scores for the three age groups: $F(2, 88) = 5.08$; $p = .008$. The actual difference in mean scores between groups appeared small (3.59, 3.24 and 3.68) but was found to have a large effect size using eta squared (.11). Post hoc comparison using the Tukey HSD was made and revealed that the mean score for Group 1 (aged 18–23) statistically differed from Group 2 (aged 24–29) but did not differ from Group 3 (aged 30–40); Group 2 and 3 were statistically different.

4.1.2. Value basis of environmental concerns

The analyses of the responses on the EMS showed that generally, participants are greatly concerned about the environment (all except one item had mean scores above 5 on a 1–7 scale). The EMS has

Table 3. Mean and standard deviation of responses on the NEP scale

| | NEP items | n | Mean | SD |
|----|--|----|------|-------|
| 1 | We are approaching the limit of the number of people the earth can support | 88 | 3.05 | 1.338 |
| 2 | Humans have the right to modify the natural environment to suit their needs | 88 | 2.65 | 1.213 |
| 3 | When humans interfere with nature, it often produces disastrous consequences | 88 | 3.98 | 1.017 |
| 4 | Human ingenuity will insure that we do NOT make the earth uninhabitable | 88 | 2.83 | 1.085 |
| 5 | Humans are severely abusing the environment | 88 | 4.41 | .783 |
| 6 | The earth has plenty of natural resources if we just learn how to develop them | 88 | 1.93 | 1.102 |
| 7 | Plants and animals have as much right as humans to exist | 88 | 4.11 | 1.119 |
| 8 | The balance of nature is strong enough to cope with the impacts of modern industrial nations | 88 | 3.55 | 1.321 |
| 9 | Despite our special abilities, humans are still subject to the laws of nature | 88 | 4.48 | .816 |
| 10 | The so-called “ecological crisis” facing humankind has been greatly exaggerated | 88 | 3.70 | 1.261 |
| 11 | The earth is like a spaceship with very limited room and resources | 88 | 2.94 | 1.316 |
| 12 | Humans were meant to rule over the rest of nature | 88 | 3.08 | 1.669 |
| 13 | The balance of nature is very delicate and easily upset | 88 | 3.69 | 1.108 |
| 14 | Humans will eventually learn enough about how nature works to be able to control it | 88 | 3.13 | 1.230 |
| 15 | If things continue on their present course, we will soon experience a major ecological catastrophe | 88 | 3.97 | 1.044 |

three subscales—egoistic (self), altruistic (others) and ecocentric (ecosystem)—and participants were most concerned for others and the ecosystem before themselves, as shown in Table 4.

Furthermore, Pearson’s product-moment correlation coefficient was used to investigate the strength of relationship between these subscales and significance tests were conducted on the correlation coefficient. Preliminary analyses were performed to ensure there were no violation of the assumptions of normality, linearity and homoscedasticity. Table 5 shows the outcome.

Table 4. Mean and standard deviation of responses on the EMS

| Subscale | EMS items | n | Mean | SD | Subscale mean |
|------------|----------------------|----|------|-------|---------------|
| Egoistic | Me | 86 | 5.79 | 1.588 | 5.43 |
| | My lifestyle | 86 | 4.49 | 1.963 | |
| | My health | 86 | 5.72 | 1.962 | |
| | My future | 87 | 5.70 | 1.578 | |
| Altruistic | People in my country | 87 | 5.48 | 1.634 | 6.01 |
| | All people | 88 | 6.13 | 1.320 | |
| | Children | 87 | 6.08 | 1.549 | |
| | Future generations | 88 | 6.35 | 1.194 | |
| Ecocentric | Plants | 88 | 5.31 | 1.704 | 5.45 |
| | Marine life | 88 | 5.41 | 1.536 | |
| | Birds | 87 | 5.43 | 1.560 | |
| | Animals | 87 | 5.55 | 1.396 | |

