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Bibliographical reference
Fornara et al., "The extended Value-Belief-Norm theory predicts committed action for nature and biodiversity in Europe", *Environmental Impact Assessment Review*, Vol 81, March 2020.

Environmental Impact Assessment Review 81 (2020) 106338

Contents lists available at ScienceDirect

Environmental Impact Assessment Review

journal homepage: www.elsevier.com/locate/eiar

The extended Value-Belief-Norm theory predicts committed action for nature and biodiversity in Europe

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ARTICLE INFO

Keywords:
Biodiversity protection
Value-belief-norm theory
Social norms
Moral norm
Biospheric values
Pro-environmental beliefs
Committed action

ABSTRACT

Biodiversity and nature conservation have become prominent issues in the political agenda, at both local and global level, and in this regard the importance of considering people lifestyles, habits and behaviours has received increasing attention.

The present study verified an extended version of the Value-Belief-Norm (VBN) theory (Stern et al., 1999) in the prediction of action for biodiversity and nature conservation. Here we found that the VBN sequential path (including biospheric values, general pro-environmental beliefs, awareness of consequences of action, ascription of responsibility for action, and moral norm), integrated by perceived behavioural control and social norms, predict action for nature and biodiversity.

Participants (N = 183), recruited in seven European countries, had performed outstanding actions either in nature-related issues or in other areas (or were just involved in some biodiversity/nature relevant actions). They filled in an online questionnaire measuring the examined constructs.

Results confirmed the paths predicted by the VBN. In particular, moral norm and biospheric values, as well as perceived behavioural control, showed a direct impact on action for nature/biodiversity. On the other hand, social norms (notably, injunctive norm) showed only an indirect influence on action, via other dimensions.

These outcomes suggest that communication and educational agencies should promote the dissemination of biospheric values in the community, in order to trigger the moral obligation of doing something relevant for nature and biodiversity conservation. A major implication is that by increasing the proportion of people acting in a committed way for biodiversity conservation should then provide a social cue for the ones not yet acting.

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https://doi.org/10.1016/j.eiar.2019.106338
Received 8 May 2019; Received in revised form 5 October 2019; Accepted 4 November 2019

1. Introduction

Biodiversity[1] plays a key role in the procurement of resources such as food, energy, raw materials, oxygen, water, medicines, recreation, and additional necessities to human beings (United Nations, 2012). For this reason, biodiversity conservation is valuable not only for the bio-ecological domain, but it has important positive implications also in the economic, social and cultural layers (Di Castri and Balaji, 2002; Bonnes et al., 2004; Bonnes et al., 2011).

Despite that, the transformations in the ecosystems and the extinction of species have increased, being faster in the past fifty years than in any other period in human history (Ceballos et al., 2015). In this regard, people activities have a powerful effect on nature and biodiversity, as human intervention is the main cause of planetary turbulences and regime changes (Steffen et al., 2015), which has led scientists to label a new geological era as "Anthropocene" (Monastersky, 2015). On the other hand, the positive impact of biodiversity on people well-being has recently been receiving empirical support (e.g., see Carrus et al., 2015). The conservation of biodiversity has become pivotal both in the United Nations agenda (UN General Assembly, 2015) and in the European Union political agenda (see EEA, 2015; Tittensor et al., 2014). Despite such a focus on this matter, biodiversity loss is far from being a solved issue, since diverse political initiatives for biodiversity conservation launched in the last decade at EU level have failed to reach the goal (Pe'er et al., 2014). In order to reverse this trend, some scholars claimed that it is crucial to consider people lifestyles, habits, and behaviours (Steg and Vlek, 2009). In fact, despite an increasing knowledge of environmental issues among laypeople and a better understanding of ecological behaviours among social scientists, there is still a huge need of knowledge on how to trigger biodiversity and nature conservation behaviours. Hence, it is important to know which dimensions (e.g., drivers and barriers) influence people choice in protecting or non-protecting nature, and in particular biodiversity.

The present study focuses on the prediction of committed action toward the conservation of nature and biodiversity by using the theoretical lens of the Value Belief Norm (VBN) theory (Stern et al., 1999), enriched by perceived behavioural control and subjective norm (both derived from the Theory of Planned Behaviour - TPB: Ajzen, 1991) - the latter presented here as injunctive norm (Cialdini et al., 1991) - thus taking into account an articulated picture of normative influence (i.e., including both personal or moral norm and social norms).

In the following section, the theoretical approaches and constructs that were included in the proposed prediction model will be discussed.[2]

2. Theoretical framework

A large number of studies have analysed the relationships between values, ecological worldviews, and specific ecological beliefs, intentions, and behaviours (e.g., Milfont and Gouveia, 2006; Nordlund and Garvill, 2003; Thøgersen and Ölander, 2002). In this regard, the role of social-psychological dimensions in the prediction of ecological behaviour has been verified by means of various models. In order to explain the specific action of public support for environmental movements, Stern et al. (1999) conceptualized the VBN theory. This theory is an extension of the Norm Activation Model (NAM: Schwartz, 1977) of altruism, which postulates that an individual helps the other(s) whether i) he/she is aware of the other(s) being threatened or in danger - that should make salient the awareness of the consequences of not coping with the other'(s)' problem - and ii) he/she ascribes the responsibility of these helping actions to him/herself. Whether both of these psychological conditions occur, then feelings of moral obligation (i.e., the moral or personal norm) for giving aid to the other(s) are elicited and, in turn, such feelings trigger the helping behaviour.

