

The Structure of Environmental Concern

Madalla A. Alibeli, Ph.D.

Neil R. White, Ph.D.

Assistant Professor

Department of Sociology, Gerontology, and Political Sciences

The University of Louisiana at Monroe

700 University Avenue, 202 Stubbs Hall, Monroe, LA 71209, Phone: (318) 342-1814

E-mail: Alibeli@ulm.edu, nwhite@ulm.edu

Abstract

The structure of environmental concern in the United States is examined in this article. Confirmatory factor analysis and structural equation modeling are used to test the environmental concern model developed by Stern, P., C. Dietz, T. & Kalof, L. (1993) which indicates that environmental concern consists of three correlated value orientations including (1) social-altruistic value; (2) biospheric value; and (3) egoism or self-interest orientation. Data are derived from the International Social Survey Program of Inter-University Consortium for Political and Social Research (ICPSR, 6640). Findings confirm the goodness of fit of Stern and associates environmental concern model. Details will be discussed in the article.

Key words: Environment, structure of environmental concern, gender, model fit.

Introduction

This study examines the structure of environmental concern in the United States. Overall, environmental concern indicates “the degree to which people are aware of problems regarding the environment and support efforts to solve them and or indicate the willingness to contribute personally to their solution” (Dunlap and Jones, 2002: 485). Research on environmental concern covers: (1) Attitudinal studies which examine differences in opinions about the environment based on respondents’ demographic and socioeconomic characteristics like country, social class, income, race, gender, and age. (2) Experimental and quasi-experimental surveys that test hypotheses derived from social-psychological theories like norm-activation theory. In addition, (3) Applied research on environmental attitudes and behaviors that investigate social factors related to behavior associated with the environment such as littering, recycling, and energy conservation (Buttel, 1987). Although a number of studies have examined environmental concern, the findings were inconclusive as various studies revealed various outcomes. Early studies indicated that environmental concern is a one-dimensional phenomenon (Dunlap and Van Liere, 1978).

In line with this argument, Dunlap and Van liere (1978) developed a ‘New Environmental Paradigm’ (NEP), a one-dimensional model and used it as a scheme to explore attitudes and levels of concern about the environment in society. A few years later, Albrecht, D., Bultena, G., Hoiberg, E., & Nowark, P. (1982) tested the newly developed NEP and found that it is more complicated than previously thought. According to Albrecht et al., the NEP consists of three dimensions including ‘balance of nature’, ‘limits to growth’, and ‘man over nature’. Furthermore, Cluck (1998) argued that environmental concern is a multilayer tripartite construct with different main dimensions including ‘environmental worldview’, ‘environmental concern’, and ‘environmental commitment’. In addition, each main dimension contains sub-dimensions. For instance, environmental worldview’s sub-dimensions are ‘balance of nature’ and ‘humans over nature’. Environmental concern’s sub-dimensions are ‘air pollution’, ‘water pollution’, and ‘nuclear dangers’. Finally, environmental commitment’s sub-dimensions include ‘willingness to commit to the environment’ and ‘environmental behavior’.

Building on Schwartz’s norm-activation model of altruism, Stern, P., C. Dietz, T. & Kalof, L. (1993) argued that environmental concern consists of three correlated value orientations. These value orientations include: (1) social-altruistic value that highlights concern about the welfare of other human beings; (2) biospheric value which indicates concern about the nonhuman species or the biosphere; and (3) egoism or self-interest orientation that is best described by the ‘not in my backyard’ attitudes. Nonetheless, egoism, biospheric, and social altruistic orientations are not incompatible, rather, they are correlated. In other words, “many people’s environmental attitudes reflect some combination of the three orientations” (Stern et al, 1993: 327). The Stern’s model however has a number of shortcomings: (1) it uses a relatively small convenient sample of college students to establish the structure of environmental concern model, and (2) it employs explanatory statistical methods to develop such an important construct.