Table 5. Pearson’s product-moment correlations between subscales

| | Egoistic | Altruistic | Ecocentric |
|------------|----------|------------|------------|
| Egoistic | 1 | | |
| Altruistic | .774** | 1 | |
| Ecocentric | .369** | .553** | 1 |

** $p < .01$ level (two-tailed).

All correlations were positive. At $r = .77$, egoistic and altruistic concerns had the strongest correlation, with high levels of egoistic concerns associated with high levels of altruistic concerns. Ecocentric and altruistic also had a strong correlation at $r = .55$, denoting the association of high ecocentric concerns with high altruistic concerns. However, there was medium correlation between ecocentric and egoistic at $r = .37$, indicating that high ecocentric concerns were not strongly associated with high egoistic concerns.

4.2. Qualitative findings

Three main themes emerged from the qualitative analysis, namely: the nature of environmental knowledge, the nature of environmental behaviour and the role of education. Within these themes, a number of aspects were evident, which are discussed further below.

4.2.1. Environmental knowledge and perceptions

Theme 1: Nature of environmental knowledge

Importance

All the participants agreed that the policies and campaigns for environmental conservation are important and only one participant thought that environmental risks, especially global warming risks, are exaggerated. David, who held the dissenting belief, said: “I don’t fully understand it (global warming) but I think its effect is exaggerated ...”

However, the others stated that they did not think environmental problems, especially those caused by humans, are exaggerated and Juliet blamed the media’s³ portrayal of scientific findings:

The scientific community is all very clear that it is very urgent and very important but I think ... err ... the media takes like bits of the scientific data and exaggerates it and makes it seem implausible; and a lot of people think it’s exaggerated but it’s not scientists doing that but the media ...

Concerns

Concerns for the environment were mainly for its utility value to humans; David was the only participant who expressed no concerns. All other participants were specific about why they think the natural environment should be preserved. For example, Sam was concerned because:

It (the environment) is where all of our resources come from – food, natural resources, shelter, clean water. If you want the human species to survive, it should be urgent (to tackle environmental problems).

Juliet went further with some prediction:

There could be more droughts and more floods, you know, that kind of messes up food security. Pollution and climate change are the biggest environmental problems and I think it (the effect) is going to be something that will hit quite hard in the next 4, 5, 10 years.

Theme 2: Nature of environmental behaviour

Actions

Participants with higher knowledge of global warming and the environment reported some PEB, but those with lower knowledge did not report any. For example, Juliet reported:

I try not to eat much meat ... I don't eat beef at all because beef is a really environmentally destructive product. I try not to use plastics and try to use things that are local as much as possible. I try not to use cosmetics as much as possible and I don't ever buy new clothes.

Barriers

Participants in the low environmental knowledge category did not acknowledge any barriers to PEB and that is understandable because they did not report any PEB. However, the other three (who are in the high environmental knowledge category) highlighted specific obstructions to their PEBs. For example, Juliet said: "A lot of foods locally produced are really expensive ... when I was working I would pay the extra money, but I don't have the money now so I can't". Sam reported his major challenge to be lack of autonomy: "I'm still living in college accommodation and in places where I don't have complete autonomy over how things operate". These barriers serve as behavioural controls as discussed earlier in the theory of planned behaviour.

4.2.2. Effectiveness of education on environmental knowledge and attitudes

Theme 3: Role of education

Experience

The reports of participants' experience of EE in secondary schools varied, but the recurrent perception was that schools simply touched the basics; therefore, they do not know enough. However, Juliet said there was nothing on EE in her school:

There was an outdoor trip in primary school and I had some climate change lessons at A-levels but not in secondary school. We didn't really study ecology much; I don't think it was a very good school for that.

Peter, Sam and Juliet reported that they had to look to other sources for their environmental knowledge: the Internet, personal field trips, books and documentaries.

Expectations

All the participants agreed that there should be improvements in the EE content in secondary schools and there was a general endorsement of fieldtrips. Cynthia and Irene were more emphatic about the role of teachers; Irene's advice was: "Teachers have to bring the whole thing out of the classroom like ... encourage students to participate in campaigns and join organizations".

