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Article

Assessing Sustainable Behavior and its Correlates: A Measure of Pro-Ecological, Frugal, Altruistic and Equitable Actions

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Abstract: Measures of sustainable behavior (SB) usually include the self-report of activities aimed at the conservation of the natural environment. The sustainability notion explicitly incorporates both the satisfaction of human needs and the need of conserving the natural environment. Yet, the assessment of sustainable behaviors rarely considers the protection of the social environment as situation to investigate. In this paper, we propose the use of an instrument assessing SB, which includes the report of *pro-ecological* and *frugal* actions in addition to *altruistic* and *equitable* behaviors. The responses provided by 807 Mexican undergraduates to a questionnaire investigating those four instances of SB were processed within a structural equation model. Emotional (indignation due to environmental destruction, affinity towards diversity, happiness) and rational (intention to act) factors assumedly linked to sustainable behavior were also investigated. Significant interrelations among pro-ecological, frugal, altruistic and equitable behaviors resulted, suggesting the presence of a higher-order-factor that we identified as SB. This factor, in turn, significantly correlated with the rest of the investigated pro-environmental factors.

Keywords: sustainable behavior; pro-ecological actions; frugality; altruism; equity; happiness

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1. Introduction

Conservation psychology (CP) is a particular area of psychology aimed at studying the behavioral causes and solutions of environmental problems. This field investigates interactions between human behavior and the socio-physical environment [1]. Gifford [2] assures that a wide sector of psychologists in the CP subfield acknowledge and accept the broader concept of sustainability as outlined in the Brundtland Report [3]. This is manifested in a growing interest in studying sustainability issues from a psychological perspective. Therefore, CP is aimed at studying the psychological components involved in sustainable actions; these components can be labeled the "psychological dimensions of sustainability" [4], which include psychological tendencies (attitudes, motives, beliefs, norms, values), human capacities (knowledge, skills, aptitudes) and psychological consequences (wellbeing, happiness) linked to sustainable actions [5−8]. Conservation psychology tries to determine the personal characteristics, aptitudes, and psychological benefits that predispose individuals towards a pro-sustainable lifestyle.

2. Sustainable Behavior

One more group of psychological variables considers *sustainable behaviors* (SB), the set of actions aimed at protecting the socio-physical resources of this planet [4]. Although "sustainable behavior" is, in practical terms, synonymous with "pro-environmental behavior," the latter has been used to emphasize efforts to protect the natural environment, while the former specifies actions aimed at protecting *both* the natural and the human (social) environments. That is why we prefer the use of the SB term. For most researchers, SB is deliberate (*i.e.*, purposeful) and effective (*i.e.*, problem-solving). This behavior is also anticipatory; that is: it is future-oriented, by definition, because it considers the needs of forthcoming generations coincidently with the satisfaction of present needs [9]. Since sustainable development claims for the active protection of natural resources while, at the same time, meeting the needs of people, the conservation of human resources (society, culture, people's survival and wellbeing) is as important as the conservation of ecosystems (all living beings and the inanimate substrate on which they base their subsistence). That is why we propose including pro-ecological, frugal, altruistic and equitable actions as instances of sustainable behavior.

2.1. Pro-Ecological Behaviors

Pro-ecological behaviors are purposeful and effective actions that result in the conservation of natural resources [4]. Psycho-environmental researchers have studied a variety of pro-ecological conducts, including recycling, composting, solid refuse control, water conservation, energy-saving behaviors, reading about environmental topics, pro-ecological persuasion to others, pro-environmental lobbying, pro-ecological design and building, and ecosystem conservation [10–16], among others. The study of these actions constituted the classical approach to pro-environmental behavior during the first years of research in this area. A number of instruments have been created and validated to assess pro-ecological behaviors, including the self-report and recording of environmentally-friendly actions across a series of behaviors, as is the case of the General Environmental Behavior (GEB) scale, developed by Kaiser [17].