To test Stern et al., (1993) model of environmental concern, the current study not only uses a large and nationally representative sample, but also it utilizes a confirmatory factor analysis and Structural Equation Modeling compared to the explanatory methods originally used by Stern and associates. Besides environmental concern in the United States, a number of studies examined the issue from a cross-cultural perspective (See, Dunlap et al., 1993; Inglehart, 1995; Tuna, 1998; Milfont et al., 2006; Olofsson and Ohman, 2006). After examining environmental concern in 24 developing and developed countries, Dunlap, R., Gallup, G. H. & Gallup A. M. (1993) found that levels of concern about the environment are high in both the developing and the developed world. They also found that nationality is no longer a factor that significantly shapes levels of concerns about the environment. Moreover, not only no significant differences in the levels of concern about the environment between the developing and the developed nations are found, but also the perception that environmentalism is a postindustrial Western value is deemed inconsistent with the evidence of strong support for the environment in the developing world. Inglehart (1995) conceded the high levels of environmental concern in the both the developing and developed world.

However, he indicated that the structure of environmental concern and the driving forces behind such concern vary based on a country's level of economic development. According to this argument, public support for the environment in the developing world represents a reactive response to high levels of air pollution, water contamination, and other environmental risks in society. In contrast, support for the environment in the developed world is deemed to be proactive and ecocentric in nature. For Inglehart, strong support for the environment in the developed world is influenced by cultural shift that reshapes public priorities concerning quality of life and clean environment. On the other hand, Tuna (1998) asserted that concern about the environment varies from one country to another and each country has its own environmental structure. Besides, the effects of demographic and socioeconomic characteristics such as age, education, and residence on attitudes toward the environment differ considerably across the developing and the developed world.

Olofsson and Ohman (2006) examined general beliefs and environmental concern in the United States, Canada, Norway, and Sweden and concluded that "general beliefs together with education and political affiliation were the most stable predictors of environmental concern" (p.768) in the four countries. Finally, Milfont, L., Taciano, D., John, & C., D., Linda. (2006) compared and contrasted environmental concern for European New Zealanders and Asian New Zealanders. Using confirmatory factor analysis, Milfont and associates found that environmental concern is driven by biospheric, altruistic, and egoistic motives. According to the study, Asian New Zealanders are found to have higher egoistic concern than did their European counterparts. In addition, "for European New Zealanders, biospheric concern predicted pro environmental behavior positively, whereas egoistic concern predicted it negatively. For Asian New Zealanders, both biospheric and altruistic concern predicted pro environmental behavior positively" (p. 745).

Finally, although gender has been one of the most examined factors predicting environmental concern, its influence has been vague and inconsistent. For example, McEvoy (1972), Arbuthnot (1977), Blocker and Blocker (1989), Arcury and Johnson (1987), and Arcury (1990) indicated that men are more active, knowledgeable, and concerned about the environment than are women. On the other hand, McStay and Dunlap (1983), Stern et al., (1993), Zelezny (2000), Uyeki and Holland (2000), and Olofsson and Ohman, (2006) stated that women are more concerned about the environment than are men. In particular, Uyeki and Holland (2000) reported that women are more concerned about the environment, nature, and animals than are men. In contrast, Hayes (2001: 657) argued that gender does not influence environmental concern and women "are not more concerned about the environment than men." On the other hand, Brody (1984), Blocker and Blocker (1989), Stern (1993), Mohai (1991), Davidson and Freudenberg (1996), and Bord and O'Conner (1997) indicated that gender differences, if any, in environmental concern between men and women are related to the divergences in the perceptions of the harmful consequences of environmental problems on humans rather than to gender per se. Finally, Arcury and Johnson (1987) played down the effect of gender on environmental concern noting that gender effect is weak and inconclusive and no definite conclusion could be drawn about the relationship between gender and concern about the environment.

Objective of the Study

This study aims at testing the model fit of Stern et al., (1993) tripartite environmental concern model. Using confirmatory factor analysis (CFA) and structural equation modeling (SEM), the model fit of environmental concern as a three-dimensional phenomenon including social-altruistic, biospheric, and egoism or self-interest orientation will be tested. In contrast to Stern and associates, the current study examines the model fit of environmental concern using a large, national, and representative sample rather than a convenient sample of college students. Besides, this study assesses the model fit of environmental concern utilizing confirmatory factor analysis and structural equation modeling rather than exploratory statistical methods.