Stern et al. (1999) claimed that the need of aid can be expressed not only by other people, but also by other valued objects, such as the self, other species, and the biosphere. In other words, for example, those who value very much other species would be highly concerned about an environmental event threatening them. Thus, the activation of problem awareness depends on the possession of values and pro-environmental worldviews. In sum, the VBN theory postulates that pro-environmental action stems from a causal chain including values, general pro-environmental worldviews, awareness of consequences, ascription of responsibility, moral norm and, finally, the outcome behaviour.

Stern (2008, p. 366) stated that the behaviour is triggered "when an individual comes to believe that a personal value is threatened and that he or she can relieve that threat by appropriate action". Personal values are here conceptualized as "the criteria that people use to select and justify actions and to evaluate people (including the self) and events" (Schwartz, 1992, p. 1). In this regard, ten universal values, included in two bipolar dimensions (i.e., self-transcendence vs. self-enhancement, and openness to change vs. conservation), have been empirically verified through diverse cross-cultural studies (Schwartz, 1992; Schwartz and Bardi, 2001). About the relationship between universal values and pro-environmental behaviours, self-transcendence (i.e., altruistic and biospheric) values were found as those positively associated to pro-environmental behaviours, whereas the opposite result emerged for self-enhancement (i.e., egoistic) values (Steg et al., 2005). Regarding the specificity of biospheric values, they cover those values that focus on the environment and the biosphere (Raymond et al., 2011). Even though biospheric values (i.e., those values related to the environment and the biosphere) were often found (or considered) as strictly related to altruistic values in the prediction of pro-environmental behaviours, De Groot and Steg (2007) found a distinction between them across five countries, thus corroborating the distinctiveness of biospheric values. Moreover, biospheric values emerged as significantly associated to the moral norm when the other intermediate dimensions of the VBN are controlled for, thus suggesting that biospheric values directly activate the moral norm (Steg et al., 2005).

About general environmental worldviews (or beliefs), they were represented in the first conceptualisation of the VBN theory (Stern, 2000) by the New Ecological Paradigm (NEP), which taps into a set of beliefs concerning the interaction between people and the natural environment (Dunlap and Van Liere, 1978). The NEP perspective depicts the contrast between the anthropocentric view - i.e., people have the right to utilize the natural environment - and the ecocentric view - i.e., people are only part of the natural environment. An integration between such two views is currently reflected by the New Human Interdependence Paradigm-NHIP (Corral-Verdugo et al., 2008), where human needs and the environment are conceived to be interdependent, and therefore an individual's pro-environmental behaviour could also be promoted by an utilitarian goal (Stern, 2008; De Dominicis et al., 2017).

As regards moral norms, they are direct antecedents of behaviour and are connected to values and to an array of beliefs that trigger them (Stern, 2000; Stern et al., 1999). Moral norms are rooted in interiorized values (Thøgersen, 2006) and concern the feeling of moral obligation about the right option to choose in a given situation for a positive self-esteem (Fransson and Biel, 1997). A significant role in the development of moral norms is played by social norms, which would suggest what kind of behaviour is right (or wrong) in a given socio-cultural or group context (Bamberg et al., 2007). In this regard, McDonald et al. (2014) have provided empirical evidence supporting the role of social norms,

[1] Biodiversity is a shortened form for "biological diversity", which is defined as the "variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems" (United Nations, Convention on Biological Diversity, 1992-Article 2).

[2] This study has been conducted within the BIOMOT project (De Groot, Bonaiuto, Dedeurwaerdere, & Knippenberg 2015).

and their possible conflicts, with reference to light glow reduction. Within the framework of Social Representation Theory (Moscovici, 1981), similar results emerged in a study on the conservation of an endangered species in Portugal (Castro and Mouro, 2016; Mouro and Castro, 2016). Several studies (see Bamberg and Möser, 2007, for a meta-analysis) provided evidence that moral norms contribute to an explanation of pro-environmental behaviours such as energy conservation (Black, Stern, & Elworth, 1985), recycling (Guagnano et al., 1995), travel mode choice (Hunecke et al., 2001), and consumer choice (Thøgersen, 1999).