2.2. Frugal Behaviors

Frugality is a fundamental behavioral characteristic of a sustainable lifestyle. It refers to a decreased level of consumption or to austere behaviors intended at diminishing the impact of human behavior on the availability and renewability of natural resources [18,19]. Frugal behaviors are antagonist to consumerism, the prevalent lifestyle of modern societies, especially of those in the industrialized world [20]. Consumerism is one of the essential causes of environmental problems. Frugal actions involve daily reduced-consumption actions as well as the type of items purchased, the activities individuals engage in, and the way wastes are discarded or disposed. A number of researchers [18–21] have created and administered instruments assessing frugal behaviors. Their results reveal that these behaviors correlate with diverse instances of sustainable lifestyles and also with a number of determinants of pro-environmental behaviors.

2.3. Altruistic Behaviors

Since the beginnings of psycho-environmental research, pro-environmental action has been conceived as altruistic behavior; that is, pro-environmental actions are thought as having repercussions on others' integrity and well-being [8]. Altruism, in fact, has been defined as a motivational state aimed at increasing others' well-being [22] or a tendency to maximize others' benefits with little or null interest in gains for oneself [23] Altruism is also related to the consideration of future consequences and to personal responsibility within the Norm Activation Model, one of the most used theoretical approaches in explaining pro-environmental behavior. In utilizing this model, several authors have found a significant relationship between altruism and other sustainable behaviors [24,25].

2.4. Equitable Behaviors

The sustainable development definition implicitly considers the idea of intra- and inter-generational equity. By sharing the satisfaction of needs between the present and future generations, sustainable development looks for a balance between the benefits gained by people living today and those to be obtained by the forthcoming human groups [3]. Moreover, SD claims that the satisfaction of needs among all individuals *currently* living in this planet should be guaranteed. Equity also implies a balance between human wellbeing and ecosystems' integrity, making possible the access of resources for people and the preservation of the physical environment. Corral-Verdugo *et al.* [26] produced a psychological measure of equitable behavior, which has been used in studies of SB. This instrument includes the assessment of social, racial, economic, age, and gender equity. Their study showed a significant relationship between equitable actions and other sustainable lifestyles.

3. Correlates of Sustainable Behavior

A number of correlates of sustainable behavior have been investigated, including contextual, demographic and psychological variables linked to a pro-environmental effort. The pertinent literature reports that, among the psychological correlates, a series of rational and emotional factors either instigate or result from the practice of pro-environmental actions. In other words, some correlates antecede the practice of SB while others are repercussions of such behavior. The antecedent factors

can be rational (pro-environmental deliberation, knowledge, beliefs) or emotional (affinity towards diversity, indignation), and the repercussions mostly include emotional states (satisfaction, happiness, *etc.*). In this section, we mention four types of SB correlates: pro-environmental deliberation, affinity towards diversity, environmental emotions, and happiness.

3.1. Pro-Environmental Deliberation

According to authors in the fields of environmental psychology and environmental education, the sustainability ideals can only be achieved through a *purposeful* behavior and the willingness to conserve the socio-physical environment. Pro-social or altruistic acting, an indicator of sustainable practices is explicitly defined as deliberate behavior intended at benefiting others [27]. Deliberation has been studied in numerous sustainable behavior models as willingness to sacrifice oneself in favor of the environment [19], as intentions to act in a pro-environmental manner [5], as willingness to pay for conserving environmental integrity [28], or as pro-environmental implementation intentions [5]. The specified and tested models consider that pro-environmental deliberation significantly and directly affect environmentally relevant behavior.

3.2. Affinity towards Diversity

Human beings exhibit a preference towards complexity and diversity in their environment [29]. Such preference has probably to do with the opportunities that rich and complex scenarios provide [30]. Affinity towards diversity (ATD) is defined as a tendency to prefer diversity and variations in the biophysical and socio-cultural scenarios of human life. ATD reflects a stable liking for the biophysical and cultural diversity that individuals face in their everyday life: *i.e.*, physical (landscapes, weather), biological (plants, animals) and socio-cultural (ethnicity, religions, sexual orientations, political inclinations) diversity encountered in daily interaction with the social world. Studies that have tested the pertinence of this concept have found that liking biological diversity is intimately linked to preference towards socio-diversity, and also that ATD predicts sustainable behavior [31].