Finally, in addition to testing the model fit of environmental concern for the overall sample, the study test the model fit for male and female separately to better understand the effect of gender on environmental concern.

Methodology

This section describes the data set along with the operational management of exogenous and endogenous variables, correlation matrix, and factor analysis. Then, it presents the theoretical model and the hypotheses of the study.

Data Set

Data were extracted from the International Social Survey Program of Inter-University Consortium for Political and Social Research, the University of Michigan (ICPSR, 6640). Interviews were conducted in conjunction with the General Social Survey (GSS) 1993. The data consist of information about various topics about the environment. Respondents were asked to make comments on environmental issues including the role and function of science and scientific solution to environmental problems, economic growth, and protection of the environment, environmental regulations, human health, and pollution. Respondents were also asked to comment on issues like environmental policy, the government role regarding environmental protection, and other philosophical issues like deep and shallow ecology.

Data Analysis and Tools

Ten relevant questionnaire items were selected to test Stern et al., (1993) environmental concern model (See Table 1). Using confirmatory factor analysis (CFA) and structural equation modeling, the ten items were treated as endogenous variables to identify and test for the latent multiple dimensions of environmental concern. The ten items were in Likert scale format and measured at the ordinal level. Items V11x, V14x, V15x, V24x, V25x, and V26x range from (1) strongly disagree to (5) strongly agree. Items V47x, V49x, V51x, and V53x range from (1) not very dangerous to (5) very dangerous. Below, Table 1 presents the ten items and their value labels.

Table 1 : List of the endogenous variables and their value labels

Variable	Label
V11x	Change in nature makes things worse.
V14x	Modern Life harms the Environment.
V15x	Animals have the same moral rights as humans.
V24x	Pay higher prices to protect the environment.
V25x	Pay higher taxes to protect the environment.
V26x	Accept a cut in living standards to protect the environment.
V47x	In general, how dangerous do you think air pollution by industry is for you and your family?
V49x	In general, how dangerous do you think pesticide in farming is for you and your family?
V51x	In general, how dangerous do you think that the pollution of rivers, lakes, and streams is for you and your family?
V53x	In general, how dangerous do you think that rise world temperature is for you and your family?

Correlation Matrix

Table 2 reveals significant correlation among all the variables in the correlation matrix. In particular, Table 2 displays moderate positive correlations between each of V11x, V14x, and V15x. The three correlated variables are associated with respondents' biospheric concern. In addition, V24x, V25x, and V26x show moderately high positive correlations with one another. V24x, V25x, and V26x are associated with respondents' willingness to make a sacrifice for the environment. Table 2 also shows moderate to moderately high positive correlations between each pairs of V47x, V49x, V51x, and V53x. The four correlated variables are associated with respondents' egoistic concern about the environment. The correlation matrix reveals that respondents are more concerned about the risk posed by the environment on themselves, their families and other humans than being concerned about the general environment.

Table 2: Correlation Matrix

	V11x	V14x	V15x	V24x	V25x	V26x	V47x	V49x	V51x	V53x
V11x	1.00									
V14x	.373**	1.00								
V15x	.263**	.316**	1.00							
V24x	.149**	.149**	.125**	1.00						
V25x	.129**	.142**	.131**	.655**	1.00					
V26x	.138**	.145**	.122**	.531**	.579**	1.00				
V47x	.178**	.188**	.163**	.166**	.165**	.158**	1.00			
V49x	.182**	.202**	.158**	.156**	.141**	.149**	.520**	1.00		
V51x	.174**	.204**	.179**	.151**	.148**	.141**	.519**	.519**	1.00	
V53x	.195**	.164**	.141**	.192**	.181**	.207**	.340**	.330**	.386**	1.00

** . Correlation is significant at the 0.01 level (2-tailed)

To better understand the latent relationship among the ten variables in the study, and to reduce these variables into a smaller set that fits together, exploratory factor analysis with principal component and varimax rotation is used. Exploratory factor analysis reduces the ten variables into three factors. Following Stern et al., (1993), the factors are labeled as biospheric, social-altruistic, and egoistic. According to Stern and associates (1993), these “three value orientation [biospheric, social-altruistic, and egoism] are the most frequently noted in the Western literature on environmental concern” (p. 326).