As for other behaviours carried out under the individual's rational control, the study of action toward nature and biodiversity needs to take into account a theoretical framework that has proven to explain several volitional behaviours, i.e., the Theory of Planned Behaviour (TPB: Ajzen, 1991). According to the TPB, the most direct antecedent of a person's behaviour is behavioural intention, which is in turn affected by three different kinds of factors, i.e., attitudes toward the behaviour, perceived behavioural control, and subjective norm. Perceived behavioural control concerns the beliefs about resources and opportunities (in other words, the beliefs about the easiness or difficulty) related to performing the target behaviour, and, as such, it may also directly predict the behaviour within the TPB framework. Steg and Nordlund (2013) noted that perceived behavioural control is conceptually similar to the construct of self-efficacy included in the NAM (Schwartz, 1977). The subjective norm is a kind of injunctive norm, as stated by Ohtomo and Hirose (2007), since it refers to others' expectancies about what we should do in a specific situation, thus recalling the distinction between injunctive and descriptive social norms (Cialdini et al., 1991). More in general, injunctive social norm has to do with the belief about what is the proper action to perform in a given situation, whereas descriptive social norm concerns the belief about how most individuals actually behave in a given situation (Cialdini et al., 1991; Schultz et al., 2008). Both kinds of social norm were found to be associated to pro-environmental behaviours such as littering (Kallgren et al., 2000), recycling (Fornara et al., 2011), energy saving (Schultz et al., 2007), and use of photovoltaic systems (Jager, 2006).

On the other hand, Poortinga and colleagues (Poortinga et al., 2004) found that attitudinal variables explain a modest amount of variance in several pro-environmental behaviours, and there is a need of a broader perspective in this research field.

3. Objective and hypotheses

The objective of this research was to verify a conceptual model concerning a specific target behaviour, i.e., action toward the conservation of nature and biodiversity. For this aim, we used a sample mostly composed by leaders in different societal domains who were protagonists of recognized actions either for nature and biodiversity conservation or for other socially relevant goals. Amel and colleagues (Amel et al., 2017) recently underlined the urge of psychological research focusing on those transformational individuals who could play the role of drivers of sustainable actions at the collective level. It should also be remarked that studies targeting activists, in order to understand pro-nature and pro-biodiversity actions, are extremely rare: in fact, as reported by Ives (2016), only about 2% of the total studies analysed in his literature review looked at leaders or activists for nature. The issue that the sample is composed of people who are engaged in actual behaviours (instead of behavioural intentions), as witnessed by solid proofs (such as awards and recognitions), is a further strength element of this research.

The model tested is framed on an extended version of the VBN theory - including perceived behavioural control and social norms (i.e., descriptive and injunctive norm) - which has proven to be a proper frame for eliciting different pro-environmental behaviours, as reported above.

Specifically, the following paths were hypothesized in the proposed prediction model.

H1) In line with the VBN theory, we expected that action toward nature and biodiversity is the result of a sequential chain that starts with biospheric values and ends with the target pro-environmental action. Specifically, as conceived by Stern and colleagues (Stern et al., 1999), VBN theory postulates that biospheric values promote general pro-environmental beliefs, which, in turn, predict ascription of responsibility. The latter is an antecedent of awareness of consequences, which, in turn, prompts moral norm, which finally triggers the pro-environmental behaviour.

H2) Consistently with previous literature focused on other pro-environmental behaviours (Nordlund and Garvill, 2002; Steg et al., 2011; Fornara et al., 2016), we expected biospheric values to directly predict both moral norm and action. The key role of biospheric values within the model is also supported both by the outcome of a qualitative study developed within this project and by evidence gathered by in-depth interviews with a sub-sample of the present survey sample.

H3) Accordingly to both the TPB framework and the literature on pro-environmental behaviours, we expected a direct effect of perceived behavioural control on action for biodiversity and nature protection.

H4) Based on previous findings, we hypothesized a direct and/or indirect effect of social norms on action. Specifically, we expected that social norms predict the behaviour via perceived behavioural control (e.g., see Fornara et al., 2011) and/or via moral norm (e.g., see Bamberg and Möser, 2007; Bamberg et al., 2007).

4. Method

4.1. Participants and procedure

Participants ($N = 183$) were recruited in seven EU countries, namely Belgium (35 Ss, 19.12%), Finland (18 Ss, 9.84%), Germany (33 Ss, 18.03%), Italy (25 Ss, 13.66%), Slovenia (30 Ss, 16.39%), The Netherlands (21 Ss, 11.48%), and UK (21 Ss, 11.48%). They were 130 men and 49 women (4 missing), from 27 to 80 years old ($M = 50.55$, $SD = 11.33$), most of them highly educated (Primary School License = 0%; Middle and High School License = 15%; Bachelor of Science = 27%; Master Degree = 43%; PhD = 15%).

The initial base of potential respondents[3] consisted in 30 persons for each country, i.e., 15 persons who achieved outstanding actions in terms of conservation of biodiversity and nature and 15 persons who did not achieve such outstanding actions, or who achieved outstanding actions in other societal areas.[4] In order to rely on an adequate sample number, forty-six leaders' collaborators (whose main role was to support and facilitate the leader's action) have been also recruited as participants in the study.

