

Relationship among values, beliefs, norms and ecological behaviour

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The present study focuses mainly on the relationship between psychological constructs and ecological behaviour. Empirical analysis links personal values, ecological beliefs, consequences of environmental conditions, denial of ecological obligation, environmental control, personal norms and environment protection behaviour. Survey data from a path analysis of a Spanish sample of 403 individuals were used, showing that ecological beliefs, personal norms and eco-altruistic values have become the main psychological explanatory variables of environment protective behaviour. Ecological beliefs, when measured by the New Ecological Paradigm Scale, affected ecological behaviour decisively. Environmental and altruistic values were shown to be related to moral obligation, and a basic variable to understand behaviour. Personal norm mediated the effects of values and environmental control on ecological behaviour.

Relación entre los valores, creencias, normas y la conducta ecológica. Este estudio se centra en la relación entre variables psicológicas y la conducta ecológica. El análisis empírico conecta valores personales, creencias ecológicas, consecuencias de las condiciones medioambientales, la negación de la obligación ecológica, el control medioambiental, las normas personales y la conducta ambiental. Los resultados obtenidos por medio de análisis de rutas con datos obtenidos en una muestra española de 403 individuos mostraron que las creencias ecológicas, las normas personales y los valores ecoaltruistas se constituyen en las principales variables psicológicas a la hora de explicar la conducta ecológica. Las creencias, medidas con la Escala del Nuevo Paradigma Ecológico, ejercieron el efecto más importante sobre la conducta. Los valores ecológicos y altruistas se relacionaron con la obligación moral. La norma personal actuó como mediadora de los efectos de los valores y del control medioambiental en la conducta ecológica.

Current ecological crisis or global environmental deterioration has been fed by a range of historical, cultural and psychological factors as values, beliefs and socially shared attitudes which in turn, did generate personal, group and cultural behaviours strong enough to trigger environmental problems (Oskamp, 1995; Vlek, 2000). An environment quality concern is taken as the relationship human beings have established towards environment and nature (White, 1967), in such a way that both historical and ecological elements shape culture and become implicit in the development of attitudes (Triandis & Suh, 2002).

As research points out, the arising concern about environmental problems came from the pollution negative effects being clearly recognized, besides the chance of less harmful alternatives adopted (Heberlein, 1972). It was assumed that environmental decisions or behaviours were related to questions of moral responsibility and not only to technical solutions (Hardin, 1968). Therefore, the ecological crisis and environmental problems causes are deeply rooted in certain aspects of human behaviour,

and in this sense, either damaging or preserving behaviours towards environment have been analysed from different psychological approaches (Winter, 2000).

A significant ecological behaviour gets defined by the range of human actions or activities, all shaped by the intention to protect the environment or reducing its deterioration, besides the impact on the environment itself (Stern, 2000). Several authors have emphasized diverse actions belonging to ecological behaviour, relatively independent to one another, being at the same time explained by different contextual and psychological predictors (Berenguer & Corraliza, 2000; Gatersleben, Steg, & Vlek, 2002). In any case, general attitudes towards the environment have been insofar found to be moderately related to different scales of pro-environmental behaviour (González & Amérigo, 1999; Scott & Willits, 1994), and influencing a wide range of specific attitudes (Vining & Ebreo, 1992; Moreno, Corraliza, & Ruiz, 2005), so it may be concluded that any environmental concern study helps to explain ecological actions.

Value-belief-norm and ecological behaviour

Some researchings have shown different elements of the cognitive system, such as values, beliefs and norms, being related to ecological actions (Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Nordlund & Garvill, 2002; Klöckner & Matthies, 2004). Specifically, different clusters of personal values appear as related

to ecological behaviours, and even in some populations the arising of distinctive orientations towards ecological values (Axelrod, 1994; Thøgersen & Grunert-Beckman, 1995, Castro & Lima, 2001; Amérigo & González, 2001) may be taken as criteria or cognitive guides concerning environmental matters.

According to that, ecological beliefs were found to be related to different environmental actions (Stern, Dietz, & Guagnano, 1995; Schultz & Zelezny, 1999). Some authors in Spanish context (Hernández, Suárez, Martínez-Torvisco, & Hess, 2000; Amérigo, Aragonés, Sevillano, & Cortés, 2005), hold that environmental beliefs represent the relationship between human beings and the environment, revealed by both anthropocentric and ecocentric concerns at least. Others studies carried out by Schultz (2000, 2001), showed both sets of beliefs were organised around concerns related to the consequences of environmental problems towards oneself, other people and all other forms of life; in other words, around selfish, altruistic and biospheric attitudes.

