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an exploratory survey of UK shoppers**

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Article

Food Purchasing Decisions and Environmental Ideology: An Exploratory Survey of UK Shoppers

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Abstract: Environmentally and ethically conscious food purchasing has traction with British consumers. We examined how broad environmental worldviews related to shoppers' ratings of the importance of various shopping criteria, including recognition of eco-labels, by surveying 502 shoppers from the city of Sheffield, England. Environmental worldviews were measured using the New Ecological Paradigm (NEP) scale. Responses to the scale split into two dimensions reflecting the scale's origins: the Dominant Social Paradigm (DSP) and NEP subscales. Subscription to the NEP (ecocentric values) was associated with greater importance ratings of nutrition & health, animal welfare, the environment, Fairtrade, seasonal, local and organic criteria. Subscription to the DSP (anthropocentric values) was associated with greater importance ratings of quality, taste, safety, price and convenience criteria. Notably, subscription to DSP values was the only predictor of eco-label recognition score in a multivariate model. These results indicate that the NEP scale should be considered as two subscales. The results suggest that campaigns to increase consumers' environmental awareness in order to encourage environmentally driven food shopping are likely to motivate only consumers disenchanted with technological and anthropocentric development.

Keywords: environmental worldviews; New Ecological Paradigm; eco-labels; shopping decisions; Dominant Social Paradigm

1. Introduction

1.1. Environmentally and Ethically Conscious Grocery Shopping

British consumers have been asked to consider sustainability issues when making food-purchasing decisions since the beginning of the new millennium [1]. Such consideration has been spurred by the spectre of global warming and recognition that the food supply chain, embracing production, processing, packaging, distribution and consumption of food, contributed about 20% of the UK's greenhouse gas (GHG) emissions [2]. Carbon saving across the food system was seen as paramount by the British Government in the light of 1997 Kyoto targets for reduction of GHG emissions [2].

Fostering environmentally conscious food (ECF) practices has therefore been a major strand of UK government's policy commitment to sustainable development [3–5]. At the time of this study, ECF goals largely focused on five behaviours suggested by Department for Environment, Farming and Rural Affairs policy: (1) wasting less food in the home, (2) avoiding fish from uncertified or

unsustainable stocks, (3) switching to more seasonal and local food, (4) increasing consumption of organic or certified/assured food and drink (including ethically certified food such as Fairtrade), (5) switching to a diet with less environmental impact, specifically consuming less meat and dairy [5,6].

UK consumer research in 2007 [6] concluded that only a minority of environmentally aware people, chosen according to a segmentation model, made seasonal and local food purchases. By 2010 consumer attitudes towards ECF purchasing appeared more positive: A nationally representative survey of British consumers reported that around two-thirds of participants valued British food and sustainably sourced fish, three-quarters of participants rated buying British seasonal food as important, while just over half of participants expressed a willingness to buy organic food [5]. Interestingly animal welfare was seen as a core element of sustainable food purchasing. Furthermore, attitudes to ECF shopping were reproduced in shopping behaviour, with actions such as greater purchase of free-range eggs and Fairtrade coffee [5].

Since 2010, it is probable that public cognisance of the environmental and ethical impacts of food purchasing has increased, given food retailers' efforts to promote sustainable consumption [7], the prominence of organic- and local-food in public procurement [8] and the ubiquity of point-of-sale labelling information about food's ethical and environmental credentials [9]. Studies have shown that consumers who are motivated by environmental concerns and participate in ECF shopping are more likely to recognise and use eco-labels [10,11].

1.2. Environmental Worldviews and ECF Shopping

While public attitudes to ECF have been addressed in British surveys, there has been less research attention to the broader values and ideologies, which may underpin such norms and motivate consumers to adopt congruent behaviours to mitigate environmental impact. The value-belief-norm (VBN) model [12], a prominent psychological model of environmental action derived in part from Schwartz's Norm Activation Model [13], identifies that strength in altruistic, biospheric and egocentric values, alongside one's beliefs about the relationships between humanity and the natural environment as being key antecedents of one's propensity to engage in a number of pro-environmental behaviours.

In the mid-1970s two North American sociologists, Dunlap and Van Liere, suggested that a worldview that prioritised nature over humans was emerging in North American society as part of the social movement of environmentalism [14]. This way of thinking represented a paradigm shift from the longstanding worldview, known as the Dominant Social Paradigm (DSP), which prizes humans above plants and animals, endorses science and technology as techno-fixes to world problems, and values material abundance [14,15].

Dunlap and colleagues named this paradigm "The New Environmental Paradigm" and developed a 12-item scale to psychometrically assess it. This concept was later refined and the scale extended to produce a 15-item scale, which is known as the New Ecological Paradigm (revised NEP) [16]. The scale comprises 8 items that measure endorsement (or otherwise) of the NEP and 7 items that measure endorsement (or otherwise) of the DSP [17]. Dunlap et al. proposed that NEP measures five aspects of environmental concern: reality of the limits to growth of human societies, anti-anthropocentrism, fragility of the balance of nature, rejection of exemptionalism (the view that humans, unlike other species, are exempt from the constraints of nature), and the possibility of an eco-crisis [16].

Since its conception, the NEP scale (and the revised NEP scale) has become a trusted and widely used measure of an individual's pro-environmental tendencies. While originally designed as a measure of environmental worldviews, the scale has been used variously as a measure of worldviews, values, concern and attitudes (see Hawcroft and Milfont for a review and critique of the use of the NEP) [18]. Many studies have treated the scale as a one-dimensional scale providing an overall score for environmental concern, despite potential benefits in explanatory power by using a multi-dimensional analytical approach [18,19].

There has been limited study of environmental worldviews underpinning ECF behaviour in a UK context. The research that has been conducted to date has produced inconsistent results.

Whitmarsh and O'Neill found no association between pro-environmental worldviews and frequency of pro-environmental shopping behaviour in a large sample of British adults in 2008; environmental values were measured using a shortened version of the NEP scale [20]. Contrastingly, a UK survey, which segmented consumers according to frequency of pro-environmental behaviour, reported that committed environmentalists who *inter alia* engaged in frequent ECF purchasing (local, seasonal, Fairtrade and organic food) were most likely to concur with elements of the NEP worldview. For example, they were likely to disagree with an anthropocentric dominance (viewing humans as dominant over nature), to hold biocentric values (viewing humans and nature as equal) and to believe that the earth has limited resources [21]. Although recently there has been substantial research interest into the relationship between level of environmental awareness and meat consumption, there has been a paucity of study in the UK [22].