After a first contact with the participants through e-mails and phone calls, the informed consent to voluntarily participate in the research was gained. To facilitate data collection, the survey has been administered through the UNIPARK on-line platform. Data were collected during the years 2013 and 2014.

4.2. Measures

Participants filled in the online questionnaire, which includes the following measures.[5]

[3] This potential base refers to those respondents who were involved in other parts of the BIOMOT project (see Dedeuwaerdere et al., 2016, Admiraal et al., 2017, van den Born et al., 2017).

[4] This discriminating variable was not used as design variable in the present study, being the core of another study included in the BIOMOT project (Scopelliti et al., 2018).

[5] Following the conventions of the Structural Equation Modelling domain, we report here the Composite Reliability (*CR*) coefficient (see Raykov, 1997) for each measure. Given the dependence of reliability coefficients on the number of

Action for preserving nature and biodiversity. It included four items concerning being active for the conservation of biodiversity, i.e.: "*I am very active in the protection of nature and biodiversity*", "*My activities to protect the plant world involve many different species*", "*My activities to protect the animal world involve many different species*", and "*My activities to protect nature and biodiversity involve rare (or endangered) species*" (AVE = 0.65; *CR* = 0.90).

Biospheric values. The two items tapping biospheric values (i.e., "*Unity with nature*" and "*Protecting the environment*", see Stern et al., 1998) were selected from Schwartz's Scale of Universal Values[6] (Schwartz, 1992). Respondents had to assess how important they considered such values as guiding principles of their lives (AVE = 0.81; *CR* = 0.89; $r = 0.81$, $p < .001$).

General pro-environmental beliefs. Two items from the NHIP scale (Corral-Verdugo et al., 2008) were selected, i.e., "Human beings can progress only by conserving nature's resources" and "Human progress can be achieved only by maintaining ecological balance" (AVE = 0.66; CR = 0.84; r = 0.73, p < .001).

Awareness of consequences of nature and biodiversity conservation vs. loss. It included two items adapted from Steg et al. (2005), i.e., "Nature and biodiversity will provide a better world for me and my children" and "Nature and biodiversity damage generated here harms people all over the world" (AVE = 0.42; CR = 0.57; r = 0.40, p < .001).

Ascription of responsibility for nature and biodiversity conservation vs. loss. This was measured by two (opposite sense) items adapted from Steg et al., 2005), i.e., "I feel personally responsible for the protection of nature and biodiversity" and "My role in the protection of nature and biodiversity is small" (AVE = 0.48; CR = 0.61; r = 0.36, p < .001).

Moral norm. Two items adapted from Abrahamse and Steg (2009) were used, i.e., "I feel personally obliged to protect nature and biodiversity" and "I feel guilty when I do not act for nature and biodiversity protection" (AVE = 0.56; CR = 0.70; r = 0.57, p < .001).

Injunctive social norm. Two items adapted from Fornara et al. (2011) were used, i.e., "Most people who are important to me think that I should act for nature and biodiversity" and "Most people I have to do with think that I should act for nature and biodiversity" (AVE = 0.59; CR = 0.74; r = 0.54, p < .001).

Descriptive social norm. It included two items adapted from Fornara et al. (2011), i.e., "Most of the people who are important to me do act to protect nature and biodiversity" and "Most people I have to do with act to protect nature and biodiversity" (AVE = 0.60; CR = 0.74; r = 0.49, p < .001).

Perceived behavioural control. Two items adapted from Fornara et al. (2011) were used, i.e., "For me acting to protect nature and biodiversity is easy" and "For me acting to protect nature and biodiversity is feasible" (AVE = 0.54; CR = 0.67; r = 0.50, p < .001).

For all the measures, the response scale was a 7-step Likert-type, ranging from 1 (= "strongly disagree") to 7 (= "strongly agree"), with the exception of Universal values, where the scale points were from 1 to 7 as well, but the labels varied from "totally unimportant" to "totally important".

The questionnaire also included socio-demographic indicators (age, gender, education, profession, context of living and family composition) and other measures that were used for other goals within the research project.

4.3. Data analysis

Preliminary analyses were run in order to exclude possible socio-demographic differences in the outcome variable across age, gender and education. In fact, such differences were all not significant.

AMOS 22 software (Arbuckle, 2013) was used for performing structural equation modelling (N bootstraps = 200). The initial model included the expected unidirectional arrows among the latent factors. In order to increase the model fit during the step-by-step improvement process, non-significant parameters were eliminated, and new parameters were added, considering those modification indexes suggested by the Lagrange Multiplier Test (Chou and Bentler, 1990) which were theoretically justifiable.

The significance of the $\chi 2$ value was not taken into account for assessing the overall fit of the models (see Marsh et al., 1988, for a detailed account of its weak reliability), whilst it was considered the more reliable ratio between $\chi 2$ and degrees of freedom (being under 3 the threshold acceptability according to Carmines and McIver, 1981). Besides the $\chi 2/df$ ratio, other conventionally considered fit indices in the SEM literature have been taken into account (e.g., see Tabachnick and Fidell, 2007), such as the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI).