The participants believed field trips would aid appreciation of the environment and the risks it faces and Peter emphasized that theoretical knowledge is not enough, thereby implying a focus on the affective domain of learning as this excerpt from his interview transcript shows:

It's not just about theoretical knowledge, that doesn't make much impact. They (students) should be taken on field trips for them to actually appreciate the environment, for example to places that have suffered erosion, flooding ... also show them pictures.

Juliet's expectation was that schools should emphasize how the world is connected and distant environments should be just as important as the local environment because she felt many people do not act because the environment looks just fine where they are and they only see environmental problems in the news from faraway lands. Sam also mentioned the need for emphasis on the unity

of nature in EE; and from all these opinions, it is evident that participants believe in the power of education to foster positive environmental behaviours and expect it to be doing more.

5. Discussion

Before the findings outlined above are discussed, it is important to highlight the limitations of this study.

5.1. Limitations

Several drawbacks limit the generalizability of this study. The low sample size is considerably too small for a cross-cultural study, but the number was found suitable for the intended quantitative analyses and the number imbalance was considered in the interpretation of results. Self-report bias may also have occurred in the survey where participants were asked to rate their level of knowledge of global warming; evaluation of responses to some open-ended questions was made to reduce this bias. This study has some strength nevertheless: the novel cross-cultural approach to the understanding of perceptions of PEB and education is one. Also significant is its mixed methods, which goes beyond the quantitative method that dominates research on environmental perceptions. The study also combined two scales whose validity and reliability have been reported to be very high. Thus, even though the results may not be generalizable, they provide a rich and detailed picture of the perceptions, experiences and expectations of the participants involved. These results will be discussed in the following sections.

5.2. Quantitative discussion

From the results presented above, it appears that participants generally have fairly strong earth-centred or pro-environmental beliefs. For example, they believe that humans have the ability to upset nature's balance and are driving the earth towards a catastrophe. It should be noted, however, that because the sample is not homogenous, it was not treated as such. In addressing the problem of low beliefs in an impending ecological catastrophe which climate science warns of, particular attention should be paid to nationality, age and gender factors.

This study and many others (such as Gifford et al., 2009; Schultz et al., 2014) have found that nationality is a very important variable for environmental beliefs. The UK sample had a NEP mean score of 3.62, while the Nigerian sample had 2.91, indicating that the former had a higher endorsement of earth-centred beliefs. This is similar to what other studies employing the NEP scale found: Ogunbode (2013) reported a low 2.95 for his Nigerian study, while Pahl, Harris, Todd, and Rutter (2005) reported 3.31 for their UK study. The trend seems to be higher earth-centred beliefs and concerns in developed countries and higher human-centred beliefs in developing countries. However, environmental problems like floods, droughts, erosion and pollution have been found to be critical public concerns in Nigeria (Egunjobi, 1993), and researchers have argued that positive environmental values, including an inclination towards nature preservation, are inherent in the traditions and culture of the Nigerian society (Adeola, 1996; Ogungbemi, 1997). Adeola (1996) opined that the priority accorded to ecological concerns is often lowered by socio-economic realities and feelings of powerlessness over issues related to natural resource exploitation. Albeit, Kvaloy, Finseraas, and Listhaug (2012) argued that nationality is not an important factor because environmental attitude is relatively evenly distributed among rich and poor countries. However, it is important for every country to pay serious attention to environmental issues, according to the peculiarities of their cultural contexts in ways that will produce the most desirable outcomes.

Furthermore, unlike other studies which found that environmental beliefs either increased or decreased with age or had no significant influence (Ogunbode, 2013), this study reports significant difference based on the large effect size between the mean scores in both decreasing and increasing directions. Given that the boundary score is 3 (as earlier explained), all age groups have high earth-centred beliefs, but the 18–23 and 30–40 age categories have the highest (3.6 and 3.7), whereas the mid-age group 24–29 has the lowest (3.2). This result appears difficult to interpret but because there was a large effect and Casey and Scott (2006) found age to be an important influence, EE could be more effective if employed differently for different age groups. Further studies are needed to clarify this.

