The Relationship between Social and Environmental Interdependence as an Explanation of Proenvironmental Behavior

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Abstract

The social acceptance of sustainable development has motivated research exploring an emergent, integrative and nondichotomic ecological worldview called the New Human Interdependence Paradigm *(NHIP). This framework is based upon a conception of interdependent development, implying a process of integration and inclusion of human needs within the dynamics of environmental balance. This paper analyzes the role played by the NHIP in the prediction of proecological, altruistic, and austere actions and in the emergence of collectivistic identity. Two studies were conducted. The first developed an expanded NHIP scale and analysed its construct validity. An oblimin factor analysis indicated the presence of four first-order factors and a NHIP higher-order factor. The second study tested a structural model that confirmed the NHIP unifactorial structure, evaluated the predictive capability of the NHIP on proecological, austere and altruistic behaviors, and identified the influence of collectivistic identity on the relationship between the NHIP and sustainable behaviors.*

Keywords: *Interdependence beliefs, sustainable behavior, collectivism.*

Introduction

The focal point of discussion and debate in the psychosocial analysis of environmental belief systems has mainly pivoted on comparing the New Environmental Paradigm (NEP) against the Dominant Social Paradigm (DSP), particularly in relation to the principle of human exceptionality (Dunlap & Van Liere 1978; Dunlap, Van Liere, Merting, & Jones, 2000). This dichotomized view of environmental beliefs represented by the NEP-DSP axis was endorsed by Thompson and Barton's (1994) definition of anthropocentric and ecocentric factors as value orientations associated with environmental interest and behavior.

The anthropocentric orientation justifies the humankind-versus-nature dichotomy. Catton and Dunlap (1980) suggested that the dominant anthropocentric view is based on four fundamental beliefs: (a) people are essentially different from all other creatures on earth, over which they have dominion; (b) people are masters of their destiny; (c) the world is vast and provides unlimited opportunities for humans; (d) the history of humankind is one of progress, and progress never ceases, because for every problem the human genius will provide a solution.

In comparison, ecocentrism regards the human being as just another feature of ecological systems. In terms of belief

systems, the ecocentric approach emerged from the inevitable consideration of humans as members of the life community on earth, or biotic community. Normative criteria and ideas derived from the ecocentric approach include: 1) the existence of a complex web (ecosystems) that connects the various components of that community, which implies that the operations (and survival) of those components depend on each other; 2) people's actions will be appropriate and "correct" if they preserve the integrity and stability of ecosystems and human communities; 3) the rejection of the principle of human exceptionality; and 4) the development of an attitude of respect for nature and for the diversity of non-human life forms (Hernández, Suárez, Hess, & Corral-Verdugo, 2010).

However, the development, generalization, and social acceptance of the sustainability and sustainable development notions have given rise to research exploring the existence of an emerging, integrative, and nondichotomic ecological worldview called the *New Human Interdependence Paradigm* (NHIP) (Gärling, Biel, & Gustafsson, 2002; Corral-Verdugo, Carrus, Bonnes, Moser, & Sinha, 2008). This new framework or paradigm is thought to be based on a conception of interdependence among spatial and temporal components of earth's ecosystems and communities, which would involve a dynamic process of integration and inclusion of human needs into the dynamics of environmental balance. By *combining anthropocentric and ecocentric beliefs*, the interdependence concept favors the idea that the physical environment will be benefited from people's conservationist behaviors and that humans need nature in order to survive. Thus, in a given ecosystem, the interdependence principle implies that the survival of the constituent elements depends on their mutual integrity. Consequently, if one component is damaged or lost, the entire system is upset and the remaining elements are affected (Capra & Pauli, 1995). As an epistemological principle, interdependence entails breaking the duality between anthropocentrism and ecocentrism. Concern about the degradation of the physical environment and its resources, combined with an interest in the satisfaction of human needs, promotes a holistic worldview, in accordance with the postulates of sustainable development.