5. Results

Table 1 reports the inter-correlation matrix among the observed variables (i.e., the items representing the measured constructs).

Fig. 1 shows the final model predicting *Action for preserving nature and biodiversity*. This model mirrors the most satisfactory solution, from both statistical and theoretical points of view, that can be found considering all measures.[7] The considered fit indices are all acceptable, according to cut-off values suggested in literature (e.g., see Hu and Bentler, 1999).

The fit indices are as follows: $\chi^2(119) = 187.99$, $p < .001$; $\chi 2/df$ ratio = 1.58; RMSEA = 0.056, 90% confidence interval for RMSEA = 0.041–0.071, test of close fit RMSEA < 0.05: $p = ns$; SRMR = 0.078; TLI = 0.94; CFI = 0.95. The model accounts for an acceptable proportion of variance of the final outcome variable, i.e., *Action for preserving nature and biodiversity* (28% of variance accounted by *Moral norm*, *Perceived behavioural control*, and *Biospheric values*), and for a high proportion of variance of its main direct antecedent, i.e., *Moral norm* (82% of accounted variance). Consistently with the VBN architecture, *Moral norm* is in turn predicted by *Ascription of responsibility* (35% of variance accounted by *Awareness of consequences*), *Awareness of consequences* (67% of variance accounted by *General pro-environmental beliefs*), and *Biospheric values*. The first endogenous variable included in the VBN framework, i.e., *General pro-environmental beliefs* (49% of accounted variance), is in turn predicted by *Biospheric values* and *Injunctive social norm*. Finally, *Perceived behavioural control*, that is another direct endogenous antecedent of the outcome variable, showed an amount of 30% of variance accounted by *Injunctive social norm* and *Biospheric values*.

Looking at the structural coefficients linking the latent factors, it emerges that *Action for preserving nature and biodiversity* is directly

(*footnote continued*)
items (that may produce low coefficients also with adequately correlated items), we also report the Pearson's *r* (and its significance) in the cases of 2-item measures. Average Variance Extracted (AVE) is also reported for each measure.

[6] The choice of selecting *Biospheric values* from the general set of *Universal values* is motivated by the fact that, consistently with the VBN framework, *Biospheric values* are more closely related to general pro-environmental beliefs than the other values (see Steg and De Groot, 2012; Fornara et al., 2016).

[7] We also tested a simpler not-nested model, represented by the classic version of VBN. Such a model showed an almost acceptable goodness of fit [$\chi^2(70) = 130.51$, $p < .001$; $\chi 2/df$ ratio = 1.86; RMSEA = 0.069, 90% confidence interval for RMSEA = 0.050–0.087, test of close fit RMSEA < 0.05: $p < .05$; SRMR = 0.099; TLI = 0.94; CFI = 0.95], even though some fit indices (i.e., $\chi 2/df$ ratio, RMSEA and SRMR) are both lower than the ones showed by the extended version of VBN and under the suggested cut-off values as concerns RMSEA and SRMR (see Hu and Bentler, 1999). Moreover, the extended version of VBN was preferred for its higher amount of explained variance of the outcome variable.

Table 1
Inter-correlation matrix among the observed variables.

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Biodiversity Action 1	–																			
2. Biodiversity Action 2	0.66**	–																		
3. Biodiversity Action 3	0.67**	0.80**	–																	
4. Biodiversity Action 4	0.64**	0.67**	0.77**	–																
5. Moral Norm 1	0.31**	0.31**	0.31**	0.30**	–															
6. Moral Norm 2	0.16*	0.25**	0.20**	0.20**	0.57**	–														
7. Ascription of Resp. 1	0.36**	0.35**	0.35**	0.35**	0.64**	0.43**	–													
8. Ascription of Resp. 2	0.45**	0.31**	0.32**	0.41**	0.34**	0.09	0.36**	–												
9. Aware of Conseq. 1	0.16*	0.26**	0.21**	0.19**	0.39**	0.43**	0.38**	0.11	–											
10. Aware of Conseq. 2	0.23**	0.36**	0.24**	0.20**	0.41**	0.48**	0.28**	0.07	0.40**	–										
11. Pro-env. Beliefs 1	0.17*	0.22**	0.23**	0.21**	0.30**	0.43**	0.36**	0.01	0.45**	0.45**	–									
12. Pro-env. Beliefs 2	0.18*	0.23**	0.25**	0.19**	0.34**	0.41**	0.41**	0.08	0.46**	0.38**	0.73**	–								
13. Perc. Behav. Control 1	0.29**	0.21*	0.24*	0.26**	0.29**	0.10	0.23*	0.14*	0.18*	0.11	0.12	0.15*	–							
14. Perc. Behav. Control 2	0.31**	0.22**	0.28**	0.30**	0.31**	0.22**	0.29**	0.15*	0.45**	0.19*	0.30**	0.36**	0.50**	–						
15. Biospheric Value 1	0.28**	0.33**	0.35**	0.33**	0.30**	0.24**	0.25**	0.22*	0.24**	0.12	0.18*	0.18*	0.22**	0.30**	–					
16. Biospheric Value 2	0.25**	0.27**	0.31**	0.31**	0.23**	0.20**	0.16*	0.17*	0.25**	0.13	0.15*	0.15*	0.20**	0.32**	0.81**	–				
17. Injunctive Norm 1	0.26**	0.26**	0.25**	0.24**	0.44**	0.43**	0.40**	0.10	0.39**	0.40**	0.52**	0.50**	0.20**	0.34**	0.16*	12	–			
18. Injunctive Norm 2	0.27**	0.23**	0.19**	0.23**	0.30**	0.22**	0.30**	0.18*	0.33**	0.20**	0.25**	0.23**	0.12	0.19*	0.00	−0.01	0.54**	–		
19. Descriptive Norm 1	0.15*	0.13	0.16*	0.15*	0.34**	0.23**	0.38**	0.13	0.20**	0.24**	0.16*	0.18*	0.13	0.13	0.16*	0.16*	0.41**	0.26**	–	
20. Descriptive Norm 2	0.09	0.03	0.08	0.11	0.06	0.08	0.12	0.15*	0.01	0.06	−0.01	−0.07	0.02	−0.08	0.08	0.08	0.21**	0.37**	0.48**	–