Earth-centred beliefs were found to be higher in females and this is consistent with Zelezny, Chua, and Aldrich's (2000) review of studies on gender differences in environmentalism, where they found that women report stronger environmental attitudes and behaviours than men. They offered probable reasons for this trend, including higher levels of socialization, protective and care-giving natures of the female gender. However, some studies (e.g. Ogunbode, 2013) maintain that there is no significant difference in level of beliefs in both genders. Therefore, it would seem logical for EE to engage the male gender more, but give sufficient attention to both genders.

The results obtained from the analysis of responses to research question two show that environmental concerns are generally high and EE programmes will probably be more effective in producing PEBs, if emphasis is placed on the benefits of a healthy environment for other people and the ecosystem rather than self. It is important to know the nature of concern for the environment because these concerns are a necessary precursor of behaviour change as Milfont et al. (2006) have shown that individuals with higher ecocentric concerns, independent of their cultural tradition, seem to report more PEB. Earlier studies on the nature of environmental concerns also revealed that ecocentric concerns are consistently positively correlated with PEB (Schultz, 2001), but the patterns of correlations for both egoistic and altruistic concerns are not consistent (Schmuck, 2003; Schultz et al., 2004). In addition, egoistic concerns have sometimes been found to be negatively correlated with PEB and altruistic concern has been found to be significantly positively correlated in some cases and non-significant in other cases (Schmuck, 2003; Schultz et al., 2004). The implication of this for EE is that even though emphasis should be placed on different aspects of environmental issues when working with culturally different groups, for example, different persuasive messages and different outdoor experiences, more weight should be placed on ecocentric concerns since they have been shown to be the most consistent with PEB. Emphasis should be on the benefits of PEB to the ecosystem before others and self. After all, the ecosystem encompasses everything!

5.3. Qualitative discussion

The interview results showed that participants with high environmental knowledge perceived the environment as being very important for the general well-being of living things and believed global warming is serious and must be mitigated quickly. In line with this belief, they reported more PEB and it appeared that higher knowledge of environmental issues, especially global warming, implied greater PEB. They believe humans have a responsibility to conserve earth's environment and, as predicted by the value-belief-norm theory earlier reviewed, these beliefs cause them to practice PEBs with the intention of contributing to the mitigation of global warming and other environmental problems. In addition, these participants who have some PEBs identified some barriers (or behavioural controls) they are challenged with and it was inferred that without these barriers, they would have had more PEBs, as supported by the theory of planned behaviour discussed earlier. It was also apparent that some Nigerian participants have more environmental knowledge than some UK participants, and contrary to the conclusion from the survey results, there is no fine line between both countries in this regard. Knowledge of the environment and the risks it faces appears to be more dependent on individual differences and interests than on national heritage.

Basically, this study found that more environmental knowledge is associated with more PEB and this is consistent with the results of studies like Kvaloy et al. (2012) who showed that education is a major factor in global warming perceptions and attitudes. This finding lends credence to the learning theory earlier discussed, as it is probable that more EE has caused the desirable self-reported behaviours. Thus, Kollmuss and Agyeman's (2002) argument that environmental knowledge is insufficient in developing environmental attitudes and behaviour is weak because education is not only about knowledge transmission, but attitude formation and behaviour change, if applied appropriately. Therefore, it can be argued that amplified EE, especially on global warming and other environmental problems, would contribute to PEB for the mitigation of global warming, pollution and other environmental problems that are caused by or can be controlled by humans. Furthermore, three participants strongly endorsed educational field trips and as Duerden and Witt's (2010) study earlier discussed showed, experiential learning is very important in fostering positive attitudes to the

environment. Being immersed in the environment helps build connection with nature and ecocentric values.