1.3. Theoretical Background

The social scientific study of pro-environmental behaviour including sustainable consumption has often been from a social psychology perspective [23]; quantitative behavioural models, such as Ajzen's Theory of Planned Behaviour (TPB) [24] and Stern's Value-Belief-Norm (VBN) model [12] have had significant application in this regard [20,21,25].

As outlined in Section 1.2, core to these approaches is the hypothesis that value orientations, extending from broad social values (e.g., altruism versus egoism) to environmentally orientated values (e.g., anthropocentrism versus biocentrism), are central and causally antecedent to environmentally significant behaviour. Specifically, value constructs are conceived to influence other variables in the models, such as beliefs and norms, which in turn impact on behavioural intention and behaviour [12,26].

A body of research literature has applied such models to understanding consumer behaviour in the context of "green" or sustainable purchasing; an international meta-analytic study [27] identified 53 studies conducted between 2001 and 2014 that addressed the drivers of green purchasing or green purchasing intention. Similarly, other influences on food purchasing, such as taste, quality and healthiness have been also been modelled in the context of consumption patterns of sustainable food [23,28,29]. Due to our focus on the NEP, the current study is constructed around the VBN model [12] as a theoretical framework. As previously outlined, environmental worldviews (as measured by the NEP scale) are theorised to mediate the relationship between values and personal norm activation within the VBN model. These personal norms then guide one's intentions to act pro-environmentally (or not), which could have implications for sustainable (environmental and ethical) food purchasing.

Actual ECF purchasing behaviour is difficult to assess. ECF purchasing covers a spectrum of aspects encompassing both ethical (e.g., Fairtrade and animal welfare) and environmental attributes (e.g., locally- and organically-produced, carbon and water footprint). Assessment of dietary aspects of shopping is notoriously difficult because of a wide range of food groups and food products, numerous shopping time frames, diversity of the marketplace and reliance on self-report. Studies have used a variety of methods to assess environmentally-driven shopping behaviour encompassing crude recall of frequency of purchase [21], intention to purchase [30], attribute-based product choice experiments [31,32] and willingness-to-pay [33]. All these measures may be subject to social desirability bias. While food purchasing data from commercial sources, such as Kantar, can provide detailed and precise data on food purchases brought into the home including ECF purchases, as a research tool for academics they are restrictive by cost, lack of control and transparency about the sampling frame for household recruitment, and use of barcode data [34].

However, recognition of eco-labels serves as a facilitating behaviour for environmentally driven food purchase [30,31]. An eco-label serves as an immediate cue to the consumer that a product has environmental credentials allowing environmentally motivated consumers to choose apposite foodstuffs without having to read the small print on the label. Indeed eco-labels have been shown to have a direct impact on consumer perceptions of a product's attributes [35]. Furthermore, in the context of purchases of environmentally labelled products (animal welfare, food quality and

organic), consumer knowledge of value-based-labels has been shown to be important in guiding consumer purchasing decisions [36]. The role of eco-labels as a bridge between motivational factors and sustainable purchasing has been modelled in various populations [11,30–32], albeit there is heterogeneity in mediating variables and process order. For example, the model fitted in one study [11] quantified the direct relationship between eco-label knowledge and pro-environmental purchases in conjunction with examination of a possible mediating relationship of trust in eco-labels; while the direct effect of eco-label knowledge on pro-environmental behaviour was negative, removal of the indirect effect of eco-label trust would have resulted in a positive relationship. Equally, this model tested if knowledge of eco-labels was an antecedent of attitude towards the environment. We contend that concern about the environment is a motivational precursor of gaining knowledge of eco-labels in line with the structural model developed by Grunert et al. [31], and congruent with the causal path model in a seminal cross-cultural study that addressed psychological determinants of paying attention to eco-labels [37]. Figure 1 provides the theoretical framework for relationships between environmental norms and purchasing behaviour used in the current study.

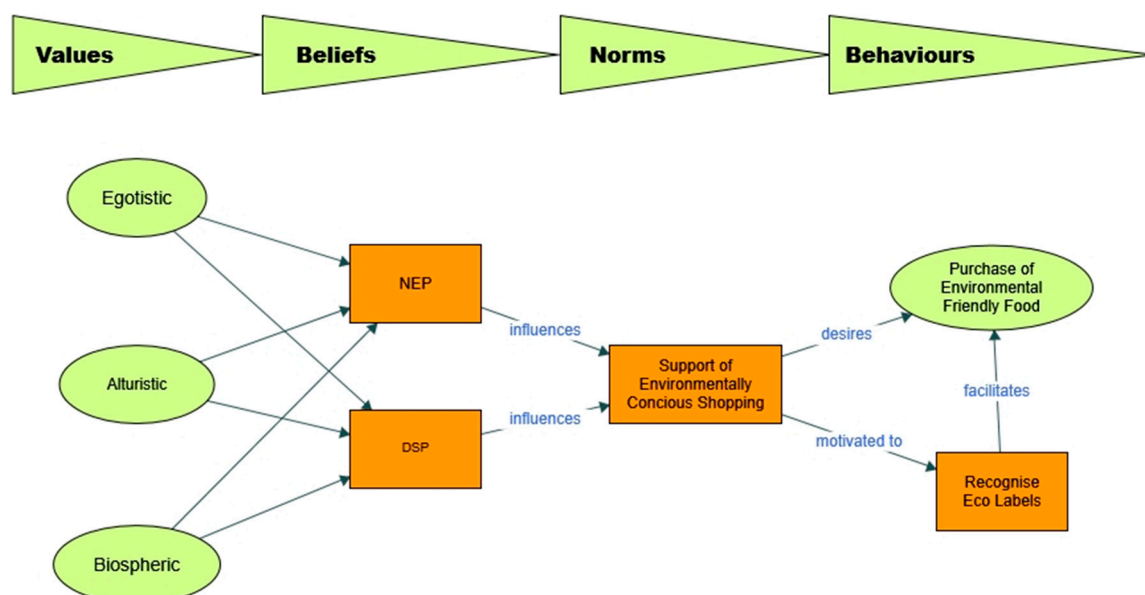


Figure 1. Theoretical Framework (NEP = New Ecological Paradigm; DSP = Dominant Social Paradigm).

