

Pro-Environmental Behavior of Undergraduate Students as a Function of Nature Relatedness and Awareness of Environmental Consequences

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Abstract: This paper sought to determine the singular and combined influence of nature relatedness and awareness of environmental consequences on the pro-environmental behavior of undergraduate students. The study employed non-experimental research method, specifically, descriptive correlation design. The respondents of the study were 300 undergraduate students enrolled in science and environment-related programs in Davao City selected through simple random sampling technique. The data for the study were collected using adapted survey questionnaires via the survey administration software, Google Forms. The data were analyzed using mean, Pearson's Product-Moment Correlation, and Multiple Regression Analysis. The results of the study revealed that the respondents have a high level of nature relatedness, awareness of environmental consequences, and pro-environmental behavior. It also showed that there are significant relationships between nature relatedness and pro-environmental behavior as well as awareness of environmental consequences and pro-environmental behavior. It was also shown that nature relatedness and awareness of environmental consequences have a significant combined influence on nature relatedness. Although when treated separately, awareness of environmental consequences showed no significant singular influence on the pro-environmental behavior of the respondents..

Keywords: Nature-Relatedness, Awareness of Environmental Consequences, Pro-Environmental Behavior, Philippines.

1. INTRODUCTION

Humans' interaction with the natural environment have been widely researched since a variety of human activities have impact on the environment^[1]. This is evident in issues like waste disposal, pollution, acid rain, deforestation, ocean acidification, ozone layer depletion, and global warming among others which continue to develop to more serious problems day by day^[2]. The pressure posed by human activities results in severe environmental deterioration in many parts of the world which can be permanent^[3]. These problems, together with the rapid rate of urbanization and industrialization, came to affect developing countries more significantly in the past years as developed countries possess more resources and technological advancements to combat these issues and its effects. In a report published by^[4] it was revealed there has been remarkable failure of environmental policy implementation particularly in developing countries which in effect can be more detrimental as these countries suffer the consequences of environmental degradation more severely.

In the most recent decades, there have been substantial attention given to understanding pro-environmental behavior as a driver for addressing various environmental issues. Pro-environmental behavior, simply referred to as environmental behavior in other literature, represents any behavior that aims to cause as little harm as possible to the environment^[5]. It can be perceived as actions undertaken by people to ensure sustainability and environmental protection^[6]. If there is lack of behaviors that manifest care and sensitivity for the environment, then the world is certainly up for irreversible damage as human attitude and behavior play a key role in achieving an ideal environmental condition^[7]. According to Slavoljubet.al^[8], humans may behave in a pro-environmental manner for the sake of either benefiting themselves or out of pure concern for nature and their surroundings.

Notwithstanding the importance given to pro-environmental behavior to solve current environmental challenges around the world, the data available about pro-environmental behavior mainly come from

developed countries and studies concerning it in developing countries remain to be insufficient^[9]. With this understanding, it is rather pressing to establish the data about pro-environmental behavior in these parts of the world. This will enable us to verify whether there truly exists a substantial connection between people's connectedness to nature, awareness of environmental consequences, and pro-environmental behavior in the context of developing countries. It is high time for us to acquire a more in-depth understanding of what drives individuals to take on pro-environmental behavior to help inform researchers and policy makers as they pursue answers to environmental problems which entail behavioral change. More importantly, the fact that there exists little to no data about pro-environmental behavior in Davao City whilst urbanization is very apparent is a call for action.

Over the years, a considerable number of published researches explored the dimensions of connectedness to nature and provided various scales to measure it. Few of the most prominent are Emotional Affinity Towards Nature which focused on the emotional aspect of connectedness to nature^[10], Inclusion of Nature in Self which measured feelings of being one with the natural world^[11], and Nature Relatedness^[12] which gives emphasis on humans' understanding and appreciation of their interconnectedness with the natural world concentrating on the affective, cognitive, and experiential factors behind it. To elaborate, the definition of nature relatedness incorporates one's awareness and comprehension of our interconnectedness with all other living beings on the planet. Higher levels of nature relatedness predicted strong opinions about the seriousness of ecological issues and human environmental care.