Previous psycho-environmental research and theorization had addressed the topic of pro-environmental orientations from an integrative, holistic, and non-dualistic perspective. The research tradition based on values as determinants of sustainable orientation — as exemplified in the research by Stern, Dietz, Abel, Guagnano, & Kaloff (1999) — is one instance of such a perspective. Stern et al adapted Schwartz' (1992) classification of values, attempting to explain the motivations behind the practice of pro-environmental behaviours, since — according to Schwartz — values function as motivational constructs that guide personal actions. Two clusters of values, one of them labelled Universalism, and the other named Benevolence are incorporated into a higher-order value concept labelled Self-Transcendence. Interestingly, Universalism includes particular values related to a biospheric orientation (i.e., unity with nature, protecting the environment, a world of beauty), which could account for a relationship with ecocentrism; while Benevolence is more focused on values of helpfulness, loyalty, friendship and responsibility, which are linked to social-altruistic attitudes or anthropocentrism. Since Self-Transcendence incorporates Benevolence and Universalism, this higher-order concept could be understood as resulting from an integration of two apparently dissimilar orientations: Self-Transcendence makes ecocentric (value) tendencies compatible with anthropocentric (value) orientations.

Moreover, the integrative approach also is present in the conceptual scheme developed by Schultz (2001), who classifies pro-environmental motives as alternatively being egoistic, altruistic, and biospheric. According to results from research that follows this scheme, people may behave in a pro-environmental manner not only because they hold altruistic concerns but also because by doing so, they may protect their own interest. Therefore, egoistic and altruistic motives operate in conjunction in the same individual to orient her/his sustainable actions. These two instances extracted from the psycho-environmental literature reveal that, when dealing with environmental dilemmas, individuals can simultaneously (and holistically) be guided by apparently opposed forces or orientations. As mentioned before, the NHIP, as a worldview or belief system, also would operate on the basis of a conjunction of different orientations.

An initial approach to a New Human Interdependence Paradigm Scale (NHIP) was outlined by Corral-Verdugo, Carrus, Bonnes, Moser, and Sinha (2008) in a crosscultural study. The authors contrasted the NEP and NHIP in four countries and the predictive capacity of both belief systems on water conservation practices. The authors created and tested a five-item scale to evaluate the NHIP. The scale combines three statements incorporating the idea that human wellbeing depends on the integrity of nature, and another two underlining the idea of the importance of conserving today's resources for future generations. Yet a multi-sample factor analysis confirmed that the NHIP was a unidimensional construct, although the relation between the NHIP and NEP factors varied from country to country. Furthermore, using structural equation modeling, the results of their study showed that the NHIP was a better predictor of residential water conservation than the NEP.

However, the consideration of human actions from the perspective of sustainability, aside from exploring the emergence of a belief system in person-environment interdepen-

dence, also involves the examination of elements that are not strictly environmental. According to Corral-Verdugo and Pinheiro (2004), sustainable actions must meet five psychological characteristics and dimensions: three of them refer to the level of personal environmental competence: anticipation, deliberation, and effectiveness, while the other two, austerity and altruism, are associated with socio-community action. This perspective therefore expressly entails integrating the community dimension, insofar as human wellbeing must satisfy parameters of environmental quality and social development.

In addition, the NHIP, as a holistic worldview, is assumed to break the anthropo-ecocentric dichotomy, by integrating beliefs regarding the need of conserving the natural environment with beliefs on the need of achieving human progress. Therefore, significant relationships between the NHIP and ecocentrism, on the one hand, and between the NHIP and anthropocentrism, on the other hand, are expected. Although the former (NHIP-Ecocentrism) relationship was confirmed, the latter — unexpectedly — was not (Corral-Verdugo, carrus, et al, 2008). Thus, a deeper exploration of the links between the NHIP and the ecocentric and anthropocentric perspectives is necessary.