1.4. Research Objective

The current study had three objectives: (1) to assess the relative importance of ECF shopping against classical influences of price, health, convenience and food safety [38], (2) to assess how ‘environmental’ and ‘dominant social’ worldviews, as measured by various dimensions of the NEP scale were related to food purchase norms and (3) to assess how ‘environmental’ and ‘dominant social’ worldviews related to recognition of eco-labels.

2. Methods

2.1. Recruitment

A purposive sample of shoppers were recruited during May 2014 by approaching shoppers leaving and entering supermarkets, health- and whole-food shops (with permission from retailers), and on two main shopping streets in the centre of a large English City. The survey took place throughout the shopping week including Saturdays. Shoppers were asked if they would like to participate in an environmental awareness and food purchasing study and were given an information sheet summarising the study. A total of 502 participants agreed to take part, and provided written informed consent.

The study had ethical approval from a relevant University Ethics Committee (approval reference number: SMBRER313). The data collection was completed as part of a Master's degree programme.

2.2. Survey Measures

The survey was carried out as a self-administered pen and paper questionnaire (available from the authors on request). It included the 15-item New Ecological Paradigm (NEP) scale (Dunlap et al., 2000), as well as a 7-item form of the Marlow-Crowne Social Desirability Scale (SDS) [39], which measures tendency to bias responses towards norms of social acceptance. The SDS was included because social desirable responding is known to be a substantial issue in research into sustainable food consumption [40]. The scale was scored as advocated by Ray in a post-publication addendum [39]. The NEP scale had acceptable internal consistency (Cronbach's $\alpha = 0.752$) while the internal consistency was lower for the SDS (Cronbach's $\alpha = 0.582$). This low level of reliability is in keeping with previous population studies that have used a 6-item version of the SDS [39]. The questionnaire also asked participants to provide demographic detail on gender, age, and household size and to describe their ethnicity. Self-reported data on height and body weight were also collected for use in a planned follow-up study; these data are not reported here.

2.3. Grocery Shopping Influences

The importance of twelve influences on grocery shopping namely, price, quality, food safety, taste, health/nutrient content, convenience, animal welfare, the environment (in general), in-season, locally-produced, Fairtrade and organically-produced on grocery shopping was assessed. Respondents were asked to rate the importance of each influence on a 7-point scale. The scale had 'not at all important' and 'very important' anchors at each end: (1) not at all important, (2) low importance, (3) slightly important, (4) neutral, (5) fairly important, (6) important, (7) very important.

2.4. Eco-label Recognition

The questionnaire also tested recognition of six common food environmental logos. Participants were presented with 12 logos: six of these were environmental certification labels (Rainforest Alliance, Marine Stewardship Council, Red Tractor (British marque), LEAF (Linking Environment and Farming), Recycle, and Organic), while the other six covered standards in relation to nutrition, ethical, food quality/safety and animal welfare. Respondents were asked to state whether each of the logos inferred the product had met environmental, nutritional, food safety/quality or animal welfare standards. As some of the logos embraced more than one standard, respondents were allowed to select more than one attribute. Responses were scored as to whether the six environmental logos were correctly identified as having environmental criteria; negative scoring was employed for incorrect responses. If respondents correctly attributed an environmental logo as having environmental credentials they got a score of 1. The decision as to whether the label had environmental credentials was based on the provider's description of the certification scheme. Minus scores were awarded if respondents wrongly attributed an environmental message to one of the non-environmental labels (for example, if the nutrition label was designated as environmental that would be a score of -1). The range of scoring was therefore -6 to $+6$. All scores were increased by six in order to give a positive range.

2.5. Statistical Analysis

The relative importance of different food purchasing criteria was ascertained using a McNemars test. Further identification of patterns in consumer food purchasing criteria employed hierarchical cluster analysis with Euclidean distance and Wards agglomeration method.

Different aspects of environmental concern as measured by the NEP scale in this population was assessed by principal components analysis with direct oblimin rotation (KMO = 0.755, Bartlett test of Sphericity $\chi^2(78) p < 0.001$). This analysis produced 15 factors; two of these factors were retained as being before the elbow in a scree plot. These two components cumulatively explained

37.6% of the variance, with initial components explaining 23.8% (factor 1) and 13.8% (factor 2) of the variance. The questionnaire items comprising each factor and their factor loadings are given in Table 1. The regression scores for both factors were calculated giving two new variables with mean of 0 and standard deviation of 1. The first factor was labelled factor 1-NEP, since it largely loaded on the NEP items. The second factor was labelled factor 2-DSP because it loaded heavily on the DSP items. Scores on the second factor were reversed to facilitate interpretability (i.e., high scores were pro-DSP).

Table 1. Factor loadings from principal components analysis of responses to the New Ecological Paradigm questionnaire.

NEP Item	NEP	DSP
15. If things continue on their present course we will soon experience a major ecological catastrophe	0.703	
3. When humans interfere with nature it often produces disastrous consequences	0.663	
13. The balance of nature is delicate and very easily upset	0.636	
5. Humans are severely abusing the environment	0.622	
11. The Earth is like a spaceship with limited room and resources	0.575	
9. Despite our special abilities humans are still subject to the laws of nature	0.556	
7. Plants and animals have as much right as humans to exist	0.494	
1. We are approaching the limit of the number of people the Earth can support	0.491	
14. Humans will eventually learn enough about nature works and how to control it		0.718
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations		0.668
10. The so called “ecological crisis” has been greatly exaggerated		0.646
4. Human ingenuity will insure that we do not make the Earth unlivable		0.616
2. Humans have the right to modify the natural environment to suit their needs		0.513
12. Humans were meant to rule over the rest of nature		0.503
6. The Earth has plenty of natural resources if we just learn how to develop them		0.485

Further to evaluate the merits of this two-factor model a series of Confirmatory Factor Analysis (CFA) was carried out. These models were single-factor and five-factor *a priori* models, as well as the two-factor model produced by Exploratory Factor Analysis (EFA). The extent to which each of the CFA models fitted the data was explored using goodness of fit indices (RMSEA: single-factor = 0.107, five-factor = 0.103 and EFA two-factor model = 0.072) from structural equation modelling procedures, indicating that the EFA two-factor model fitted moderately, while neither the single-factor nor the five-factor model had adequate fit.