NR-self. Authors of the Relatedness to Nature scale^[12] defined NR-Self as "an internalized identification with nature, reflecting feelings and thoughts about one's personal connection to nature". Oneness with nature is seen as the end product of a sense of peace with the world, which contributes to reverence for the life of other living beings and an interconnectedness with them^[13]. Schultz^[11] developed a scale to assess the degree to which an individual includes nature in himself or herself. The idea of self is a critical component of nature connectedness and has been extensively developed in literature as a significant indicator of a person's sense of being one with nature^[14]. In support, a published review stated that there has been a link established between oneness (with nature) beliefs and pro-environmental attitudes and behaviors^[15]. According to research findings from different disciplines, feeling at one with nature has beneficial effects such as adaptation, well-being, and life satisfaction.

NR-perspective. Authors of the Relatedness to Nature scale^[12] defined NR-Perspective as "reflecting an external, nature related worldview, a sense of agency concerning individual human actions and their impact on all living things". It has been established that sense of responsibility for nature is actually an important predictor of ecological behavior^[16]. They explained that personal responsibility is divided into four sections. These include knowledge of and control over individual thoughts and feelings, awareness of and control over behavioral choices, a desire to be responsible for the behavior performed and the outcome, and awareness of, and consideration for, the effect of one's behavior on others. If a person is aware of environmental problems, he or she should take personal responsibility for them.

NR-Experience. Authors of the Relatedness to Nature scale^[12] defined NR-Experience as "physical familiarity of the natural world, the level of comfort with and desire to be out in nature". Based on the study of Pensini et al.^[17] which investigated the relationship between adults' childhood exposure to nature, it was revealed that outdoor activities such as camping have been shown to increase one's connection to nature and production of pro-environmental behaviors. Their results agreed with the idea of ecopsychologists that humans' psychological and physical wellbeing benefit from exposure to nature.

Awareness of consequences is a factor which results to environmental behavior. According to the Value-Belief Norm Model^[18], it is regarded as a construct which describes explicit awareness of consequences of one's actions, but now includes views about potential world states^[19]. Awareness of consequences is even considered to be a part of a bigger concept which is environmental concern^[5]. Over the years there have been a number of scales developed to characterize awareness of consequences. In 2008, Ryan and Spash^[19] published a study measuring awareness of consequences using two scales: environmental concern (EC) scale and awareness of consequences (AC) scale. In their study, they hypothesized that that awareness of consequences can independently measure the three underlying values of the value-belief-norm model which are egoistic, social altruistic, and biospheric. A new approach was also explored taking into account several theories and propositions suggesting that actions could be linked to people's perception of benefits and costs, pursuit of gains

and prevention of losses, and preference to inaction. One example is how Stern et al.^[18] outlined the value-belief-norm theory, showing that assumptions of negative consequences will result in action. It was stressed that the perceived costs and benefits of a particular environmental action for each collection of valued items, weighted according to the individuals' relative value orientations, would influence behavioral intention.

Benefits and Costs of Action. Benefits of action, as described by the authors of the awareness of consequences scale, are people's awareness of the benefits that can be obtained by taking environmental action^[19]. In an article published by Keohane & Olmstead^[20], they defined benefits in the context of economics as a person's value for a specific thing based on what he or she is willing to give up in return for. The idea that we gain benefits from taking care of our natural environment is actually, by some means, undebatable and backed up by researches, studies, and reports^{[21][22]}.

Benefits and Costs of Inaction. The authors of the awareness of consequences scale define benefits of inaction as people's awareness of the benefits that can be achieved by not responding to environmental issues^[19]. The psychology underlying the concept inaction have been traced back to the theory of status quo bias which explains people's preference for inaction than doing something^[23]. This in turn may explain people's disregard or lack of participation towards addressing issues concerning the environment. Inaction towards environmental issues have been well-discussed in literature. Notably, a good amount of attention is given on climate change inaction. According to a study published by Xiang et. Al^[24], inaction towards the issue of climate change can be seen on the individual, business, and government level as manifested in people being unbothered about the existing climate change problem and continued practice of high-carbon lifestyle.