3.3. Environmental Emotions: The Role of Indignation

Emotional processes complement cognitive factors in the determination of sustainable behaviors. Environmental positive emotions, such as emotional affinity towards the environment, indignation due to ecological destruction, guilt resulting from not conserving the environment, interest and appreciation for nature, as well as affinity towards diversity, among others, predict people's engagement in pro-ecological behaviors [31,32]. Similarly, pro-social conducts are influenced by positive emotions such as empathy, which leads to sympathy and concern for others; also by the affinity towards sociodiversity and by moral emotions [27,31]. In our study, we focus on indignation due to insufficient ecological protection, as negative emotion, in addition to happiness, a positive emotion.

3.4. Happiness

Happiness is an expected consequence of sustainable development [33]. A number of studies in conservation psychology seem to show that people who protect their physical and social environment are happy persons. Happy individuals are cooperative, pro-social, charitable, and focused on the needs of others [34]. Equitable individuals experience higher levels of subjective wellbeing [35]. Frugality, leads to both psychological wellbeing and to intrinsic motivation reinforcing a lightly consumption of resources [18,19]. In addition, people who frequently engage in pro-ecological behaviors perceive themselves as happier than those who are not pro-environmental [36,37]. These studies demonstrate the positive psychological consequences of being sustainably oriented.

4. Aims of the study

The purpose of this study was to test a model of interrelations among the proposed facets of sustainable behavior: (pro-ecological, frugal, altruistic, and equitable actions) allowing the emergence of a second-order factor (SB). The second aim was to test the relation between this second-order factor and the intention to act in a pro-sustainable way. A third purpose implied the testing of an association between sustainable behavior and the reported happiness of participants.

5. Method

5.1. Participants

Eight-hundred-and-seven students at ten universities from four northwestern Mexican cities were investigated. Groups were randomly selected among the whole spectrum of (social, humanistic, biological, engineering, and technical) areas at the universities. The students were 52% females and 47% males; their age ranged from 18 to 44 years (mean = 21.9; SD = 4.17); 40% of them were of middle-low-class origin; while 57% constituted middle-class students and the additional 3% were of high-class extraction. This selection closely corresponded to a representative public university sample, according to criteria of the Mexican Census Bureau. The response rate was 100%

5.2. Instruments

Indignation due to environmental damage was measured through 7 items, taken from Corral-Verdugo *et al.* [21]; this scale includes situations such as "When someone cuts down a tree" or "When someone throws their trash on public roads". These items were responded using a 0 (I feel indifference) to 5 (I feel so bad that I'd try to prevent someone from doing it by all means) likert scale. We also used six items from a scale of *intention to act* developed by Corral-Verdugo *et al.* [21]. They assessed respondent's willingness to engage in behaviors such as recycling, participating as volunteer in conservationist actions, and water conservation behaviors. They responded to these items by considering four-option scale ranging from 0 (never) to (4) always. A .80 alpha was previously reported from administering this instrument. *Affinity towards diversity* was measured through 14 items taken from Corral-Verdugo *et al.* ATD scale [31]; it encompassed items indicating preference for physical (weather, scenarios) and biological (plants, animals) diversity, as well as human (ethnic,

gender), and social (religious, social-class, political) diversity. Responses ranged from 0 = "Does not apply to me", 1 = "It almost does not apply to me", 2 = "It partially applies to me, to 3 = "It totally applies to me". *Frugality* was self-reported considering ten actions such as buying the strictly necessary, the reuse of clothing, taking meals at home, *etc.*, which were reported using a 5-point likert-options of response (0 = totally agree…4 = totally disagree); this instrument was also designed by Corral-Verdugo *et al*. [21], producing indication of validity and reliability. We used a scale assessing *altruistic actions*, self-reporting 10 behaviors aimed at assisting or helping others, such as visiting sick people, economically helping the poor, supporting the Red Cross, *etc.* Corral-Verdugo *et al*. [21] reported the use of this scale, providing indications of validity and reliability; the scale uses a 4-point response-option format (0 = never…3 = always engage in such an action). *Equity* was measured with a scale developed by Corral-Verdugo *et al*. [21], which included seven items indicating behaviors such as providing equal educational opportunities for girls and boys, and treating the rich and the poor as equals, *etc.*, using response options from 0 (totally disagree) to 4 (totally agree). One more used scale measured *proecological behavior*, considering 16 items from Kaiser's General Ecological Behavior Scale [17]; this instrument includes the report of actions such as reuse, recycling, energy conservation, *etc.*, which are assessed in a 0 (never) to 3 (always) scale. Finally, the Lyubomirsky and Lepper's [38] *Happiness* scale was also administered. This is a measure of global subjective happiness developed and validated in USA, using a 7-point (1 = not very happy... 7 = very happy) likert format of responses to items such as "In general I consider myself happy" and "Compared to most of my peers, I consider myself happy".