Logistic regression models were used to ascertain if the factor scores from the two retained factors predicted the log odds of rating influences on grocery shopping as important or very important, with adjustment for SDS, gender and age. Multiple regression models were also built to test if factor scores predicted recognition of food eco-labels, again with adjustment for SDS, gender and age.

The factor scores for factor 1-NEP and factor 2-DSP were used to categorise participants into one of four quadrant groups by splitting each factor score distribution according to whether the score was positive or negative. These quadrant groupings were labelled: High NEP & Low DSP, High NEP & High DSP, Low NEP & Low DSP, and Low NEP & High DSP. The number of people rating each shopping influence as important was compared across these four quadrants using chi-squared tests.

3. Results

3.1. Sample

Table 2 provides descriptive characteristics of the sample. The age distribution of the sample was compared with 2011 census returns for the city. For the age group of 25 to 64 years the sample closely reflected that of the census data. However, there was over-sampling of the 20–24 age group (17.7% compared with 12.8% in the census return), and under-sampling of those over 65 years (10.5% compared with 19.6% in the census return). The sample comprised 47.3% men, while the 2011 census

return for the city was 49.7%. For ethnicity, 88.2% of the sample was classified as White, which is a slightly greater proportion than the census return for Sheffield of 84%.

Table 2. Descriptive characteristics of sample.

Variable	Mean (Standard Deviation)	<i>n</i>
Age (years)	41.2 (16.6)	447
Gender (% male)	47.3% (2.3%)	463
Social Desirability Score (range: 1–21)	15.6 (3.2)	463
Eco-Label Recognition Score (range: 0–12)	8.54 (1.55)	502
Ethnicity	<i>n</i>	%
Asian-British	9	2.1
Asian-other	20	4.6
Black -British	3	.7
Black-other	16	3.7
White-British	364	84.5
White-other	19	4.4
New Ecological Paradigm Items	Mean (Standard Deviation)	Count
Earth approaching limit	3.53 (1.12)	495
Human right to modify environment ‡	3.22 (1.14)	496
Interfering with nature is disastrous	3.81 (1.07)	498
Not make Earth unliveable ‡	3.20 (1.12)	493
Humans abusing environment	4.09 (1.06)	500
Earth has plenty of resources ‡	2.36 (1.16)	497
Plants and animals have rights	4.25 (1.00)	495
Nature balance is strong ‡	3.86 (1.03)	497
Humans subject to the laws of nature	4.33 (0.86)	493
Environment crisis is exaggerated ‡	3.87 (1.09)	496
Earth has limited room	3.51 (1.17)	493
Humans are meant to rule ‡	3.99 (1.23)	496
Delicate nature balance	3.92 (1.07)	497
Humans will control nature ‡	3.37 (1.13)	498
Ecological catastrophe	3.98 (0.97)	499
Overall NEP Score †	3.30 (0.39)	498

† Overall score is calculated after adjustment for direction of Dominant Social Paradigm items, which are marked with ‡; imputed means calculated when there were three or less missing values.

3.2. Description of Food Purchasing Influences

Figure 2 shows the ratings of various influences on food shopping decisions. Fewer participants ranked the environment (in general) as important in food shopping compared to the number rating taste, quality, food safety and nutrition & health as important. However, more participants rated the environment as an important influence relative to price. Interestingly, animal welfare was important/very important in food shopping to significantly more people than was the environment (in general) (McNemars = 8.410, $p = 0.004$, odds ratio = 14.01).

The cluster analysis of the influences on shopping decision variables showed two clear groups of responses. The dendrogram from this cluster analysis is provided in Appendix A. The first group comprised influences of quality, taste, food safety, health & nutrition, price and convenience. The second group comprised influences of animal welfare, the environment (in general), Fairtrade, in-season, locally produced and organic. The second group of variables has a distinct sustainability theme. In summary, responses fell into two groups with traditional shopping criteria usually weighted as more important than environmental shopping criteria.

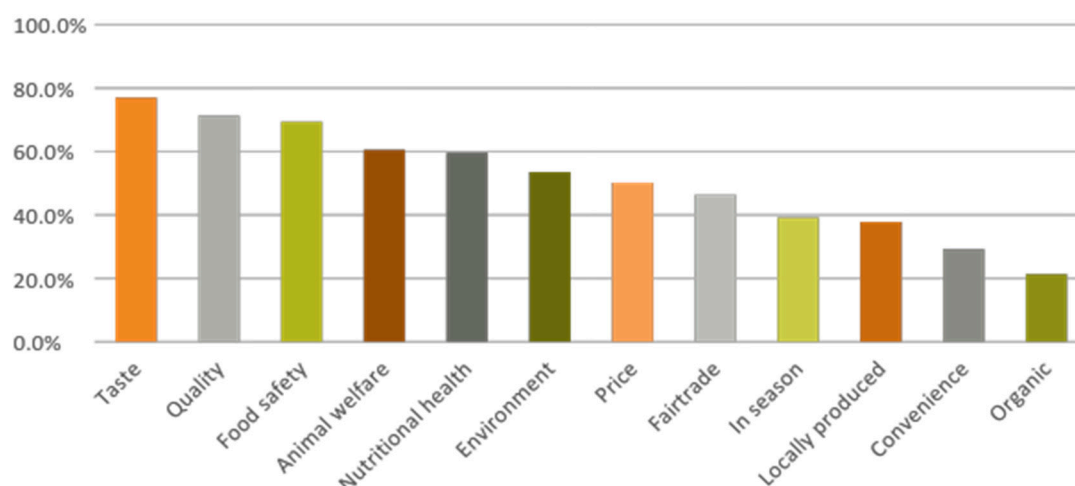


Figure 2. Proportion of sample rating various influences on food shopping as important or very important (n = 431).