In recent decades, altruistic values have been linked to environmental attitudes, regarded as feelings of moral obligation to behave in a way to benefit other human beings (Heberlein & Black, 1976). This sense, Schwartz's (1977) Norm Activation Theory (as an explanation of altruistic behavior extended to proenvironmental behavior), suggests an integrative theoretical framework for researching, in which values become imperatives for standard ethical behavioural norms and constitute themselves as antecedents of ecological behaviour. According to the conceptual and empirical framework of Stern et al. (1999), people keeping distinct value orientations get exposed to situations where norms are activated and will act in a proecological way, as long as they recognise the harmful consequences of ecological deterioration, other people or even other species, feeling responsible for them. In brief, environmental concern refers to expectations or beliefs about how ecological conditions will affect

to their different valued aspects, to others and even to nature (Schultz, 2000). Seen this way, environmental concern may be thought of as a cognitive process, a psychological construct or a way of thinking related to personal identification with other human beings and the environment, able to predispose towards some environmentally friendly behaviours. That is, environmental concern constitutes a field of research into the psychological factors implied in significant ecological behaviour.

A value-belief-norm framework of environmental concern

The current study outlines a cognitive framework of environmental concern, based on Schwartz's (1977) altruistic Norm Activation Theory and test patterns of interrelations among cognitive predictors of ecological behaviour. There follows a description of the variables and some of the hypothesized relationships among them (see Figure 1). *Values* are taken as simple principles guiding evaluations or cognitive inferences which, in turn, influence on attitudes and behaviours. Thus, values filter information about the consequences of the particular environmental conditions, and decisions on behaviour are taken in order to avoid, or mitigate, the perceived or anticipated consequences. Furthermore, these values are also related to personal norms, since they determine the contents towards which feelings of moral obligation are directed.

The *ecological beliefs* and *environmental consequences* refer to, respectively, beliefs about the relationship between human beings and the environment, as well as the consequences of ecological protection or deterioration based on personally valued aspects. Both components are thus involved in the consequences of the decision to carry out environmentally protective behaviours or not.

Denial of ecological obligation is considered as «a cognitive mechanism of moral denial based on refutation, minimisation or