Table 3: Rotated Component Matrix and Cronbach alpha

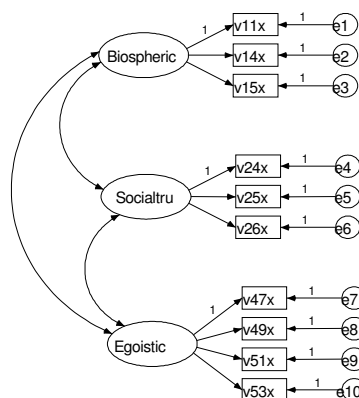
	Factor	Factor 2	Factor 3	alpha
“Pollution of rivers and lakes-you + your family” (V51x)	.828	.104	.056	.813
“Air pollution by industry-you + your family” (V47x)	.798	.098	.113	
“Pesticide in farming-you + your family” (V49x)	.762	.027	.132	
“Rise world temperature- you + your family” (V53x)	.744	.171	.185	
“Pay higher taxes to protect the environment” (V25x)	.122	.883	.065	.841
“Pay higher prices to protect the environment” (V24x)	.100	.865	.063	
“Accept cut in living standards to protect the environment” (V26x)	.102	.836	.053	
“Change in nature makes things worse” (V11x)	-.037	-.025	.798	.532
“Modern life harms the environment” (V14x)	.220	.065	.705	
“Animals have the same moral right like humans” (V15x)	.203	.124	.603	

In addition, Cronbach alpha is used to test the internal consistency of the three factors. As Table 2 shows, each of the biospheric, social altruistic and egoistic factors is reliable. Nonetheless, social altruistic and egoistic constructs reveal higher Cronbach reliability levels (.841; .813 respectively) than the biospheric one (.532). Understandably enough, respondents show more consistent responses concerning risks inflicted on themselves, their families, and on other human beings rather than those related to the general environment.

The Theoretical Factor Model

To test the model fit of environmental concern as developed by Stern et al., (1993), a theoretical confirmatory factor analysis model is constructed with the assumption that environmental concern is a multidimensional construct with three correlated aspects: biospheric, social altruistic, and egoistic (see Figure 1). The current study hypothesizes that the biospheric aspect of environmental concern will load on V11x, V14x, and V15x for the overall sample, male sample, and female. Loading indicates that the biospheric aspect of environmental concern is associated with ‘changes in nature makes things worse’ (V11x); ‘modern life harms the environment’ (V14x); and ‘animals have the same moral rights as humans’ (V15x). In addition, the study hypothesizes that social-altruism will load on V24x, V25x, and V26x for the overall sample model, male sample, and female sample. Loading on these variables also suggests that social altruism is associated with ‘willingness to pay higher prices to protect the environment’ (V24x); ‘willingness to pay higher taxes to protect the environment’ (V25x); and ‘willingness to accept a cut in living standards to protect the environment’ (V26x).

Figure 1: Theoretical Confirmatory Factor Model of Environmental Concern



Finally, the study also hypothesizes that the egoism will load on V47x, V49x, V51x, and V53x for the overall sample, male sample, and female sample. Thus, egoistic aspect of environmental concern is associated with respondents' views on how dangerous on themselves and their family are 'air pollution by industry' (V47x); 'pesticide in farming' (V49x); 'pollution of streams, rivers, and lakes' (V51x); and 'rise world temperature' (V53x). Structural Equation Modeling (SEM) is used because it is an important methodology for hypothesis testing that "takes a confirmatory rather than explanatory approach; it provides explicit estimates of measurement errors; and it can incorporate both unobserved (latent) and observed variables" (Byrne, 2000: 3-4). Besides, multidimensional analysis with SEM is an important tool because it starts with formulating the problem, and then obtaining the data, running the statistical program, mapping the results, defining the dimensions, and finally testing the results for reliability and validity of the theoretical construct (Borg and Groenen, 2005).