3.3. Dimensions of the NEP Scale

There was a weak negative correlation between NEP & DSP scores ($r = -0.183$, $p < 0.001$). Women scored higher on factor 1-NEP (mean = 0.11, sd = 0.93, n = 229) than men (mean = -0.11 , sd = 1.08, n = 204). This difference was statistically significant ($t(431) = -2.270$, $p = 0.024$, d = 0.22). Scores on factor 2-DSP did not differ by gender ($t(431) = 1.109$, $p = 0.268$, d = 0.11). Age was not significantly associated with factor scores (factor 1-NEP $r = 0.076$, $p = 0.12$, n = 421; factor 2-DSP $r = -0.063$, $p = 0.196$, n = 421). The only significant association between the dimensions and demographic variables was between gender and NEP.

3.4. Factor Scores and Ratings of Norms on Shopping

Table 3 provides the results of a logistic regression model, which used factor scores to predict ratings of importance of norms on shopping with adjustment for age, gender and SDS. A standard deviation increase in factor 1-NEP score increased the odds of rating food safety, nutrition & health, animal welfare, the environment (general), Fairtrade, in-season, locally-produced and organically-produced as important in food shopping. The odds ratios were particularly high for the environment (in general) (odds ratio = 2.028) and Fairtrade (odds ratio = 1.783). High scores on the NEP scale were therefore particularly associated with appreciating food's environmental credentials.

Table 3. Odds ratios (OR) of rating shopping influence as important for a one-unit increase in factor score.

Influence	New Ecological Paradigm Factor				Dominant Social Paradigm Factor			
	OR	95% C.I. of OR		p-Value	OR	95% C.I. of OR		p-Value
		Lower	Upper			Lower	Upper	
Quality	1.15	0.915	1.447	0.23	1.314	1.028	1.678	0.029
Taste	0.992	0.776	1.267	0.946	1.304	1.006	1.689	0.045
Safety	1.258	1.003	1.579	0.047	1.399	1.095	1.786	0.007
Health	1.590	1.263	2.003	<0.001	1.208	0.955	1.527	0.115
Price	1.053	0.857	1.294	0.622	1.401	1.131	1.733	0.002
Convenience	1.235	0.971	1.571	0.086	1.795	1.406	2.288	<0.001
Animal Welfare	1.649	1.31	2.074	<0.001	0.981	0.782	1.232	0.869
Environment (in general)	2.028	1.588	2.59	<0.001	0.814	0.648	1.024	0.079
Fair-trade	1.783	1.413	2.251	<0.001	0.963	0.775	1.199	0.739
In Season	1.438	1.139	1.816	0.002	0.935	0.750	1.166	0.549
Local	1.492	1.186	1.878	0.001	0.932	0.751	1.156	0.521
Organic	1.455	1.115	1.900	0.006	0.876	0.687	1.117	0.286

In contrast, a standard deviation increment in factor 2-DSP score was associated with increased odds of rating quality, taste, food safety, price and convenience as important in food shopping, with the odds being particularly high for rating convenience as important (odds ratio = 1.795). High scores on the DSP scale were particularly associated with prizing traditional shopping criteria.

3.5. Factor Scores and Eco-label Recognition

Eco-label recognition was modelled using multivariate regression analysis in relation to factor scores controlling for age, gender and SDS. The model parameters are given in Table 4. Factor 1-NEP score was not associated with eco-label recognition. Notably a standard deviation increase in factor 2-DSP score was inversely associated with eco-label recognition ($B = -0.273$; $p < 0.001$). Overall the model explained 6% of the variance in eco-label recognition, with the majority of the variance accounted for by factor scores (5%). Subscription to the DSP had the greatest influence in the model.

Table 4. Regression model for prediction of eco-label recognition score with adjustment for age, gender and social desirability score (SDS) (NEP = New Ecological Factor Score; DSP = Dominant Social Paradigm Factor Score).

Model	Unstandardized Coefficients		<i>t</i>	<i>p</i> -Value
	B	Std. Error		
Gender	−0.084	0.137	−0.611	0.541
Age	0.001	0.004	0.280	0.779
SDS	−0.040	0.022	−1.804	0.072
NEP	0.023	0.070	0.335	0.738
DSP	−0.273	0.070	−3.877	<0.001

3.6. Quadrant Groups

The frequency distribution was fairly even across the four quadrant groups (see Table 5) ranging from 95 (21.6%) participants classified as scoring high on NEP & high on DSP factors to 138 (29.9%) participants classified as scoring high on NEP & low on DSP factors. Mean eco-label recognition scores are also given in Table 5 in relation to DSP and NEP quadrants. There were statistically significant differences between quadrants ($F = 4.8448$; $p = 0.001$; $n = 461$; $\eta = 0.176$). A post-hoc Tukey test revealed that the quadrant returning high NEP scores & high DSP scores scored lower for eco-label recognition than the quadrant with high NEP scores & low DSP scores (difference = 0.74 standard deviations; $p = 0.001$). The greatest difference in eco-label recognition was seen in the two groups that had high NEP scores, with those who had low DSP scores having superior eco-label recognition than those with high DSP scores.

Table 5. Recognition score for eco-labels by quadrant.

New Ecological Paradigm Factor	Dominant Social Paradigm Factor	Number	Mean Score	Std. Error
High	High	95	8.20	0.148
	Low	138	8.93	0.118
Low	High	128	8.55	0.136
	Low	100	8.69	0.154
Total		461	8.62	0.070

Table 6 provides the results from the chi-squared analysis of the proportion of participants rating each shopping influence as important in relation to classification of Factor1-NEP and Factor 2-DSP scores in quadrants. The proportion of participants rating quality, taste, food safety and price as important in food shopping was similar across quadrants. There were significant differences between

quadrants in the proportion of participants rating the influence as important for all ECF shopping variables. Equally, there was a significant effect of quadrant grouping in ratings of animal welfare and nutrition & health as important. For these latter two variables the two quadrants distinguished by high Factor 1-NEP scores had a greater proportion of participants rating the influence as important, compared with the two quadrants with low Factor 1-NEP scores. The pattern of response was different for ratings of convenience as an influence in food shopping: the quadrant that had high NEP factor scores & high DSP factor scores had the greatest proportion of participants rating convenience as important.