The results also indicated that participants believed their secondary education has not been effective in providing them with environmental knowledge. Five of them acknowledged that there was some EE content but just the basics and one reported that she got nothing on EE from secondary school. Nigerian and the UK secondary schools have EE content in their curriculum so it was expected that secondary schools would inculcate a reasonable level of knowledge and appreciation of the environment in students. This study emphasizes secondary education because the students are neither too young to appreciate the scientific concepts nor too old to have their behaviours or beliefs changed. The question now is why secondary school EE is not doing more in the UK and Nigerian schools, especially in Nigeria where there are lower earth-centred beliefs. Author (2010) conducted a study with 19 secondary school geography teachers in Nsukka, Nigeria on the implementation problems of the infusion of EE contents in the senior secondary geography curriculum. The teachers reported time and financial constraints as the basic hindrances. This, which may be related to Adeola's (1996) deduction that ecological concerns are low due to socio-economic realities, may also explain why Nigerian participants seem to have lower earth-centred beliefs and knowledge about the environment. This needs to be addressed because the environment constitutes our very existence and its state reflects our health and general well-being. More so, studies show an increasing mortality rate due to environmental problems in both the UK and Nigeria, and the world in general (Baccini et al., 2011); Bailis, Ezzati, and Kammen (2005) reported an estimated 9.8 million premature deaths in Africa by the year 2030 due to air pollution.

5.4. Significance of the findings

The major significance of this study's findings is that people want to know more and education has a crucial role to play in satisfying this need. Direct experiences (like field trips) are essential in creating deeper affection or connections with the environment and a practical analogy would be the way connections are stronger between people who spend more time together. Pooley and O'Connor (2000) have also emphasized the importance of allowing environmental affections and connections to develop in an investigation on the cognitive and affective bases of environmental attitudes. They argued that it is what people feel and believe about their environment that determines their attitudes towards it. Indeed, it is quite difficult to appreciate something that has neither been seen nor felt; and if students are taken out to the environment, it is likely going to stimulate ecocentric feelings and beliefs that will lead to PEB. Therefore, emotions and beliefs, and not just knowledge, need to be targeted in EE programmes.

5.5. Recommendations and suggestions for future research

Although based on a small-scale study with limitations, the findings proffer the following recommendations:

- (1) More emphasis should be given to EE in primary and secondary schools, preferably as a subject on its own but where this is not feasible, it should be effectively infused into relevant subjects like geography and the sciences. This study's participants had high concerns about earth's environment and the risks it faces but relatively low knowledge, which they acknowledged; thus, EE should be employed to increase environmental knowledge and foster positive environmental attitudes and behaviours, with focus on ecocentric values.
- (2) Teacher training on effective delivery of the EE curriculum is required and provisions should also be made to encourage the teachers to stay up to date on environmental issues.
- (3) More emphasis should be placed on outdoor/direct learning or nature immersion (such as field trips); where this is not feasible, graphic images and videos should be used in the classrooms to portray the environment, its problems and their causes and ways humans can contribute to local and global environmental sustainability.

Future studies should employ larger, purely homogenous and random samples of both countries to increase generalizability of results. In addition, experimental or quasi-experimental studies, to eliminate self-report and/or recall bias, would be valuable to measure environmental knowledge and attitudes to determine how much they predict environmental behaviour. Also, more specific knowledge, attitudes and behaviours should be measured, instead of a general assessment of environmental knowledge and behaviour perceptions.

6. Conclusion

The major aim of this study was to find out the relationship between levels of environmental knowledge and attitudes and reported environmental behaviours in the UK and Nigerian university students and examine the role of EE from their perspective. It was discovered that people are generally concerned about the environment but do not know what specific actions to take and how beneficial these actions would be for a healthier environment. Therefore, it was concluded that the more EE (and not just environmental knowledge) people have, the more PEB they would reveal. Thus, EE needs to receive more attention in schools so that youths do not get discouraged by media misrepresentations, political hype or the overwhelming scale of environmental problems, especially global warming. This, through the inculcation of PEB, will contribute to the mitigation of global warming and other environmental problems, as well as improve the quality of life on earth.