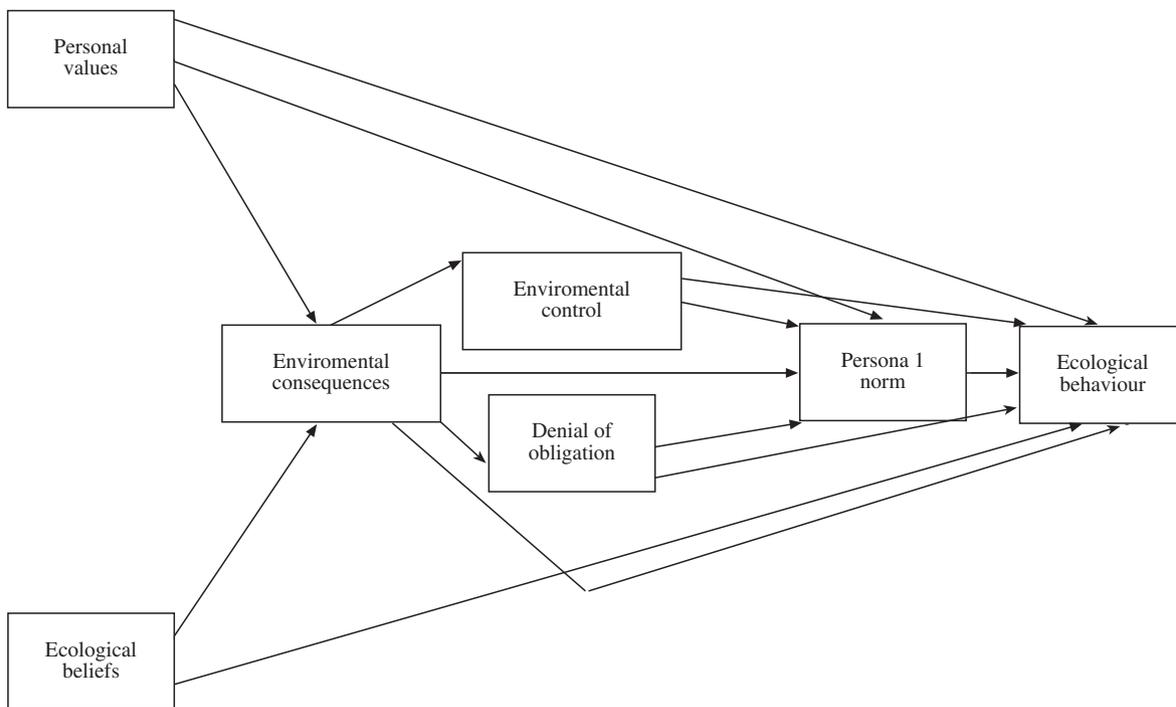


Figure 1. Path diagram showing proposed relations between variables

acceptance of ecological deterioration as inevitable, and as a defensive tendency of personal responsibility to act in the face of the environmental situation» (Opotow & Weiss, 2000). This mechanism is triggered by environmental beliefs and has a direct influence on ecological behaviour as well as the personal norm, activating or counteracting feelings of moral obligation by redefining the ecological situation.

Environmental control, as based on 'outcome expectations' (Bandura, 1986), refers to the confidence in certain strategies or ecological actions which will lead to an improvement in environmental quality. More specifically, it refers to actions designed to prevent or mitigate the adverse consequences of ecological deterioration. Therefore, environmental control is to a certain extent explained by environmental consequences. It is a direct influence on behaviour and personal norms since relying on our own ability to mitigate the consequences of ecological deterioration; it will activate an obligation to start ecologically protective behaviours.

Regarding *personal norms*, these are considered principles, rules or cognitive heuristics in the evaluation and prescription of behaviour, and are experienced as feelings of moral obligation, as stated by Schwartz & Howard (1981). We consider personal norm as the main antecedent of *ecological behaviour*, being the latter considered as a wide range of indicators of types of environmentally protective behaviours, or ecological behaviour general dimension (Kaiser, 1998).

The proposed target is similar to Stern's value-beliefs-norm theory (1999), but the present study also examined variables like denial of obligation and environmental control. The main aim of this target is to test the processes of influence of mentioned psychological variables on others, besides any direct and indirect effects of all variables on ecological behaviour.

Method

Participants

Data for this study were collected from a survey of 403 citizens living in a small town of Spain. Participants were selected from different districts of the city. Subject selection was based on age and gender quotas. In May 2001, a trained researcher visited a resident's home. Sample age ranged from 18 to 78 years of age; though mean age was 40, a standard deviation of 13.26. Gender distribution was 52.1% women and 47.9% men.

Procedure

Participants were requested to anonymously fill a questionnaire about environmental subjects. An environmental concern instrument was developed for this study, consisting of seven scales and some questions designed to measure different sociodemographic characteristics. The scales appear below, just as they appeared in the questionnaire.

The first scale used was the *New Ecological Paradigm Scale* (Dunlap, Van Liere, Mertig, & Jones, 2000), with a total of 15 items grouped in a series of aspects, all showing an ecological view of the relationship between human beings and the environment or beliefs about the adverse impact of human activity on nature.

Second one was the *Awareness of Environmental Consequences Scale*, expressly designed for this study (see

appendix), with similar questions to those of Stern et al (1999). This scale showed nine items in a Likert-type five point format, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). It was used to measure beliefs about the consequences that conditions of ecological protection or deterioration may have on oneself, other human beings and the biosphere.

Thirdly, an adaptation of the *General Scale of Ecological Behaviour* (Kaiser, 1998) was incorporated, representing a probabilistic approach to measuring behaviour. This time a wide range of indicators of types of environmentally protective behaviour were used showing varying degrees of difficulty in execution, and thereby constituting a general dimension of ecological behaviour, termed as «general ecological behaviour». This adaptation consisted of 29 additive items (yes/no format), being final score all the answers sum.

Fourthly, the *Denial of Environmental Obligation Scale* was specifically developed for the study. Based on the conceptual aspects of moral exclusion and denial of responsibility towards the environment, it showed seven items in a Likert-type five point format, from 1 (*strongly disagree*) to 5 (*strongly agree*). Scale items addressed the sense of responsibility or personal obligation regarding environmental matters.