Table 6. Results of chi-squared tests for proportion of quadrant rating shopping influences as important (NEP = New Ecological Paradigm; DSP = Dominant Social Paradigm).

Influence as Important	High NEP and High DSP Factor Scores <i>n</i> = 95	High NEP and Low DSP Factor Scores <i>n</i> = 138	Low NEP and High DSP Factor Scores <i>n</i> = 128	Low NEP and Low DSP Factor Scores <i>n</i> = 121	Chi-Squared Value	<i>p</i> Value
Taste	76.8%	71.0%	74.2%	67.0%	2.720	0.436
Quality	70.5%	68.8%	67.2%	59.0%	3.586	0.310
Food safety	70.5%	63.8%	62.5%	61.0%	2.272	0.518
Price	55.8%	42.0%	50.0%	40.0%	6.727	0.081
Convenience	48.4%	21.7%	25.0%	16.0%	30.524	<0.001
Nutrition and health	64.2%	66.7%	46.9%	46.0%	17.365	0.001
Animal welfare	66.3%	68.8%	43.8%	46.0%	25.212	<0.001
Environmental impact	54.7%	69.6%	34.4%	40.0%	38.465	<0.001
Fair-trade	46.3%	58.7%	32.0%	36.0%	22.355	<0.001
In season	43.2%	47.1%	25.0%	30.0%	17.646	0.001
Locally produced	35.8%	47.8%	25.8%	27.0%	17.651	0.001
Organic	22.1%	29.7%	12.5%	17.0%	13.057	0.005

Quadrants that had high NEP scores were more likely to rate animal welfare and nutrition as important regardless of how they were classified according to DSP score. In general the quadrant that scored low on NEP & high on DSP was least likely to rate environmental criteria as important in food shopping. In general, environmental criteria were given greater importance ratings across quadrants as follows: low NEP & high DSP, low NEP and low DSP, high NEP & high DSP and high NEP & low DSP.

4. Discussion

This study ascertained how environmental worldviews related to shoppers' purchasing criteria for food and explored how environmental worldviews interacted with understanding of popular food eco-labels.

4.1. Rating of Environmental and Ethical Shopping

ECF shopping was rated secondary to core issues of taste, quality and food safety. This rating of norms on food shopping concurs with a recent international study, which included North American, European and BRIC countries [41]. The higher rating of animal welfare relative to other environmental considerations concurs with the findings of a British nationally representative survey [5].

Furthermore environmental and ethical purchase criteria were clustered in a manner concordant with other studies [42–44]. While the environment (in general) was rated as important in food shopping by over 50% of participants in the current study, being rated comparably to nutrition & health norms, purchasing of seasonal, local and organically-produced food was of lesser importance with endorsement of organic food being particularly low. Other British surveys have shown that choosing organically-produced food is of lower priority than other environmental attributes [5]. A high rating of organic products is therefore not a good index for being environmentally aware.

4.2. Dimensionality of the NEP Scale

It is striking that the pattern of responses to the NEP scale split into two distinct subscales mirroring the NEP scale's theoretical origin, which embraces both pro-ecological and traditional social values [14]. The two-dimensions of response identified, namely, a pro-NEP pattern and a pro-DSP pattern, is congruent with a factor analysis of responses to the NEP scale in a sample of Canadian students [45]. While the Canadian study identified three dimensions of response, importantly an eco-centric pattern and a techno-centric pattern ranked foremost [45].

Most studies have treated the NEP as a one-dimensional scale [18] and Dunlap asserts that scale should be treated as a single construct, despite the original validation study reporting that responses were three-dimensional [16]. However, Amburgey and Thoman argue strongly that NEP scale should be represented as correlated subscales [19]. Tellingly, a recent cross-national survey using the 15-item NEP scale, which while scoring the scale as a single unit, noted that one-third of participants had a pro-DSP view subscribing to a belief in human ingenuity and modern technology [17], and that British participants recorded a greater level of support for the seven DSP-items compared with participants from other European countries. This cross-cultural difference in response to DSP items supports the possibility of a two-dimensional factor structure. It is also in keeping with research in the area of energy security, which indicates that people with different cultural backgrounds subscribe to different facets of the NEP scale [46,47]. The current analysis indicates that at a minimum two belief dimensions are operational in the NEP scale.

It can be debated what this bi-dimensionality means. It is probable that individuals who espouse both paradigms understand the fragility of the natural environment and are beginning to appreciate and identify with the need to care for the environment, but do not want to see efforts to do so coming at an unacceptable cost to human progress (and the luxury this provides). Such a stance is congruent with a consumer typology identified as “light greens” [48]; this group may be responding to extrinsic demands to adopt green behaviours. In contrast people who embrace the NEP and reject the DSP may have internalised the need to think and behave in a pro-environmental manner, which fits with a committed environmentalist or “deep green” typology [49–51]. Interestingly, a belief in the scientific tradition and a conviction that science and technology can solve environmental problems within current political structures has been suggested to be a tenet of ‘environmentalism’ in contrast to ‘ecologists’ who reject science [52]. It is significant that a recent segmentation study [53] focusing on British consumers’ acceptance of GM-food identified two clusters of consumers, which both reported practising “green” behaviour, but had polar attitudes as to the value of science: ‘*Scientific Greens*’ and ‘*Cautious Greens*’.

4.3. Demographics and NEP Dimensions

There were few demographic associations, aside that women supported a NEP worldview to a greater extent than men. This difference is consistent with the findings of a literature review of environmental concern and gender [54], but contrasts with a meta-analysis of studies that have specifically addressed environmental concern using the NEP scale [18]. However, in the latter study the NEP scale was treated as a single scale in which responses to DSP items were negatively scored; furthermore one-third of studies included in the meta-analysis did not report the gender composition of the sample [18]. The gender difference found in the current study is therefore in keeping with the general timbre of the literature, allowing for different understandings of assessment of ecological views through the NEP scale.