Supplementary material

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Notes

1. Bloom (1956) explained three broad ways in which students learn, involving the combination of: cognitive skills (development of mental skills to acquire knowledge), affective skills (development of feelings, emotions and attitudes) and psychomotor skills (development of manual and physical skills).
2. This is a measure of internal consistency—a facet of reliability—that ranges between 0 and 1.
3. Media here refers to channels of mass communication like print media, the Internet, television and radio.

References

Adeola, F. O. (1996). Environmental contamination, public hygiene, and human health concerns in the third world the case of Nigerian environmentalism. *Environment and Behavior*, 28, 614–646. doi:10.1177/001391659602800503

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health*, 26, 1113–1127. doi:10.1080/08870446.2011.613995

Ajaps, S., Ibezim, C., & Udoeye, A. (2010). *Implementation problems of the infusion of environmental education content in the senior secondary geography curriculum in Nsukka educational zone* (Unpublished undergraduate dissertation, BSc (Ed)). University of Nigeria, Nsukka.

Baccini, M., Kosatsky, T., Analitis, A., Anderson, H. R., D'Ovidio, M., Menne, B., ... Biggeri, A. (2011). Impact of heat on mortality in 15 European cities: Attributable deaths under different weather scenarios. *Journal of Epidemiology and Community Health*, 65, 64–70. doi:10.1136/jech.2008.085639

Bailis, R., Ezzati, M., & Kammen, D. M. (2005). Mortality and greenhouse gas impacts of biomass and petroleum energy futures in Africa. *Science*, 308, 98–103. doi:10.1126/science.1106881

Bloom, B. S. (1956). *Taxonomy of educational objectives*. New York, NY: David McKay.

Brandon, G., & Lewis, A. (1999). Reducing household energy consumption: A qualitative and quantitative field study. *Journal of Environmental Psychology*, 19, 75–85. doi:10.1006/jevp.1998.0105

Bryson, R. (2005). Global warming? *Energy & Environment*, 16, 333–334. doi:10.1260/0958305053749499

Casey, P. J., & Scott, K. (2006). Environmental concern and behaviour in an Australian sample within an ecocentric-anthropocentric framework. *Australian Journal of Psychology*, 58, 57–67. doi:10.1080/00049530600730419

Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for nature*. Hoboken, NJ: Wiley.

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. London: Taylor & Francis.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. *Journal of Applied Social Psychology*, 28, 1429–1464. doi:10.1111/j.1559-1816.1998.tb01685.x

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Los Angeles, CA: Sage.

Cordano, M., Welcomer, S., Scherer, R. F., Pradenas, L., & Parada, V. (2011). A cross-cultural assessment of three theories of pro-environmental behavior a comparison between business students of Chile and the United