The *Personal Environmental Norms Scale* consisted of nine affirmations, in a five point format, ranging from 1 (*Not at all obliged*) to 5 (*very obliged*). This scale was also expressly designed for this study, and considered the feelings of moral obligation to perform general actions to protect and defend environmental quality. Allusive motivational dispositions included were: changes in lifestyle, making complaints about ecological matters, prevention of pollution and depletion or destruction of resources.

The sixth one, *Control of Environmental Behaviour Scale*, was adapted from Smith-Sebasto & Fortner's (1994) Environmental Action Internal Control Index. It showed a total of eight items in a Likert-type five point format, from 1 (*strongly disagree*) to 5 (*strongly agree*). Items referred to beliefs about the capacity to improve environmental quality by means of certain personal actions.

Seventh scale was the *Scale of Values*, showing a total of 17 values, 15 taken from a translated version of Schwartz's (1992) Value Inventory Scale, and two others, namely «Respecting the earth» and «Preventing pollution», taken from the work of Stern, Dietz, & Guagnano (1995). Here the subjects were asked to evaluate the importance of each value as a guiding principle in their lives on a five point scale, ranging from 1 (*not at all important*) to 5 (*very important*).

Finally, they were asked about sociodemographic issues as age and gender, being these data not included in the final analysis.

Results

Psychological variables and ecological behaviour description

A main components factor analysis was performed on each scale, and final scale scores were made on the basis of factor analysis. Each item was pondered according to its contribution to the factorial structure or saturation matrix. In this way, the resulting scales got standard, that is to say their average was zero and the standard deviation was 1. Table 1 shows the internal consistency coefficients and explains items variance measuring the theoretical constructs.

Regarding the *New Ecological Paradigm Scale*, each items correlations in relation to the rest of the scale were moderate-low. The «*The earth has plenty of natural resources if we just learn how to develop them*» one was discarded because it showed a negative correlation to the rest. Thereafter, a main component factor analysis was carried out on the 14 items, seeking to extract a single factor. Affirmations 1, 7 and 12 showed a very low saturation on this factor, but the rest showed moderate-high saturation. Therefore, this 'ecological beliefs' termed component, consisted of 14 affirmations about beliefs concerning the relationship between human beings and the environment and the effects or impact of human action on nature.

Regarding the *Scale of Values*, a main component factor analysis was also carried out on the 17 values used in this study. The factorial solution extracted from this case consisted of two factors, since the factorial structure obtained was compatible with other clusters of items normally found in empirical studies on environmental values. Consequently, on the basis of these results, this scale was regarded as having a bi-dimensional structure. The first dimension is represented by values related to concern for the welfare of nature and other human beings, such as equality, a world at peace, union with nature, natural beauty, social justice, respecting the earth, helping and protecting the environment, and preventing pollution. The correlations between each of these items and the rest of the scale were satisfactory, ranging from 0.47 to 0.70. Second factor or dimension covered values relating to personal self-interest, such as social power, an exciting life, wealth, a varied life, authority, influence, life enjoyment and curiosity. The correlations of each item with the rest of the scale were lower compared to first dimension, ranging from 0.26 to 0.47. Consequently, according to these results, the component formed by human values got divided in two dimensions, termed 'ecoaltruistic' and 'egocentric', characterised by values relating to the welfare of others and nature and by the achievement of personal self-interest, respectively.

As for the *Awareness of Environmental Consequences Scale*, it was decided to restrict the main components factor analysis to obtain a single factor, being treated as unidimensional, since the solution obtained when factors number was not limited (eigen values >1) lacked interpretative significance. Here, the affirmation «*Protection of the environment limits my career development and personal freedom*» was discarded from the analysis because of its low correlation with the rest of the scale. Each item correlation with the rest of the scale ranged from 0.26

to 0.53. Thus, 'environmental consequences' termed component showed eight affirmations regarding the consequences of ecological protection and deterioration to personal interests, those of other people and the biosphere. None of these three aspects or motives for environmental concern were differentiated in this sample. Consequently again, it would seem that general population, after considering the dangers of environmental deterioration or the benefits of environmental protection, feel their personal considerations just as important as social or natural aspects.

Regarding the *Personal Environmental Norms Scale*, after measuring personal norm related to ecological behaviour, main components factor analysis produced a single factor or component, so the scale is considered unidimensional. All items showed a relatively high correlation to the rest of the scale, ranging from 0.51 to 0.71. As a consequence, the 'personal norm' termed variable, or sense of moral obligation, gets represented by nine questions concerning the sense of obligation to perform different general behaviours designed to protect and defend environmental quality.