4.4. Dimensions of the NEP and Food Purchase Criteria

Subscribing to the DSP was strongly associated with rating the classical norms on food purchase as important: quality, taste, convenience and price, which would fit with the traditional roots of the DSP. Prioritising these tangible aspects of food purchase may serve to diminish attention towards more

reflective shopping behaviour including environmental and ethical considerations [55]. The strong association between commitment to the DSP and prioritising convenience in food shopping resonates with the findings of a large German survey, which showed that consumers who were motivated by convenience in food purchasing were less likely to espouse organic food [44].

Subscribing to the NEP was clearly linked to people's importance ratings of ethical and environmental purchase criteria of animal welfare, environment (in general), Fairtrade, in season, local and organic. Such ratings could be expected to lead to deliberate intentions to make ECF purchase decisions in real-world shopping contexts [5,44]. A few other studies have reported that endorsement of the NEP is associated with pro-ecological behaviour such as recycling, composting and water conservation [56], ECF purchasing [21] and increased perception of risk of hazards such as genetically modified food and pesticides [57]. Endorsement of the NEP was also linked to prioritisation of health and safety when choosing food; this relationship echoes the conclusions of other surveys on motivations underpinning choice of sustainable food [21,25]. Indeed a review of empirical studies on green purchasing behaviour noted that concerns about health and safety were positively linked to green purchasing behaviour [27].

In summary, it would seem there is reciprocity between espousing reflective and classical food shopping, which is driven by commitment to the NEP and DSP, respectively. Thus there is balancing of food shopping priorities according to subscription to each worldview.

4.5. Dimensions of the NEP and Understanding of Eco-labels

Environmental concern as measured by the NEP sub-scale was not associated with understanding of eco-labels, whilst non-subscription to the DSP was associated with eco-label understanding. Thus people who tend to reject the modernist discourse show greater orientation towards environmental labelling. The lack of association between subscription to a pro-ecological worldview and eco-label understanding is somewhat at odds with a study of over 4000 consumers in six European countries including the UK [31], which reported that general concern about sustainability issues was a determinant of use of both ethical (Fairtrade and animal welfare) and environmental labels (Rainforest Alliance and carbon footprint). However, in the pan-European study concern for the environment was assessed by combining responses to 14 specific issues, such as the amount of food wasted and poor treatment of animals in food production, and not contextualised in the wider ideological debate embracing anthropocentrism, biocentrism and faith in technology.

Moreover and importantly, the current study has revealed that rejection of the DSP is more strongly associated with greater awareness of eco-labels relative to espousal of the NEP. There is a paucity of empirical research addressing the role of adherence to the DSP in relation to environmentally significant behaviour or norms towards the environment. However, Kilbourne and Carlson assert that there is growing evidence that belief in the DSP is complicit in environmental decline, and indeed in a quasi-experimental study subscription to DSP values was inversely associated with environmental concern and perception of the need to change consumption behaviour, specifically to decrease consumption [58].

There is a general expectation that high DSP scores should be accompanied by low NEP scores (and *vice versa*) however, the correlation seen here is low leading to the presence of a large number of high scorers on both dimensions. It could be argued that environmental concern is shaped by support for NEP and rejection of DSP with the commonality arising from the anthropocentric and eco-centric domains of the sub-scales. Such reciprocity has previously been noted in a multi-national population study of university students [15]. Alternatively the substantial level of attention to environmental issues within contemporary society may have nudged people who hold traditional social values such as anthropocentrism and faith in growth and technology to embrace an environmental agenda, while still maintaining adherence to the DSP.

4.6. Quadrant Analysis

The quadrant analysis provided further insight into the complexities of how the two belief systems interact to influence environmentally significant behaviour. It is evident that people varied in the extent that they supported both paradigms with between 20 and 30% classified in each of the four quadrants. It seems that people do not simply adopt the NEP and reject the DSP, but combine subscription to each in different ways.

This heterogeneity in commitment to the two paradigms unveiled some interesting associations; the quadrant that returned high NEP scores combined with low DSP scores had greatest understanding of eco-labels, whereas the quadrant holding a worldview that endorsed both the NEP and the DSP had the lowest understanding of eco-labels. It seems that people who espouse NEP values, and who equally hold anthropocentric values believing that there is a techno-fix to environmental problems, are less familiar with eco-labels, and by inference are less likely to use them. We have previously discussed how embracing both paradigms may map to a “light green” typology that is shaped by social pressure and science outlook; it seems probable that ‘light greens’ either are apathetic to the practical value of recognising eco-labels or believe such lifestyle changes are unnecessary.

The four quadrants rated classic shopping criteria (price, quality, safety) similarly suggesting consistency across the study group. Significantly, the quadrant that endorsed both the NEP and the DSP rated convenience as particularly important as a purchase criterion. There may be complex sociocultural reasons why this group are attracted to convenience food, not least a lifestyle that is time-pressured [59]. People in this quadrant may be concerned about business prosperity and anthropogenic progress while simultaneously espousing environmental ideals, which is compatible with a three-pillar (social, economic and environmental) concept of sustainability [60]. The need to fundamentally change economic and social systems to address the tension between environmental and economic sustainability goals in the arena of public policy has been discussed [61]. Contextualisation of these associations is difficult, as there are few empirical studies on endorsement of the DSP and pro-environmental behaviour, although a multinational study using student samples showed that environmental concern was inversely and strongly influenced by the level of subscription to the DSP [15]. Equally the same study showed that subscription to the DSP was associated with a reduction in students’ perception of the need to personally change consumption behaviour.

4.7. Study Limitations and Research Directions

Firstly, the study results are based on a purposive sample and extrapolation beyond this sample should be done with caution. Clearly a survey based on people who were shopping in a city centre and in suburban areas are unrepresentative of the wider population, with rural dwellers and those who have difficulty accessing shops omitted. Also, the survey was conducted in the summer of 2014 and it is likely that shoppers’ environmental awareness has changed since then. In particular, there may be greater awareness of the link between meat consumption and environmental harm since reduced meat consumption is now a government policy climate change target [62]. Whether this change would impact on the relationships we have delineated in this analysis is unknown. No socioeconomic measures were included in the survey given that some people may find such questions intrusive, and therefore we were not able to assess any possible bias in relation to socio-economic profile. Because a substantial proportion of the sample was recruited from specialist food shops and potential participants were informed that it was an environmental study it is likely that this sample is weighted towards people holding a pro-environmentalist worldview. Since people with strong environmental views are likely to be a minority in the general population this enrichment should lead to more robust comparisons.