5.3. Procedure

The instrument was administered at the participants' classroom. They were debriefed by telling them the aims of the study and their informed consent to participate was obtained. None refused to collaborate with the study. The administration of the scales took about fifteen minutes.

5.4. Data Analysis

Results were analyzed using univariate statistics (means, standard deviations and frequencies). The internal consistency of the scales was also analyzed calculating their Cronbach's alphas. Interrelations among latent variables were estimated within a structural equation model, using three parcels by studied construct. Eight first-order factors were constructed: (1) Indignation due to environmental damage, (2) Intention to act, (3) Affinity towards diversity, (4) Frugality, (5) Altruism, (6) Equity, (7) Pro-ecological behavior and (8) Happiness. Factors 4, 5, 6 and 7 were the indicators of a second-order latent variable of "sustainable behavior." In our model, this SB factor is directly predicted by intention to act, which, in turn is influenced by indignation due to environmental degradation, and by affinity towards diversity, while happiness is influenced by SB

6. Results

Table 1 exhibits the univariate statistics and internal consistencies of the used scales. The Cronbach's alpha values in all scales resulted appropriate, indicating an acceptable reliability of the

instruments. Moderate levels of response to the Indignation due to Environmental Damage scale were obtained (general mean=2.81, from a 0 to 5 response rank). A higher level of agreement with the Intention to Act (general mean = 2.01, 0 to 3 rank) and Affinity towards Diversity (mean = 2.06, 0 to 3 rank) scales resulted. As for the SB subscales, the most practiced reported behaviors were the equitable ones (mean = 3.21, 0–4 rank), followed by altruistic (mean = 1 .81, 0–3 rank), and pro-ecological (mean = 1.73, 0–3 rank) actions. Frugal behaviors were the less practiced sustainable actions (mean = 1.35, 0–4 rank). The levels of happiness resulted notoriously high (mean = 5.76, 0–7 rank).

Table 1. Univariate statistics and reliabilities of the used scales

SCALES/items	Mean	*Sd*	Alpha
INDIGNATION DUE TO ENVIRONMENTAL DAMAGE			0.79
When someone cuts down a tree	2.25	1.35	
When someone throws their cigarette butts on the floor	1.86	1.64	
When someone throws their trash on public roads.	2.97	1.33	
When someone harms an animal, person or plant.	3.73	1.19	
When observing factories that throw waste into rivers/sewage	3.11	1.28	
When seeing streets full of traffic and filled with smoke	2.50	1.34	
When observing that neighbors waste water	3.31	1.27	
INTENTION TO ACT			0.76
To participate in proecological manifestations	1.28	1.06	
To donate money for environmental campaigns	1.64	0.83	
To volunteer in environmental conservation	1.76	0.91	
To collaborate in environmental protection	1.85	0.88	
To sign against an act that harms the environment	1.52	1.25	
To buy environmentally friendly products	2.27	0.85	
To use energy efficient systems	2.59	0.71	
To walk or use bike instead of car	1.92	0.95	
To deposit paper in its container	2.42	0.78	
To deposit glass in its container	2.36	0.84	
To conserve water	2.50	0.72	
AFFINITY TOWARDS DIVERSITY			0.60
People of different races	2.40	0.78	
People of different social classes	2.60	0.69	
Only people my age	2.14	1.15	
Different political orientations	1.89	1.02	
People of different gender	2.25	1.11	
Many types of animals	2.06	1.08	
In my garden, only one type of plant	1.94	1.19	
Likes visiting zoos, with many types of animals	2.16	1.02	
The more variety of plants, the better	2.31	0.94	
I only like certain types of pets	1.59	1.08	
I only like one kind of weather.	1.57	1.14	
I could live comfortably anywhere	1.81	1.06	