Talking about the *Denial of Environmental Obligation Scale*, the correlations of each item with the rest of the scale were moderate, ranging from 0.35 to 0.50. The «*My contribution to environmental problems is insignificant when compared to the decisions and actions of governments and industry*» item was discarded because of its low correlation to the rest of the scale. Therefore, the factor analysis was executed on the six remaining items, producing a single factor solution, and the component termed «denial of obligation», meaning denial of obligation regarding environmental matters, referred to denial of personal obligation or involvement in environmental protection.

As for the *Control of Environmental Behaviour Scale*, the main components factor analysis produced a single factor and the scale was therefore considered unidimensional. All of the items showed a relatively high correlation with the rest of the scale, ranging from 0.41 to 0.72. Thus, the 'environmental control' termed component referred to the outcoming expectations or beliefs of certain behaviours will lead to certain results. Hence, if individuals have a sense of efficacy or environmental control, they will trust in their own ability to mitigate adverse consequences by means of their own actions.

In the case of the *General Scale of Ecological Behaviour*, according to the theoretical approach adopted by the scale's author (Kaiser, 1998), results obtained by adding up the number of actions is a unidimensional measure of ecological behaviour. The lowest score on this scale was -5 and the maximum 28. The mean was 11 actions and the standard deviation 4.9.

Interrelations between cognitive factors and ecological behaviour

Firstly, a variables correlation matrix was obtained. This matrix is shown in table 2. Most of the correlation coefficients were significant and moderate.

Validity test results performed on the scales by factor analysis were taken into account. Thus, the two dimensions of the *Scale of Values* - *ecoaltruistic values* and *egocentric values* - were incorporated. Both of these variables influence *ecological behaviour*, *denial of obligation*, *personal norm*, *environmental consequences* and *environmental control*.

Table 1

Internal consistency coefficients (Cronbach's α) and explained variance of the theoretical constructs of the model

Scales	Factors	% variance	
NEP	Ecological beliefs	19.8	0.60
Values	Ecoaltruistic	28.0	0.85
	Egocentric	14.4	0.68
Consequences	Environmental consequences	35.3	0.70
Denial of obligation	Denial of obligation	37.7	0.63
Environmental control	Environmental control	54.9	0.88
Personal norms	Personal norm	53.4	0.89
Ecological behaviour	Ecological behaviour	55.2	0.55

A path analysis was conducted to test the processes. Path coefficients made standard are shown in Figure 2. Given the exploratory character of the analysis, the non significant hypothesized parameters ($p < 0.01$) were removed in order to increase the model adjustment.

The R^2 value for the dependent variable ecological behaviour was .21, showing that model variables explain 21% of the variance in behaviour. The χ^2 value ($\chi^2 = 60.23, df = 14, p < .001$) shows that the model is not supported empirically by data. However, alternative indexes for assessing a model, such as goodness of fit and adjusted goodness of fit index (GFI = .99; AGFI = .91), which assess the degree to which the reproduced covariance matrix accounts for the original sample covariance matrix, exceeded the conventionally accepted $> .90$ and so indicating a close fit between the data. The root mean residual square (RMRS = .086, $p = .002$) and

the root mean square error of approximation (RMSEA = .091, $p = .002$) indicate that the model does exhibit a certain approximation of reasonable adjustment. Therefore measures assessing the overall fit of a model indicate that was supported by the data.

Final results supported the overall pattern of relations between the variables; however some of the proposed relationships did not find empirical support. *ecoaltruistic values* and *ecological beliefs* showed a positive and moderate relationship on *ecological behaviour*. The *personal norm* showed a moderate positive effect on *ecological behaviour* and *denial of obligation* had also the expected negative effect though, of lesser magnitude. *Environmental control* and *ecoaltruistic values* had a moderate positive effect on *personal norm* while *egocentric values* had a moderate negative effect thereon. Direct and total relationships between the variables are shown in table 3. *Personal norm* and *obligation denial* were the principal mediator variable. Both *ecological beliefs* and *ecoaltruistic values* had an indirect effect on *ecological behaviour* through the mediator variables. *Ecological beliefs* triggered *environmental consequences*, which in turn, had a negative effect on *obligation denial*. As the results pointed out, *ecological beliefs* were the principal variable to provoke proenvironmental behaviours.