Our measure of social desirability responding had low reliability; with a Cronbach’s alpha level of 0.582. This low value is likely to be a function of the shortness of the scale used (7 items). It is recognised that reliability is highly dependent on the number of items used; a scale with few items may have an alpha value of 0.5 yet be internally consistent, while a scale with 14 items returning an alpha of 0.7 may well have two dimensions [63].

A shortcoming of the study design is that there are manifold other influences on food choice and while norms are most proximate to behavioural intention in the VBN model, other antecedents may be active. Ideally the relationships uncovered here require substantiation in studies that have tangible measures of food purchase behaviour; these should preferably be assessed over an extended period of time.

It should be noted that the eco-label recognition score employed in the current survey does incorporate a behavioural element, since the recognition test, as designed, measures behaviour-dependent knowledge. However this measure was crude; it did not assess specific understandings of the environmental implications of the eco-label nor value placed on the eco-labels. It would be of benefit to confirm the presumed validity of the eco-label recognition test by asking survey participants to explain their interpretation of the label. Further study is clearly necessary to unpick how worldviews relate to precise understandings of and attention to eco-labels.

Corroboration of the bi-dimensionality of the NEP scale in other study populations is also needed, and furthermore to examine if negative framing of DSP items may contribute to the possible bi-dimensional effect. Confirmation of the “Light Green” and “Dark Green” consumer typologies as revealed by the quadrant analysis is clearly warranted. Finally, the outcomes of the study could be extended beyond environmental and ethical food shopping, as delineated by eco-labels, to include other nascent elements of green dietary behaviour, such as consumption of meat.

5. Conclusions

The ethical and environmental norms on food shopping were rated less important than classic purchase criteria of price, convenience, quality, and food safety. Responses to the NEP scale split into two distinct subscales mirroring the NEP scale’s theoretical origin, which embraces both pro-ecological and traditional social values; these dimensions associate with espousal of different shopping criteria. Subscription to traditional social values was strongly related to rating classical food purchase criteria as important, while subscription to NEP values was associated with prizing ECF shopping. Furthermore eco-label awareness relies on an interaction between the two dimensions that is not a simple correlation; adoption of ECF behaviour is not solely predicated on subscription to altruistic NEP values, but is moderated by people’s endorsement of the DSP.

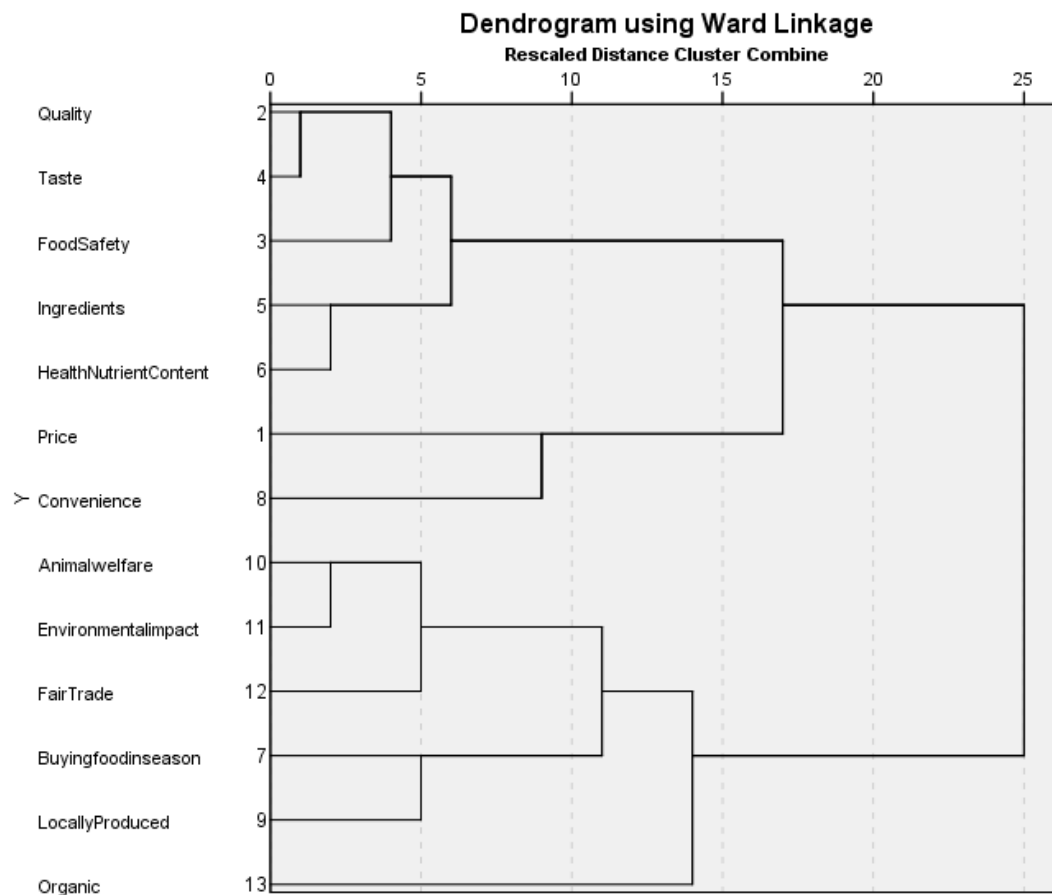
Campaigns to increase consumers’ environmental awareness are likely to motivate only some consumers to embrace ECF purchasing, namely those who tend to be disenchanted with technological and anthropocentric development. However, consumers who still accept dominant social values tend to be more sceptical about the value of adopting ECF. This scepticism may arise from a belief in human ingenuity to produce a solution to climate change and concern about the economic impact of ECF purchases on their own lifestyle. Therefore market and legal intervention may be necessary to establish greater ECF purchasing.

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Appendix A Dendrogram from Cluster Analysis of Norms of Food Shopping



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