This paper pursues a two-fold aim. First of all, it seeks to further the conceptual and empirical definition of the NHIP as a system of environmental beliefs. Although the results presented by Corral-Verdugo, Carrus et al. (2008) pinpoint the unidimensional nature of the NHIP, the usage by these authors of a scale with only five items may have hindered the identification of additional components of the paradigm. Moreover, their study does little to elucidate the relative contribution of the two value orientations — anthropocentric and ecocentric — that, as a new system of beliefs, the NHIP aspires to integrate. Secondly, the relationships between the NHIP and the socio-community components of sustainability (as a proxy for antropocentrism) are analyzed, with particular regard to prosocial (altruism) and self-containment (austerity) behaviors, in line with the definition of sustainable behavior proposed by Corral-Verdugo and Pinheiro (2004). To that end, we undertook two studies. The first explored the internal structure of the NHIP and the relationship of this paradigm with anthropocentrism and ecocentrism. The second analyzed a causal model linking proenvironmental behavior with the NHIP and socio-community variables.

Study one

Method

Participants

The study involved 115 university students at the Faculty of Psychology, all living in the island of Tenerife (Spain), from 17 to 30 years of age, with an average age of 21.4 years, (*SD*=2.89), 47% women and 53% men. Family income was declared at below 1500 euros per month by 38.4%, between 1500 and 2500 euros by 34.4%, and over 2500 euros by 21.1%, while 6.1% of participants provided no information whatsoever.

Instruments

A 20-item scale was used to evaluate human interdependence beliefs along with the Spanish adaptation (Amérigo, Aragonés, Sevillano, & Cortés, 2005) of Thompson and Barton's (1994) scale assessing anthropocentric and ecocentric attitudes towards the environment. The anthro-eco scale was responded using five-point options, ranging from "Strongly disagree" to "Strongly agree". The human interdependence scale contained the five items originally used by Corral-Verdugo, Carrus et al. (2008) plus another 15 that, as well as assessing the two ideas included in the original scale (human wellbeing depends on the integrity of nature, and the importance of conserving today's resources for future generations), incorporate two new aspects: a) the compatibility between human development and environmental conservation and b) a responsible use of natural resources to achieve human wellbeing. Both aspects are basic elements of interdependence associated with the concept of sustainability (Schmuck & Schultz, 2002). This scale was responded according to four-point options, ranging from "Strongly disagree" to "Strongly agree".

Procedure

The questionnaire was collectively administered to the student sample during classroom sessions. All students participated voluntarily and received no payment for doing so. The questionnaire was delivered in two versions to avoid any carry-over effect: 1) in the original order of presentation and 2) in a counterbalanced order. The two versions were checked to ensure that no significant differences were generated.

Results

First of all, we obtained the frequency distribution of individuals' responses to the items in the NHIP scale. The results revealed that four items generated a percentage of agreement ("i.e., strongly agree") for more than 70% of the cases. These four items were ruled out for subsequent analysis and the scale was reduced to 16 items. The internal consistency for these 16 items as assessed by Cronbach's alphas was .88 and, when calculated by a split sampling procedure, it was .78 and .79, the correlation between both halves being .90.

We then performed a principal components analysis with oblimin rotation to explore the structure of the scale. This analysis uncovered a five-component structure. The fifth component was, however, solely composed of two items. The analysis was subsequently repeated, forcing the solution to four components (Tabachnick & Fidell, 1989). The solution obtained explained 59.8% of the variance. The resulting weights are shown in Table 1.

Table 1. Configuration matrix.