* $p < .05$.
** $p < .01$.

predicted by *Moral norm* ($\beta = 0.31$, $p < .001$), *Biospheric values* ($\gamma = 0.22$, $p < .01$), and *Perceived behavioural control* ($\beta = 0.18$, $p < .06$). Data support the rest of the sequential chain hypothesized in the VBN theory, since *Biospheric values* predict *General pro-environmental beliefs* ($\gamma = 0.15$, $p < .05$), which in turn predict *Awareness of consequences of nature and biodiversity conservation* vs. *loss* ($\beta = 0.82$, $p < .001$), which in turn predicts *Ascription of responsibility for nature and biodiversity conservation* vs. *loss* ($\beta = 0.59$, $p < .001$), which in turn predicts *Moral norm* ($\beta = 0.52$, $p < .001$). Consistently with the VBN framework, *Moral norm* is also directly predicted by *Awareness of consequences* ($\beta = 0.46$, $p < .001$) and *Biospheric values* ($\gamma = 0.13$, $p < .06$).

As concerns the role of social norms, it did not appear any direct link with *Action for preserving nature and biodiversity*, and only *Injunctive social norm* showed some indirect connections, notably via *Perceived behavioural control* ($\gamma = 0.40$, $p < .001$) and, at an earlier stage of the VBN chain, via *General pro-environmental beliefs* ($\gamma = 0.66$, $p < .001$).

6. Discussion

On the whole, our findings provided empirical support to an extended version of the VBN theory, which integrates perceived behavioural control and social norms in predicting an understudied pro-environmental behaviour such as action toward biodiversity conservation. This result is a confirmation of the validity of the VBN framework in relation to pro-environmental behaviours, as demonstrated in various studies (e.g., Kaiser, Hübner, & Bogner, 2005; Cordano et al., 2011; Bronfman et al., 2015).

Particularly, this study confirmed the expected sequential chain (H1) linking values, beliefs, awareness of consequences, ascription of responsibility, moral norm and, finally, (self-reported) action. Within this model, moral norm revealed its prominent role, resulting as the most powerful direct antecedent of pro-environmental action, as was also found for a very different kind of pro-environmental behaviour (i.e., household energy efficiency, see Fornara et al., 2016). This outcome confirms that those who feel the moral oblige to behave pro-environmentally are likely to act coherently (Van der Werff et al., 2013). Such a pattern is consistent with the same one already emerged for the explanation of both general ecological behaviour (e.g., see Nordlund and Garvill, 2002) and specific environmentally significant actions, including pro-environmental activism (see Steg et al., 2011).

Direct effects were also found on variables more than one level downstream. Specifically, there was a direct effect i) of awareness of consequences on moral norm and, above all, ii) of biospheric values on both moral norm - which was already assumed by Schwartz (1977), who considered moral norms as rooted in internalised values - and action. The direct link of awareness of consequences on moral norm was also found for other pro-environmental behaviours such as household energy efficiency (see Fornara et al., 2016).