Discussion

This section presents and discusses the results of the statistical analyses of the study. In this regard, Table 4 provides a descriptive analysis of respondents' levels of concern about the environment. As Table 4 shows, respondents tend to agree that water pollution like pollution of streams, rivers, and lakes (V51x: mean = 3.740), air pollution from industry (V47x: mean= 3.673), pesticide in farming (V49x: mean= 3.346), and rising world temperature (V53x: mean= 3.354) are serious problems that may inflict harm on themselves and their families. On the other hand, respondents reveal moderate to moderately low means of attitudes toward social altruistic and biospheric items. Understandably, the findings indicate that respondents are more concerned about environmental risk inflicted on themselves and their families (egoism) than other social-altruistic or biospheric concern.

Table 4: Descriptive Statistics of the Study's Endogenous Variables

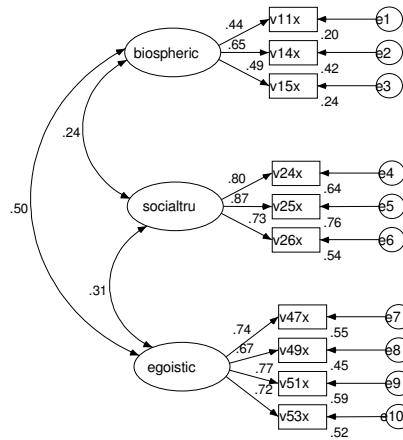
Variables	Mean	Std. Dev	Minimum	Maximum	N
<u>Biospheric</u>					
V11x	2.843	1.044	1	5	1170
V14x	3.235	1.037	1	5	1170
V15x	2.745	1.169	1	5	1170
<u>Social Altruistic</u>					
V24x	3.362	1.081	1	5	1170
V25x	3.027	1.165	1	5	1170
V26x	2.913	1.158	1	5	1170
<u>Egoistic</u>					
V47x	3.673	0.931	1	5	1170
V49x	3.346	0.902	1	5	1170
V51x	3.740	0.958	1	5	1170
V53x	3.354	1.033	1	5	1170

To assess the goodness of fit of the confirmatory factor analysis models and to evaluate the level of correspondence between the theoretical model and the data, a number of fit indices were utilized including the Comparative Fit Index (CFI); the Goodness Fit Index (GFI), and Root Mean Square Error (RMSEA). Although both of CFI and of GFI range from zero to 1.00, cutoff values that close to .95 are advised and indicate goodness of fit (Byrne 2001). RMSEA values that are less than .05 also indicate goodness of fit (Byrne 2001). Finally, Chi-square analysis is used with caution because chi-square is a function of a sample size and therefore, large samples have a tendency to reject a true hypothesis. According to Hu and Bentler (1995) "even if the discrepancy between estimated models and data is very small, if the sample size is large enough, almost any model will be rejected because the discrepancy is not statistically equal to zero" (p.81). To test the goodness of fit of the Stern et al., tripartite model of environmental concern, three theoretical models were constructed: (1) overall sample model, (2) male sample model, and (3) female sample model. The goodness of fit of these models is assessed using the GFI, CFI, RMSEA, and Chi-square analysis.

Whereas Figure 2 displays the model fit for the overall sample, Figure 3 reveals the results for the male sample, and Figure 4 shows the results for the female sample. Thus, any model that scores higher than .95 on its CFI and GFI and lower than .05 on its RMSEA is considered a satisfactory fit. Figure 2 displays standardized coefficients of confirmatory factor analysis for the general model. The model's coefficients confirm that environmental concern is a three-dimension phenomenon. In addition, the model is highly in agreement with the data ($X^2= 75.891$; CFI= .987; GFI= .987; RMSEA= .034). Put differently, the data confirm the theoretical model that is constructed under the assumption that environmental concern is a tripartite phenomenon including biospheric, social-altruistic, and egoistic aspects.