Component	1	2	3	4
2. Humans can only enjoy nature if we make wise use of its resources	.817			
11. Human welfare can only be understood through respect for the environment	.615			
14. Respecting the balance of nature promotes the wellbeing of people	.597			
17. Citizens' satisfaction and happiness are only possible if we achieve progress by respecting the environment	.532			
6. Caring for nature now means safeguarding the future of humankind	.499			
15. We must develop lifestyles in tune with the ecological balance	.490			
9. Human progress and caring for nature are perfectly compatible		.853		
12. A consumer society that respects nature is possible		.789		
8. Caring for nature also leads to economic benefits because we extract resources from nature		.526		
18. Environmental deterioration affects hungry in poor countries			.862	
19. A balanced progress is based on saving and not on wasting water			.692	
7. We must consume fewer resources so that present and future generations can enjoy them			.512	
20. One factor that negatively affects human wellbeing is the environmental degradation of cities			.483	
1. Humans can only progress if we protect natural resources				-.784
3. Real human progress can only be achieved by conserving the natural balance				-.593
13. True human development requires us to use natural resources in a balanced way				-.358

Extraction method: Principal components analysis. Rotation method: Oblimin with Kaiser Normalization. The rotation converged in 12 iterations.

The first component explains 38.6% of variance and refers to the idea of the need to establish a conditioned relationship between the present and future welfare of humans and the conservation of natural resources. That is, it is assumed that without that conservation human well-being is not possible. We have named this component *Human Wellbeing and Natural Integrity*. The second component explains 7.9% of variance and we have labeled it *Sustainable Development*. It incorporates the idea that human progress and caring for nature are fully compatible, so that economic and material development does not confront respect for nature. We have termed the third component *Awareness of Future Consequences*. It pinpoints current and potential consequences of not establishing a balanced relationship between humans and the environment. This component explains 6.9% of the variance. The fourth component, which justifies 6.4% of the variance, highlights the idea of the need to promote (humans-nature) interdependent forms of progress and development; we have named it *Compatibility Between Human Progress and Responsible Use of Natural Resources*.

A second-order analysis was performed in order to check the extent to which all these four components exhibit a salient communality. The results revealed that the four oblique components converge in a single factor that explains 46.8% of the variance.

We then calculated the mean score for the NHIP, anthropocentrism and ecocentrism variables. The maximum and minimum values, score, and standard deviation of the three variables are shown in table 2.

Table 2. Descriptives of NHIP, Anthropocentrism and Ecocentrism

	Min	Max	Mean	SD
Anthropocentrism	1.20	5.00	2.70	.81
Ecocentrism	2.10	5.00	4.10	.63
NHIP	1.88	4.00	3.43	.39

The scores show a high degree of agreement with beliefs about human interdependence and ecocentrism, although the extent of agreement with anthropocentric orientation is low.

Finally, we calculated the interrelations between the three variables. A significant positive correlation between the NHIP and ecocentrism (.47) was obtained. The relationship between the NHIP and anthropocentrism was, however, not significant and neither was the correlation between anthropocentrism and ecocentrism.

Discussion

The results revealed that the NHIP, as assessed in this study, obeys a structure of four interrelated factors. However, the second-order factor analysis showed that these components are arranged around a common dimension — namely humans - environment interdependence. Our results support the consideration of the NHIP as a unidimensional construct, in accordance with the suggestions by Corral-Verdugo, Carrus et al. (2008). The inclusion of an expanded number of items assessing the NHIP revealed the presence of new ideas associated with the concept of sustainability: the compatibility between human development and environmental conservation, and the need for a responsible use of natural resources to achieve human wellbeing.

Our findings also reveal that, all in all, the idea of interdependence is not merely based on belief contents. Also underlying interdependence is an approach by which environmental concern would be supported by the value attributed to the environment itself and by its instrumental value, insofar as the environment contributes to human wellbeing and development. In other words, interdependence is doubly defined as being simultaneously hinged on an anthropocentric and an ecocentric appraisal.