About biospheric values, their key role within the VBN framework was confirmed (H2), since they appeared not only as direct predictor of moral norm - as found for other pro-environmental behaviours (see Steg et al., 2011; Nordlund and Garvill, 2002; Fornara et al., 2016) - but they also emerged as a proxy of action. This is consistent with the outcomes of both a qualitative study carried out within the BIOMOT project (De Groot, Bonaiuto, Dedeurwaerdere, & Knippenberg, 2015) and a large-scale comparative analysis of pro-biodiversity values of 169 actors involved in 34 prominent ecosystems protection projects in the EU (Dedeurwaerdere et al., 2016). On the whole, these findings confirm that people are more likely to perform a pro-environmental action way if they possess biospheric values (Honkanen and Verplanken, 2004; Steg and De Groot, 2012). A further non-hypothesized link involving biospheric values concerns perceived behavioural control. In this regard, it could be speculated that those persons valuing nature and environment protection as guiding principles of their existence are more likely than others to perceive whether (or not) to act for defending

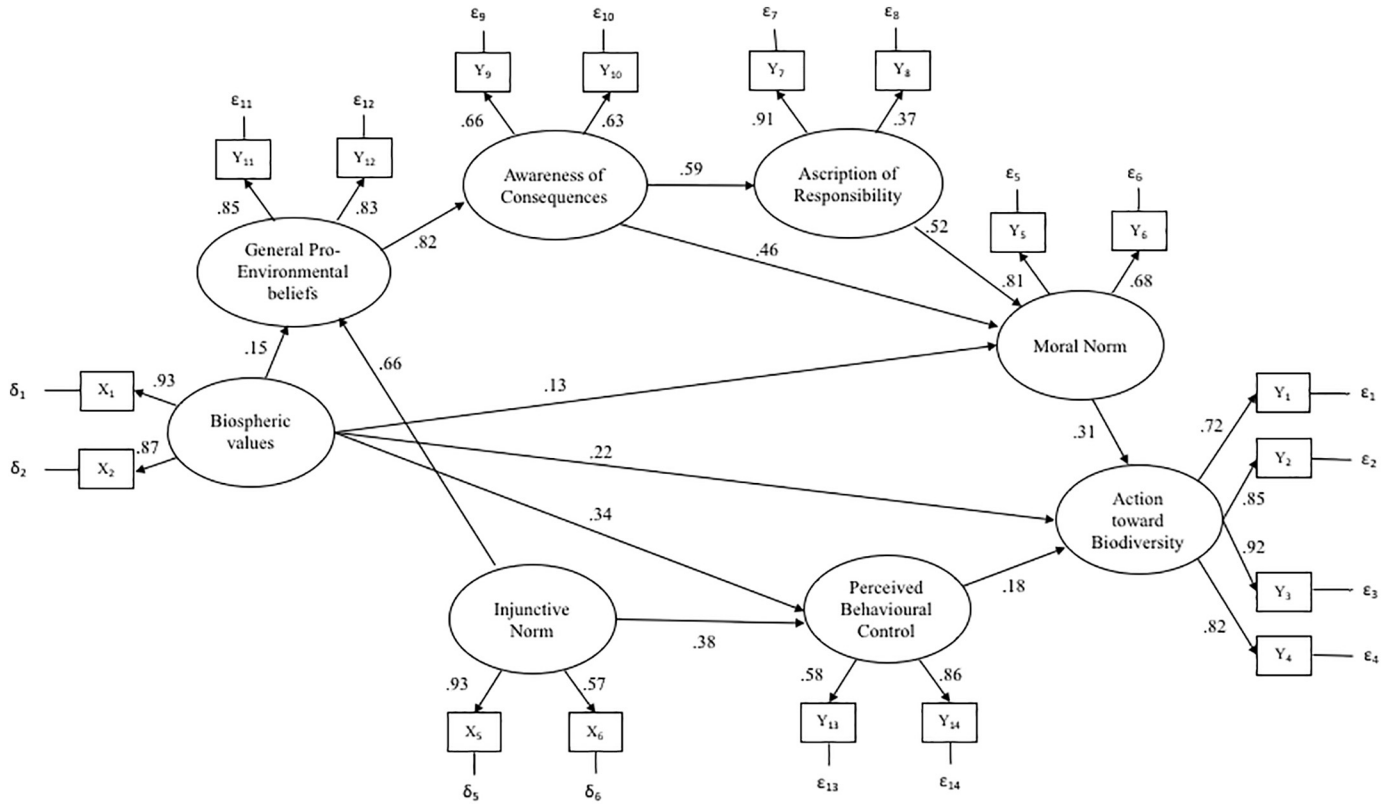

Fig. 1. Structural Equation Model predicting Action toward Biodiversity (N = 183).
Note: Reported values are standardized regression weights.

nature and biodiversity under their control (or willingness). In other words, holding biospheric values should render the performance of such actions easier (or more feasible), in the mind of the individual.

Still about perceived behavioural control, it was confirmed (H3) that it is a direct antecedent of pro-biodiversity action, coherently with the TPB framework (Ajzen, 1991).