- States. *Environment and Behavior*, 43, 634–657. doi:10.1177/0013916510378528
- Dansgaard, W., Johnsen, S. J., Clausen, H. B., Dahl-Jensen, D., Gundestrup, N. S., Hammer, C. U., ... Bond, G. (1993). Evidence for general instability of past climate from a 250-kyr ice-core record. *Nature*, 364, 218–220. doi:10.1038/364218a0
- Doran, P. T., & Zimmerman, M. K. (2009). Examining the scientific consensus on climate change. *Eos, Transactions American Geophysical Union*, 90, 22–23.
- De Young, R. (2011). Slow wins: Patience, perseverance and behavior change. *Carbon Management*, 2, 607–611. doi:10.4155/cmt.11.59
- Duerden, M. D., & Witt, P. A. (2010). The impact of direct and indirect experiences on the development of environmental knowledge, attitudes, and behavior. *Journal of Environmental Psychology*, 30, 379–392. doi:10.1016/j.jenvp.2010.03.007
- 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, 425–442. doi:10.1111/0022-4537.00176
- Egunjobi, L. (1993). Issues in environmental management for sustainable development in Nigeria. *The Environmentalist*, 13, 33–40. doi:10.1007/BF01905501
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage.
- Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. *Journal of Environmental Psychology*, 19, 369–382. doi:10.1006/jev.1999.0141
- Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, 66, 290–302. doi:10.1037/a0023566
- Gifford, R., Scannell, L., Kormos, C., Smolova, L., Biel, A., Boncu, S., ... Uzzell, D. (2009). Temporal pessimism and spatial optimism in environmental assessments: An 18-nation study. *Journal of Environmental Psychology*, 29(1), 1–12. doi:10.1016/j.jenvp.2008.06.001
- Global warming. (n.d.) Retrieved April 20, 2014, from <http://dictionary.cambridge.org/dictionary/british/global-warming>
- Göckeritz, S., Schultz, P., Rendón, T., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2010). Descriptive normative beliefs and conservation behavior: The moderating roles of personal involvement and injunctive normative beliefs. *European Journal of Social Psychology*, 40, 514–523.
- Green, K., & Armstrong, J. S. (2007). Global warming: Forecasts by scientists versus scientific forecasts. *Energy & Environment*, 18, 997–1021. doi:10.1260/095830507782616887
- Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior normative and behavioral strategies to expand participation in a community recycling program. *Environment and Behavior*, 23, 195–220. doi:10.1177/0013916591232004
- Iizuka, M. (2000). *Role of environmental awareness in achieving sustainable development*. Prepared for the project Enhancement of citizen's awareness in formulation of pollution control policies in major Latin American Cities, Environment and Human Settlements Division of ECLAC, with the support from the Government of Japan.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33, 14–26. doi:10.3102/0013189X033007014
- Kaiser, F.G., Wöfling, S., & Fuhrer, U. (1999). Environmental attitude and ecological behaviour. *Journal of Environmental Psychology*, 19(1), 1–19. doi:10.1006/jev.1998.0107
- Kemmelmeier, M., Krol, G., & Kim, Y. H. (2002). Values, Economics, and Proenvironmental Attitudes in 22 Societies. *Cross-Cultural Research*, 36, 256–285. doi:10.1177/10697102036003004
- King, D. A. (2004). Environment: Climate change science: adapt, mitigate, or ignore? *Science*, 303, 176–177. <http://dx.doi.org/10.1126/science.1094329>
- 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, 239–260. doi:10.1080/13504620220145401
- Kvaloy, B., Finseraas, H., & Listhaug, O. (2012). The publics' concern for global warming: A cross-national study of 47 countries. *Journal of Peace Research*, 49, 11–22. doi:10.1177/0022343311425841
- Kwaadsteniet, E. W., Dijk, E., Wit, A., Cremer, D., & Rooij, M. (2007). Justifying decisions in social dilemmas: Justification pressures and tacit coordination under environmental uncertainty. *Personality and Social Psychology Bulletin*, 33, 1648–1660. doi:10.1177/0146167207307490
- Mayer, H. (1999). Air pollution in cities. *Atmospheric Environment*, 33, 4029–4037. doi:10.1016/S1352-2310(99)00144-2
- Milfont, T. L., Duckitt, J., & Cameron, L. D. (2006). A cross-cultural study of environmental motive concerns and their implications for proenvironmental behavior. *Environment and Behavior*, 38, 745–767. doi:10.1177/0013916505285933
- Moore, S., Murphy, M., & Watson, R. (1994). A longitudinal study of domestic water conservation behavior. *Population and Environment*, 16, 175–189. <http://dx.doi.org/10.1007/BF02208782>
- Ogunbode, C. A. (2013). The NEP scale: Measuring ecological attitudes/worldviews in an African context. *Environment, Development and Sustainability*, 15, 1477–1494. doi:10.1007/s10668-013-9446-0
- Ogungbemi, S. (1997). An African perspective on the environmental crisis. In L. P. Pojman (Ed.), *Environmental ethics: Readings in the theory and application* (pp. 265–270). Boston, MA: Jones and Bartlett.
- Oreg, S., & Katz-Gerro, T. (2006). Predicting proenvironmental behavior cross-nationally values, the theory of planned behavior, and value-belief-norm theory. *Environment and Behavior*, 38, 462–483. doi:10.1177/0013916505286012
- Oskamp, S., Harrington, M. J., Edwards, T. C., Sherwood, D. L., Okuda, S. M., & Swanson, D. C. (1991). Factors influencing household recycling behavior. *Environment and Behavior*, 23, 494–519. <http://dx.doi.org/10.1177/0013916591234005>
- Pahl, S., Harris, P. R., Todd, H. A., & Rutter, D. R. (2005). Comparative optimism for environmental risks. *Journal of Environmental Psychology*, 25(1), 1–11. doi:10.1016/j.jenvp.2004.12.004
- Pearce, F. (2005). Climate change: Menace or myth? *New Scientist*, 2486, 38–43.
- Pew. (2006). *Little consensus on global warming: Partisanship drives opinion*. Pew Research Center. Retrieved from <http://www.people-press.org/2006/07/12/little-consensus-on-global-warming/>
- Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and Behavior*, 32, 711–723. doi:10.1177/0013916500325007
- Reser, J. P., Pidgeon, N., Spence, A., Bradley, G., Glendon, A. I., & Ellul, M. (2011). *Public risk perceptions, understandings, and responses to climate change in Australia and Great Britain: Interim report to the national climate change adaptation research facility*. Gold Coast: Griffith University.
- Rideout, B. E., Hushen, K., McGinty, D., Perkins, S., & Tate, J. (2005). Endorsement of the new ecological paradigm in systematic and E-mail samples of college students. *The Journal of Environmental Education*, 36, 15–23. doi:10.3200/JOEE.36.2.15-23