By accepting that interdependence fundamentally pivots on the assumption that human development and environmental sustainability are not only compatible but also necessary for each other, we might imagine a positive relationship between the interdependence worldview and anthropocentrism as a value orientation. Our results, however, did not reflect this connection, at least from the way we assessed the anthropocentric orientation. In this sense, the absence of a significant relationship between the NHIP and anthropocentrism left unanswered the question about the manner in which the appraisal of human needs integrates into the interdependence beliefs

An explanation of this absent relationship can perhaps be found in the ambiguity of the measure adopted when delimiting anthropocentrism as a value orientation. While the Thompson and Barton scale (1994) groups the elements of value associated with ecocentrism (animal species, natural areas, ecosystems, etc.) into a single category: the environment or nature, the same cannot be said of the contents that define the anthropocentric factor. For some items, the anthropocentric perspective alludes to future generations ("The thing that concerns me about deforestation is that there will not be enough lumber for future generations"), while for others it is linked to social health or economic benefit ("One of the best things about recycling is that it saves money") and leisure as personal goals ("One of the most important reasons to keep rivers and lakes clean is so that people can have a place to enjoy water sports"). In this sense, we may assume that the anthropocentric factor does not expressly or clearly reflect the consideration of people's concern for the human dimension, specifically, concern for the wellbeing of human beings. It may be that an approach incorporating an appraisal of humans themselves is required in order to analyze the role of this dimension in the NHIP. A useful conceptual approach is the analysis of collectivism-individualism in studies on cultural differences (Hofstede, 1980), insofar as this dimension can be interpreted as an anthropocentric value orientation.

Collectivism presupposes considering that people can feel encouraged to subordinate personal goals to those of groups, collectives, or social environments, so that wellbeing and individual satisfaction stem from upholding the functions and obligations associated with the presence and belonging to such interpersonal and social realities. In fact, Gärling et al (2002) assumed that such a feeling was a necessary component of the idea of *interdependence* between individuals and their groups, so that the prevalence of the collective interest — over the egoistic one — guarantees the group's sustainability (and, henceforth, the individual's wellbeing). Conversely, individualism as a guide to individuals' behavior would essentially be oriented towards achieving *independent* personal goals. If we presuppose this perspective, the human orientation of the NHIP is not similar to the egoistically-oriented anthropocentric perspective but rather to an individualist-collectivist one.

In the same way, Clayton (2003), based on the emphasis that environmentalism puts on interdependence, argued that an environmental view of the world is more compatible with collectivism than with individualism. In an investigation in which environmental identity (described as the extent to which the natural environment plays an important part in a person's self definition) was associated with a scale of individualism and collectivism, she found out that environmental identity was positively related with collectivism and negatively with individualism.

The distinction between individualist and collectivist roots is based on the construction of the self and personal values system (Markus & Kitayama, 1991; Triandis, 1995). From this viewpoint, the psychological entity underlying the cognitive, affective, and behavioral differences between individualistic and collectivistic societies arises from the degree to which people interpret and construct their self in interdependent or independent terms. People who construct their own self-concept in interdependent terms incorporate the references to their social relations, communal and social roles from collectivistic personal values along with their connection to other significant people or social contexts that are important to them. In contrast, people who base their self and their personal values on independence and individualism define themselves by emphasizing their differences in relation

to others and by the extent to which they pursue their own interests and projects without being influenced by their social and interpersonal context. In this sense, insofar as the principle of interdependence incorporates a positive assessment of social bonds, the NHIP would be related to an ecocentric and collectivistic value orientation and would therefore not be related either positively or negatively to anthropocentrism (as traditionally assessed).

This interdependent and collectivistic view has been equally associated with the concepts of altruism and austerity. Accordingly, altruistic people are interested in doing good to others and adopt personal and collective interests in their interpersonal relations (Kopelman, Weber, & Messik, 2002). Faced with environmental dilemmas, people with prosocial values are more cooperative than individualists and tend to make sustainable decisions in everyday situations (Bonaiuto, Bilotta, Bonnes, Carrus, Ceccareli, & Martorella, 2008). In the same way, Brown and Kasser (2005) demonstrate that austere people present fewer materialistic values and more respect for nature and for other people than those with higher levels of consumption. Thus, austerity also appears to be consistently linked to sustainable behavior.