Table 1. *Cont.*

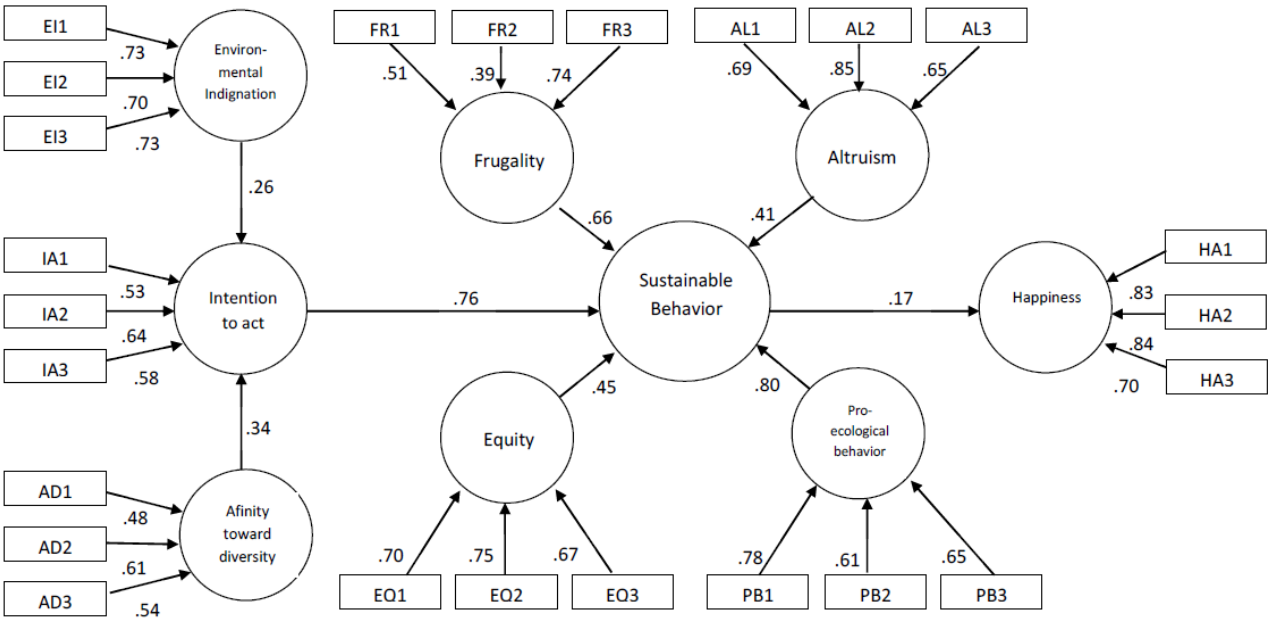
SCALES/items	Mean	*Sd*	Alpha
FRUGALITY			0.64
Does not buy a new car if old functions.	2.75	1.34	
Wears same clothing.	2.53	1.36	
Wouldn't buy jewelry.	2.93	1.28	
Buys lots of shoes.	2.14	1.42	
Buys more food than needed.	2.30	1.41	
Uses most earnings for buying clothing.	2.12	1.35	
Always takes meals at home.	2.49	1.25	
Rather walks than drives.	2.75	1.41	
Reuse notebooks and paper.	2.39	1.47	
Likes living lightly.	2.08	1.21	
ALTRUISM			0.80
Gives clothes to the poor	2.21	0.82	
Assists people who fall or get hurt	2.43	0.74	
Contributes financially with the Red Cross	2.06	0.81	
Visit the sick at hospitals/homes	1.03	0.88	
Helps olders or handicapped crossing street	1.86	0.95	
Guides persons asking for direction	2.29	0.78	
Provides some money to homeless	1.95	0.83	
Participates in fund-collection rallies	1.28	1.02	
Donates blood in response to campaigns	0.74	0.98	
Cooperates with colleagues	2.31	0.73	
EQUITY			0.76
Wives should have same rights husbands have at home.	3.62	0.88	
At work, boss should treat his/her subordinate fellows like his/her equals.	3.04	1.17	
Children in my home have the same rights as adults in making important decisions.	2.06	1.30	
Even people who don't work should have guaranteed their access to health services	3.40	0.95	
In my family, men and women have same cleanup chores.	3.42	1.00	
Indians are equally capable to be in charge of a business as white people	3.55	0.89	
I treat rich and poor people equally.	2.86	1.18	
Poor people should live in the same city zone where the rich live	2.72	1.20	
At school, a student is as important as a professor	3.60	0.87	
In my family, girls and boys have the same educational opportunities.	3.79	0.70	
Natural resources should be equitably distributed	3.30	1.11	