Discussion and conclusions

Study data place ecological values and beliefs as antecedent variables, and environmental consequences, environmental control, denial of obligation and personal norm, as mediator variables. A path analysis was used to estimate simultaneously the processes of influence of some variables on others, and the direct and indirect effects of all variables on ecological behaviour.

Table 2
Correlation matrix of variables included in the path model

	1	2	3	4	5	6	7	8
1. Ecological behaviour	-							
2. Environmental control	.27**	-						
3. Denial of obligation	-.33**	-.44**	-					
4. Personal norm	.39**	.38**	-.29**	-				
5. Consequences	.28**	.48**	-.46**	.30**	-			
6. Ecoaltruistic values	.30**	.24**	-.23**	.45**	.30**	-		
7. Egocentric values	-.15**	.03	.06	-.24**	-.01	0	-	
8. Ecological beliefs	.38**	.46**	-.51**	.29**	.66**	.24**	-.07	-

** $p < .01$ Bilateral

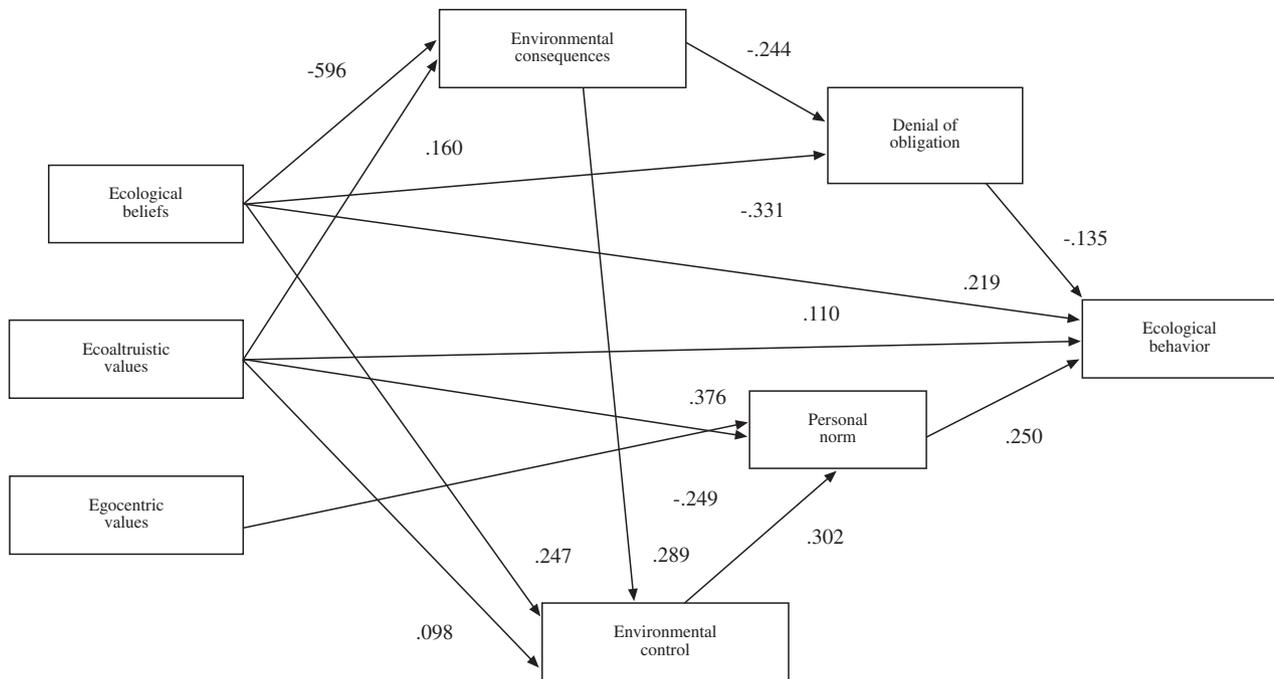


Figure 2. Reestimated path - analytic model of the influence from cognitive factors on ecological behaviour

Note: All coefficients are significant ($p < .01, N = 403$). $\chi^2 = 60.23, df = 14, p < .001$; GFI = .99, AGFI = .91, RMRS = .086, RMSA = .091. Percentage explained variances for factors were EB = 21%, PN = 32%, DO = 26%, EControl = 24% and EConseq = 38%