One more situation to comment on has to do with the restricted sample of study one. Its participants were psychology students: their environmental orientation is not necessarily the one hold by the general population. This may have influenced the resulting factor structure of the NHIP, producing a biased perspective which was, perhaps, non-representative of the more general population. Thus, although useful in the exploratory phase of our research, the sample of students had to be replaced, in a subsequent study, by a more representative group of participants.

By considering the findings of study one, and the previous discussion regarding the hypothetical links between the NHIP and the collectivistic and prosocial orientations, we designed a second study aimed at exploring such links.

Study two

The main aim of the second study was to develop a structural model that would enable the following: 1) confirm the unifactorial structure of the NHIP; 2) evaluate the predictive capacity of the NHIP vis-à-vis proenvironmental, altruistic, and austere behavior; 3) identify the influence of individualism-collectivism on the relationship between the NHIP and proenvironmental behavior.

Method

Participants

This study involved 125 persons, 53% men and 47% women, aged from 18 to 68 years (average=34, *SD*=12.7), all living in the island of Tenerife. Their family income was declared at below 1000 euros per month by 25% of the sample between 1000 and 1500 euros by 29.2%, between 1500 and 2000 euros by 19.2%, between 2000 and 2500 euros by 12.5%, over 2000 euros by 14.1%, while 4% of participants provided no information whatsoever.

No more than the 38% of the participants were currently enrolled in university programs studying psychology, social work, labor relations, education, and physiotherapy. The remaining 62% came from outside the university, 46% had basic or secondary studies and 16% were graduates.

Instruments

This study used a seven-scale questionnaire. We administered the NHIP scale from the previous study to assess human interdependence beliefs. A Spanish adaptation by Sivadas, Bruvold, and Nelson (2008) of the reduced version of the Singelis et al. (1995) 14-item horizontal/vertical individualism/collectivism scale was used to evaluate the individualism-collectivism dimension. Altruism was measured using an adapted version of 14 items from the scale by Corral-Verdugo, Tapia, Fraijo, Mireles, & Márquez (2008). Austerity behaviors were measured by adapting 12 items from the austerity scale by Corral-Verdugo, Tapia et al. (2008). Proenvironmental behavior was assessed using an adapted Spanish version of Kaiser's 15-item general environmental behavior scale (1998). Finally, we administered the Spanish adaptation (Amérigo, Aragonés, Sevillano, & Cortés, 2005) of Thompson and Barton's (1994) scale assessing anthropocentric and ecocentric attitudes towards the environment. The entire questionnaire was responded according to a four point Likert-type scale ranging from 1 = *totally disagree* to 4 = *totally agree*.

Procedure

The questionnaire was administered to an incidental sample of university students and their families. All students participated voluntarily and received no payment for doing so. The questionnaire was delivered in two versions so as to avoid any carry-over effect. Both versions were checked to ensure that no significant differences between them were generated.

Data analysis

Firstly, all the scales were screened bearing in mind the correlation of each item with the whole scale. Secondly, we obtained the descriptive statistics of the scales used and calculated the interrelations between the latent variables assessed through a structural equation model.

Mean and reliability analyses (Cronbach's alpha) were

calculated. The interrelations between NHIP, ecocentrism, anthropocentrism and collectivism were calculated too. A structural equation model was specified in order to test the hypothesized structure of the assessed latent variables and their presumed significant relationships. Items of all scales were parceled into four (NHIP), three (Ecocentrism and Collectivism) and two (Anthropocentrism) indicators for each tested construct. A parcel is the mean of two or more randomly chosen items of a construct (Little, Cunningham, Shahar, & Widaman, 2002). In addition, goodness of fit indicators was estimated from the structural equation model.

Results

Table 3 shows the descriptive statistics and internal consistencies of the scales. Most of the reliability indices were satisfactory (Cronbach above .70) except for the austerity and individualism/collectivism scales, which produced slightly lower scores (.61 and .67, respectively). We also conducted an item-discrimination analysis (Likert, 1932) for a more in-depth analysis of the reliability of these two scales. To that end, the participants were arranged from lower to higher total scoring, and the upper 25% was compared with the lower 25% on the mean of each item. All the contrasts were satisfactory (using alpha adjustment for multiple comparisons), so we can conclude that the items possess an adequate discriminatory capacity.