Table 1. *Cont.*

SCALES/items	Mean	*Sd*	Alpha
PRO-ECOLOGICAL BEHAVIOR			0.72
Waits until having a full load for laundry	2.15	1.00	
Drive at speeds below 100 on freeways	1.58	1.08	
Collects and recycles used paper	1.35	1.01	
Brings empty bottles to a recycling bin	1.06	0.96	
Has pointed out unecological behavior	1.73	0.94	
Buys convenience foods	1.82	0.94	
Buys products in refillable packages	1.64	0.83	
Buys seasonal product	2.26	0.78	
Uses a clothes dryer	1.99	1.22	
Reads about environmental issues	1.39	0.89	
Talks to friends about environmental problems	1.38	0.87	
Kills insects with a chemical insecticide	2.03	0.97	
Turn down air conditioning when leaving place	2.44	0.88	
Looks for ways to reuse things	1.94	0.88	
Encourages friends and family to recycle	1.37	0.96	
Conserves gasoline by walking or bicycling	1.62	1.01	
HAPPINESS			0.83
In general, I consider myself happy	5.85	1.06	
Compared to most of my peers, I consider myself happy	5.87	1.12	
I enjoy life, regardless of what's going on	5.58	1.20	

In addition, Figure 1 exhibits the results of the structural model testing the idea of SB as composed of pro-ecological, frugal, altruistic, and equitable behaviors. As this figure shows, SB coherently emerges from the significant interrelations among their four first-order factors. The model also indicates that SB is directly predicted by intention to act, which in turn is positively and significantly influenced by environmental emotions and affinity towards diversity. Finally, SB slightly (yet significantly) predicts the self-report of happiness. The obtained goodness of fit indicators revealed that this model fit appropriately the data.

Figure 1. Structural model of determinants of sustainable behavior. Goodness of fit: X^2 = 382.3 (243 df), p <.00001; *NNFI* = .93, *RMSEA* = .03. R^2 Sustainable behavior = 0.57.



7. Conclusions

The pertinence of a sustainable-behavior higher-order factor composed of pro-ecological, frugal, altruistic, and equitable behaviors seems to be supported by our data. The assessment of practices intended at the protection of other individuals (altruistic, equitable actions) supplement the measurement of pro-ecological and frugal behaviors (actions aimed at conserving natural resources), providing congruence and inclusiveness to the SB concept [1]. Sustainable behavior is not only about the conservation of Nature and its living and non-living substrates but also about taking care of the need of fellow humans [4,9]. Our model confirmed that individuals that engage in pro-ecological and frugal actions are also likely to practice altruistic and equitable behaviors. Thus, a person that practices sustainable behavior not only engages in one kind of actions but tends to act in an integrated pro-environmentally manner. In addition, our measure of sustainable behavior was significantly and directly influenced by intention to act, repeating a result from the literature on predictors of pro-environmental behavior [5,19,28], and indirectly predicted by environmental emotions and affinity towards diversity. The SB factor also correlated significantly (yet, slightly) with a measure of happiness. All these findings seem to indicate that our assessment of sustainable behavior is a valid measure of such a construct.

These results and conclusions support the idea that SB is an unidimensional construct [17], which is encouraging at least because two reasons: (1) Since one sustainable action is likely to lead to others, the educational efforts aimed at developing pro-social and pro-ecological actions can be facilitated; and (2), in a related manner, since the antecedents and consequences of one sustainable behavior also apply to the rest of SB's, using those antecedents and consequences as instigators of one type of sustainable action can be generalized to the rest of behaviors. If our findings were to be replicated, they

would provide a useful way of measuring SB, which would include the assessment of the ecological and social components of a pro-sustainable orientation.

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Conflict of Interest

The authors declare no conflict of interest.

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