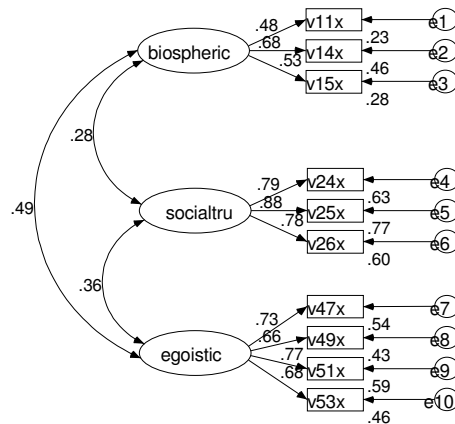
The data also confirm that environmental concern not only consists of the biospheric, social altruism, and egoistic aspects but also is made of these constructs simultaneously. Figure 3 provides the standardized coefficients of the confirmatory factor analysis for the male sample. In this model, the data also confirm quite strongly that environmental concern is a three dimensional phenomenon ($X^2 = 46.030$; CFI= .991; GFI= .983; RMSEA= .029). Likewise, the findings support the research hypothesis that environmental concern consists of three-correlated facet, namely, biospheric, social altruistic, and the egoistic. Figure 4 confirmed the tripartite model of environmental concern for the female sample ($X^2 = 62.150$; CFI= .982; GFI= .983; RMSEA= .038). to sum it up, the data confirmed Stern et al., (1993) environmental concern model indicating that environmental concern is a tripartite phenomenon with three main correlated and interconnected aspects.

Figure 2 Standardized Coefficients of Confirmatory Factor Analysis of Environment concern for the entire Sample (N= 1170)



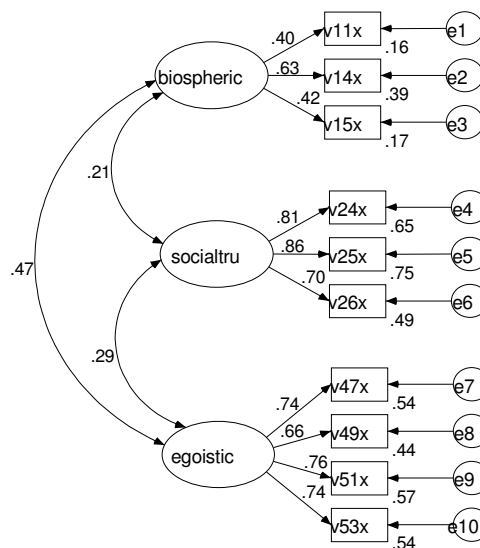
Chi-square= 75.891; CFI= .987; GFI= .987; RMSEA= .034

Figure 3 : Standardized Coefficients of Confirmatory Factor Analysis of Environment concern for Male Respondents (N=527)



Chi-square= 46.030; CFI= .991; GFI= .983; RMSEA= .029

Figure 4 Standardized Coefficients of Confirmatory Factor Analysis of Environment Concern for Female Respondents (N=643)



Chi-square= 62.150; CFI= .982; GFI= .983; RMSEA= .038

Conclusion

The structure of environmental concern in the United States was examined in this study. The model fit of environmental concern model as developed by Stern et al., (1993) was tested using confirmatory factor analysis and structural equation modeling. According to Stern et al. (1993), environmental concern is a tripartite phenomenon that includes a concern about nonhuman species (biospheric); concern about the welfare of other human beings (social-altruistic); and egoism or self-interest orientation. Data for this study were derived from the International Social Survey Program of Inter-University Consortium for Political and Social Research, the University of Michigan (ICPSR, 6640). Data collection was conducted in conjunction with the General Social Survey (GSS) 1993. To examine the structure of environmental concern as proposed by Stern et al., (1993), a theoretical model was developed under the assumption that environmental concern consists of three correlated dimensions consisting of a biospheric, social altruistic, and egoism or self-interest.

The findings confirmed the goodness of fit of environmental concern as coined by Stern et al., (1993). In particular, the data confirmed the goodness of fit for the overall sample, male sample, and female sample. Thus, the data confirmed that environmental concern “incorporates...three value orientations: concern of the well-fare of other human beings, which [is] call[ed] the social-altruistic value orientation; concern with the nonhuman species or the biosphere, which [is] call[ed] the biospheric orientation; and egoism or self interest” (Stern et al., 1993: 326). In addition, men and women are shown to have similar structure of environmental concern. Thus, gender’s effect on environmental concern is found to be weak with little impact on respondents’ views about the environment. Future research is recommended to consider the complex and the multidimensional array of public concern about the environment. Obviously, such concern is a combination of self-interest, social altruistic, and a general concern about the environment rather than a one-dimensional fixed phenomenon. Whether or not this is true when doing international comparison has yet to be determined, but does lend itself to future inquiry.

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