We can notice in the same table that, in the main, variables present averages that are above the midpoint of the scale of response (2.5) and rather low standard deviations, except anthropocentrism (M=2.19, SD=66) and altruism (M= 2.24, SD= 44) wich score lower. In connection with the proenvironmental behavior, 39.2 % of the sample can be considered as good examples of proenvironmentalism because their scores are in the upper area of the response scale (> 2.5).

Once the scales had been screened, a structural equation model was tested to confirm the factorial structure of the NHIP in relation to the three types of behavior studied: proenvironmental, altruism, and austerity, and to anthropocentrism, collectivism, and ecocentrism.

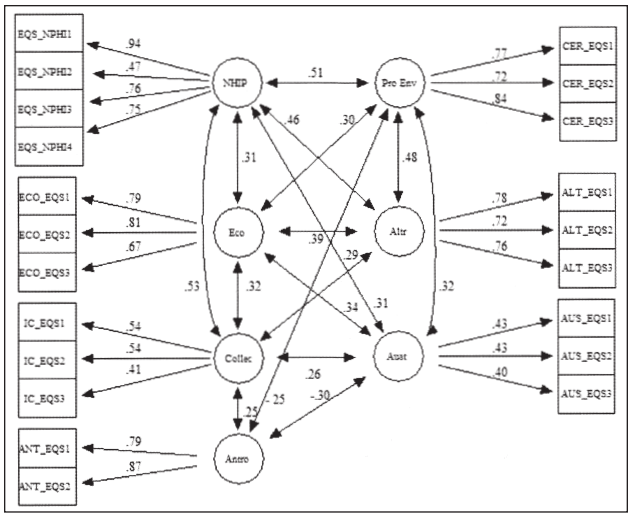

Figure 1. Structural model of the relationship of NHIP with beliefs and behavior. SBS X^2 =158.77; 156; p>0.05; NFI=.841; NNFI=.995; CFI=.996; RMSEA=.012; 90% Confidence interval of RMSEA (.000, . 044)
NHIP: New Human Interdependence Paradigm; Eco: Ecocentrism; Collec: Collectivism; Antro: Antropocentrism; Pro Env: Proenvironmental behavior; Altr: Altuism; Aust: Austerity.

Figure 1 displays the results of the structural model. All the indicators generated significant loads (p<.05) on their latent variables and the fit indices were adequate (SBS X^2 =158.77; 156; p>0.05; NFI=.841; NNFI=.995; CFI=.996; RMSEA=.012; 90% Confidence interval of RMSEA (.000, . 044). In order to simplify the figure we omitted the correlations between independent variables lower than .25

The NHIP showed significant (p<0.05) correlations with ecocentrism (.50), collectivism (.53), proenvironmental behavior (.32), altruism (.46), and austerity (.32).

Furthermore, as shown in Figure 1, collectivism relates significantly to ecocentrism (.32), anthropocentrism (.25), altruism (.29) and austerity (.27). Proenvironmental behavior

Table 3. Descriptives for the scales

	Items	N	Min	Max	Mean	SD	alpha
NHIP	16	125	2.13	4.00	3.50	.39	.87
Ecocentrism	10	124	1.50	4.00	3.37	.44	.78
Anthropocentrism	5	124	1.00	4.00	2.19	.66	.71
Collectivism	8	125	2.00	4.00	3.20	.40	.67
Proenvironmental Behavior	8	125	1.13	4.00	2.30	.64	.84
Altruism	12	125	1.29	4.00	2.24	.44	.78
Austerity	11	125	1.18	3.00	2.34	.34	.61

relates to austerity (.32), altruism (.48), ecocentrism (.30) and negatively to anthropocentrism (-.25). Austerity relates to ecocentrism (.34) and negatively to anthropocentrism (-.30); and finally, altruism relates to ecocentrism (.39).