- Schmuck, P. (2003). Biospheric, altruistic, egoistic environmental concern and environmental behavior. In *5th Biannual Meeting of the Division of Environmental Psychology of the German Psychological Association*. Eindhoven.
- Schultz, W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology*, 21, 327–339. doi:10.1006/jevp.2001.0227
- Schultz, P. W., Milfont, T. L., Chance, R. C., Tronu, G., Luis, S., Ando, K., ... Gouveia, V. V. (2014). Cross-cultural evidence for spatial bias in beliefs about the severity of environmental problems. *Environment and Behavior*, 46, 267–302. doi:10.1177/0013916512458579
- Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal of Environmental Psychology*, 24, 31–42. doi:10.1016/S0272-4944(03)00022-7
- Snelgar, R. S. (2006). Egoistic, altruistic, and biospheric environmental concerns: Measurement and structure. *Journal of Environmental Psychology*, 26, 87–99. doi:10.1016/j.jenvp.2006.06.003
- Somerville, R. C. (2011). How much should the public know about climate science? *Climatic Change*, 104, 509–514.
- Stapp, W. B. (1969). The concept of environmental education. *Environmental Education*, 1, 30–31. doi:10.1080/00139254.1969.10801479
- 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, 81–98.
- Stern, P. C., Dietz, T., & Kalof, L. (1993). Value orientations, gender, and environmental concern. *Environment and Behavior*, 25, 322–348. doi:10.1177/0013916593255002
- Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, 1, 195–212. doi:10.1080/1350462950010206
- Uzzell, D. (2000). The psycho-spatial dimension of global environmental problems. *Journal of Environmental Psychology*, 20, 307–318. doi:10.1006/jevp.2000.0175
- Vicente, P., & Reis, E. (2010). Using questionnaire design to fight nonresponse bias in web surveys. *Social Science Computer Review*, 28, 251–267. <http://dx.doi.org/10.1177/0894439309340751>
- Vidal, J. (2010, June 25). London air pollution. *The Guardian*.
- Vining, J., & Ebreo, A. (2002). *Emerging theoretical and methodological perspectives on conservation behaviour*. (R. Bechtel & A. Churchman (Eds.)). New York, NY: Wiley.
- Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: Dimensions, determinants and change over time. *Global Environmental Change*, 21, 690–700. doi:10.1016/j.gloenvcha.2011.01.016
- Zelezny, L. C., Chua, P.-P., & Aldrich, C. (2000). New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56, 443–457. doi:10.1111/0022-4537.00177



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