Table 3
Total (T) and direct (D) effects between the variables of the model

Beta	Ecological beliefs		Ecoaltruistic values		Environmental consequences		Environmental control		Egocentric values		Denial obligation		Personal norm	
	D	T	D	T	D	T	D	T	D	T	D	T	D	T
EConsequences	.596	.592	.160	.157										
EControl	.247	.425	.098	.145	.289	.295								
Denial obligation	-.331	-.486		-.039	-.244	-.251								
Personal Norm		.128	.376	.421	.089	.302	.302	-.249	-.251					
Ecological behavior	.219	.317	.110	.220	.056	.075		-.062	-.135	-.133	.250	.248		

Results show that personal norm, ecoaltruistic values and ecological beliefs exert a direct and positive influence on ecological behaviour, and denial of obligation has a direct and negative effect on behaviour. Therefore, people with a clear sense of moral obligation to carry out ecological protective behaviours, identified themselves to ecological beliefs about the relationship between humankind and the environment, and those who had ecoaltruistic values, showed a higher degree of involvement towards ecological behaviours.

Ecological beliefs measured by means of the New Ecological Paradigm Scale showed here as the most important variable to explain ecological behaviour. Thus, any ecological view of the relationship between humankind and the environment becomes the fundamental variable to explain environmentally protective behaviours. Contrary to what Stern et al. (1999) proposed, this variable will not influence directly on the personal norm but on the very same behaviour, and other mediator variables proposed.

Personal norm showed also itself as the fundamental mediator construct to account for the activation of an ecological behaviour. This variable was found to have an important impact on ecological behaviour and as Schwartz's (1977) theory proposes, and it got explained by both values and certainty that potential actions will determine the outcome for the affected area, that is, by environmental control. Consequently, values and environmental control are the variables exerting the greatest impact on the activation of the normative process. As in other studies (Grob, 1995; Tanner, 1999), environmental control was found not to have a direct effect on ecological behaviour. On its part, denial of environmental obligation is related not to the personal norm but to ecological beliefs and awareness of consequences, and its activation inhibits ecological behaviour (see also Schultz & Zelezny, 1999; Kaiser & Shimoda, 1999).

The values referred to as ecoaltruistic constitute a fundamental variable in understanding environmental concern and behaviour since, in addition to their importance to activate a personal norm, they also exert a direct positive effect on ecological behaviour itself (see also Nordlund & Garvill, 2002). Both ecoaltruistic values and ecological beliefs function not only as direct antecedents of ecological behaviour but also as antecedents of more specific attitudes. These attitudes were specified when talking about mediator variables and are, namely, attitudes towards

ecological deterioration and protection (environmental consequences), towards actions efficiency to improve environmental quality (environmental control), and towards ecological behaviour in itself (sense of obligation or personal norm). Therefore, like any ecological beliefs and ecoaltruistic values, environmental attitudes act also as ecological behaviour predictors. This way, results obtained in this study confirm people construct their attitudes to emergent subjects by reference to their values and general beliefs, lending support to a hierarchical model of value-attitude-behaviour (see also Grob, 1995; Homer & Kahle, 1998).

In spite of its theoretical basis, the proposed model tries just to explore but not confirm anything. In fact, the model explains up to a third of the variance in the mediator variables, being of capital importance for models of this type, and up to 21% of the variance in ecological behaviour. Secondly, the goodness of fit indexes are basically reasonable.

Regarding the limitations of this study, it should be noted that although it was carried out with a sample taken from common population, results obtained would need to be verified using a larger sample featuring other populations. The ecological behaviour measure is also limited by the survey methodology. An external measure will be recommended for future studies in order to avoid the social desirability effect and guarantee behavioural measurement validity.

Reliability and validity of the scales used to measure model components could be improved. Scales composition could be revised, given the low variance accounted for by some of them. As for the large amount of unexplained variance, it might be advisable to include other variables or to explore new dimensions in the proposed variables using more complex scales. The proposed model is an exploratory one, and thus needs to be tested and proved with other samples to increase its explanatory power and external validity.

Further studies designed to investigate processes involved in environmental concern, would need to focus on a conceptual and methodological effort to include new variables like contextual factors and personal capabilities or routines, as well as unravel other dimensions involved in the attitudinal variables considered, in order to establish what relationships exist between the components of commitment to ecological behaviour.

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