General discussion

The results of our first study confirmed the unifactorial nature of the NHIP, as assumed by Corral-Verdugo, Carrus, et al (2008), since that study enabled us to identify a second-order factor that grouped the four isolated components in the first-order principal components analysis with oblimin rotation. Thus, the structural equation model clearly supports the validity of the NHIP, defined as a unidimensional construct.

In our research, studies one and two have revealed the lack of correlation between the NHIP and anthropocentrism, as assessed by Thompson and Barton's (1994) scale, identifying only a significant and positive relation between the NHIP and the ecocentrism factor. However, the idea of interdependence requires a simultaneous link of people's beliefs with the human and environmental dimensions of their daily living. In this sense, the NHIPS' seemingly lacking an anthropocentric root appeared to question the nature of the very concept of interdependence. The rest of our findings, however, enabled us to base the human dimension on interdependence in that they identify a positive relationship between the NHIP and collectivism as an indicator of such human dimension. Thus, the NHIP is consistently linked to ecocentrism and the collectivistic approach to anthropocentrism. The emphasis is thereby placed on the role of the relationship between an interdependent view of ecological conditions, and a relational and collectivist view of social and community bonds.

In any case, prior evidence points to differences in the relationship between anthropocentrism and ecocentrism within the paradigms of environmental beliefs when samples from different cultural origins are compared (Bechtel, Corral-Verdugo, & Pinheiro, 1999; Bechtel, Corral-Verdugo, Asai, & Gonzalez, 2006; Castro & Lima, 2001). From this perspective, future research should analyze the recurrence of possible cultural differences in the relationship between the NHIP and the anthropocentrism-ecocentrism dimension, and in the factorial structure of the human interdependence paradigm.

Where behavioral aspects are concerned, our results indicate that a high degree of agreement with the NHIP is significantly associated with the development of ecologically responsible, altruistic, and austere behaviors. In turn, the three types of sustainable actions maintain significant positive interrelations between them.

If we focus specifically on proenvironmental behavior, our results reveal that environmentally responsible actions are significantly related both to the NHIP and to ecocentrism. That both belief systems have a simultaneous effect on behavior is possibly due to their differential nature (i.e., the NHIP and the ecocentrism factor are independent from each other). Whereas the ecocentric dimension is more focused on the valuation of nature conservation and the need of maintaining the integrity of the environment, the NHIP stresses the idea of interdependence between the social and the natural aspects of the environment. Also, the measure of ecocentrism highlights its affective and valuative nature (i.e., Thompson and Barton define their measure as attitudinal), while the NHIP, as a belief system, is essentially rooted in rational-cognitive criteria.

All in all, the behavioral core of sustainability is not only shaped in terms of actions aimed at conserving natural resources and the ecological balance, but also by expressly incorporating socially responsible and significant community behaviors. Specifically and in keeping with the definition contributed by Corral-Verdugo and Pinheiro (2004), sustainable behavior also integrates proactive responses of solidarity and assistance to others, in addition to behaviors of austere and self-contained consumption. Likewise, future research should explicitly compare subsamples with different types and levels of proenvironmental behavior, in order to generalize the proposed explanatory model.

In short, the principle of interdependence has an environmental and a social dimension that interconnect when it comes to explaining sustainable behavior. In this regard, consideration should be given to aspects related to social, collective, and community identification, in order to analyze and uncover possible solutions to the problems associated with the ecological crisis and sustainability. The interdependence principle does not deny the importance of the human component and people's interests where environmental conditions are concerned. However, justifying the anthropocentric dimension by merely emphasizing the instrumental value associated with the environment is not useful when explaining sustainability. Consideration towards others in terms of collective action and solidarity emerges as a central mechanism when promoting environmentally sustainable actions.

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Endnote

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