As concerns the influence of social norms on pro-biodiversity action (H4), only an indirect association emerged. More specifically, it was found the connection between social norms and action via perceived behavioural control, as found by Fornara et al. (2011) for household waste separation disposal, but in the latter case the antecedent was the descriptive norm, whereas in this study it is the injunctive norm. Such a difference can be due to the kind of pro-environmental behaviour. In fact, it is likely that, for recycling behaviour, the belief about what the others (particularly neighbours) actually do (i.e, the descriptive norm, see Cialdini et al., 1991) can be relevant for a person in order to evaluate the extent to which her/his personal efforts will be effective for the goal (Fornara et al., 2011). In other words, following the social dilemmas perspective (e.g., see Dawes and Messick, 2000), recycling is a behaviour that has collective implications for a community, and its consequences depend on the willingness of other people of the community to cooperate for the same goal, literally on a day-by-day basis. On the other hand, in the case of action toward nature and biodiversity conservation, this interdependence between the individual and the collective level should be less salient in people's mind. In this case, in fact, it is not surprising that the perceived easiness and feasibility of action is increased if significant others (of our present or of our past) value such action as worthy and important. This is consistent with the content of some of the life histories collected within the BIOMOT project, where the choice of “defending” nature and/or biodiversity was oriented by significant persons (such as parents, relatives, teachers, other mentors, etc.), particularly in the early stages of life (see De Groot et al., 2015). Such a reason would also explain the link between injunctive norm and moral norm via general pro-environmental beliefs.

To sum up, in line with the suggestions of other scholars in this field (e.g., see Raymond et al., 2011; Steg and Vlek, 2009), this study verified the direct impact of values, beliefs and norms on (self-reported) actual behaviour, rather than considering just behavioural intentions as it is done by many other studies. These findings confirm the validity of this enlarged version of the VBN model (including perceived behavioural control and injunctive norm) in the explanation of an understudied pro-environmental behaviour such as action toward nature and biodiversity protection by EU leading activists.

Regarding the limitations of this study, it should be mentioned the specificity of the sample. In fact, even though they were selected in a cross-cultural vein (i.e., recruited in seven different EU countries), participants were mostly leaders, working in different fields such as business, public society, and civil society; moreover, they were mostly men. Thus, these persons cannot be considered as a representative sample of the general population, but rather a special cluster of committed actors, often already engaged in biodiversity conservation. Further research should verify the generalization of the observed relationships (e.g., the impact of injunctive norm on perceived behavioural control) on the rest of the population, even though to act directly for nature and biodiversity conservation has been quite unusual so far. The present result, therefore, speaks in favour of a major importance of the injunctive (vs. descriptive) norm when the person achieves a difficult, challenging goal (being the sample mainly composed by leading activists, predominantly men). Nevertheless, it is to highlight that the VBN framework proved to work well also for a very specific behaviour detected in a special sample like this one.

A further limitation concerns the correlational nature of the study, which suggests caution in making causal inferences from the supposedly unidirectional relationships found in our model.

7. Implications and conclusions

The study findings suggest that the path depicted by the Value-Belief-Norm (VBN) theory should be exploited to encourage biodiversity conservation actions. More specifically, communication agencies and educational authorities should promote the dissemination of biospheric values across the general population, since the increase of values oriented toward the conservation of nature and biodiversity would increase the likelihood of congruent beliefs, concerning the awareness of consequences for biodiversity loss and the ascription of responsibility to ourselves for challenging this event. In turn, this process would drive to the moral obligation of doing something for nature and biodiversity conservation and, thus, to shift to the action domain. In this regard, the role of injunctive norms - related to significant others' expectancies - as drivers of action should also be taken into account. A structural framework should also be provided in order to make people feel they have the power of acting for biodiversity conservation. In other words, individual actions toward the protection of nature and biodiversity should be perceived as more easy and feasible, in order to spread pro-environmental committed actions to broader strata of the population, which may not share the same psychological needs and features characterizing individuals who are already personally committed in such actions, as it is in this case (for a deeper analysis of their social-psychological structure see Scopelliti et al., 2018, Molinario et al., 2019). In this regard, two factors can strengthen the potential impact of the tested model at least for biodiversity and nature protection, and possibly for other pro-environmental issues. Firstly, by extending such a socialization to the broader society, the amount of pro-biodiversity leaders can increase and therefore the amount of individual committed action could directly increase too. Secondly, each leader can affect a certain amount of other people which in turn are brought to align to the leader course of action: therefore, the leader's action is enlarged by indirectly causing more committed actions by modifying her/his followers' standard course of action into a committed action in favour of nature and biodiversity.

In conclusion, the issue of communicating adequate normative messages for the promotion of biodiversity conservation should be definitively taken into account. In particular, it would be important to increase in the community (at local, national and EU level) the proportion of people acting for biodiversity conservation, in order to develop a virtuous circle where perceiving many others who make something in such a direction provides a cue for the ones not acting yet. In this regard, community and organizational leaders play a pivotal role in fostering a major shift toward sustainability in the community (Amel et al., 2017) and, consequently, further research focusing on those processes that drive the leader's action in a pro-environmental direction is needed.

Declarations of Competing Interest

None.

Acknowledgements

The present research had been possible thanks to the BIOMOT EC 7th FP, “MOTivational strength of ecosystem services and alternative ways to express the value of BIOdiversity” (BIOMOT; call ENV.2011.2.1.4-3, Collaborative project n. 282625).

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