For ages, there have been growing attention devoted to understanding factors linked to pro-environmental behavior and many theories have been proposed to explain these variables. Bronfman et.al^[25] cited predictors such as value orientation, ecological vision, awareness of consequences, ascription of responsibility, connectedness to nature, and personal norms among others. Up to date, efforts to measure people's pro-environmental behaviors remain of importance as we continue to face severing environmental problems. Given that humans are responsible for biodiversity loss and climate change, one would expect people to engage in more environmentally friendly actions^[26]. Pro-environmental behavior specifically refers to behaviors aimed at positively affecting or minimizing negative impacts to the environment^[7].

Civic Actions. Civic action is one of the domains of pro-environmental behavior. As a social construct, it is described as engagement in a collective effort with the aim of addressing problems and becoming valuable members of a community^[27].

Policy support. Policy support refers to the intention to support actions (of policy makers) on environment issues without actively participating in the action^[28]. According to^[29], politicians are unlikely inspired to push through with environmental policies that are not fully supportive or in conflict with the opinions of their constituents.

Recycling. Recycling, together with composting and other technologies have been used to battle against the worsening waste problems^[30]. Recycling is among the most effective movements in response to the environmental impacts of waste^[31] in many countries across the globe today. The manner of recycling does not only contribute to solving current waste problems, but it also helps provide for a cleaner and less polluted surrounding, lesser greenhouse emission from incineration, and a more sustainable environment benefiting not only humans, but also conserving wildlife habitats^[32].

Transportation. Transportation is one of our necessities that have greatly impacted the environment because of its great energy expenditure. Its negative impacts on the environment are also undebatable as it is known to contribute highly to air pollution. In developing countries, transportation is one of the greatest contributors of air pollution and ever-increasing emission of greenhouse gases^[33].

Household Setting. Activities done in the household setting is just as relevant environmental behavior as all the rest mentioned above. Household practices, just like transportation falls under the private sphere of environmental behaviors. It is known that people are more likely to engage in these private sphere pro-environmental behaviors than public sphere environmental behaviors^[34]. *Consumption.* Conservation (lifestyle) behavior^[35] is an umbrella term that pertains to any activity done in the household that have subsequent effects on the environment^[5]. Years of research have already

established the importance of conservation of resources to achieve environmental capacity^[36]. An immense augmentation of solid waste problem as a result of accelerated rate of consumption has been one most relevant issues of the present time^[6].

2. MATERIALS AND METHODS

2.1. Research Design

This study employed non-experimental, quantitative research method which is most fitted to test larger samples^[37]. A regarded advantage of this design was that it allowed for generalizability of results within the study population^[38] and even other populations^[37]. Quantitative research methods are generally known to establish a higher level of objectivity as it makes use of standardized instruments and protocols for data collection and analysis^[39]. Taking into account the fact that non-experimental, quantitative design was inexpensive and feasible especially for survey research^[38] and that this study aimed to examine the relationship and influence of the study variables among a considerably large number of samples – this design was perceived to be the most convenient and appropriate method to apply. In particular, this study made use of descriptive-correlation design.

2.2. Population and Sample

The respondents of this study were undergraduate students from Davao City. A total of 300 respondents were included which was considered as the minimum sample size for a correlation study^[40]. The respondents were selected using stratified random sampling which was carried out by splitting the population into subgroups where each subgroup was sampled at random. Stratified random sampling allowed for making sure that each subgroup was properly represented^[41] which was deemed appropriate for this research study which targeted students from various programs of related to science and environment.

Furthermore, the respondents of the study were also selected based on a set of criteria. To be included in the study, the respondents had to be of legal age (≥ 18 years of age) and enrolled in science and environment related programs in Davao City (e.g., BSEd-Sciences, BS Biology, BS Environmental Science, BS Forestry, BS Agroforestry, etc.). The undergraduate students who were not enrolled in these programs in Davao City and refused to give informed consent to participate were excluded in the study. In addition, respondents who expressed their decision to withdraw or discontinue their participation were also excluded from the study.

2.3. Research Instrument

The instrument used in this study to measure IV_1 , nature relatedness, was a 21-item survey questionnaire adapted from the Nature Relatedness Scale of Nisbet et.al^[12]. The instrument used to measure IV_2 , awareness of environmental consequences, was a 15-item survey questionnaire adapted from the Awareness of Consequences (AC) Scale of Ryan and Spash^[19]. Meanwhile, the instrument used to measure the DV, pro-environmental behavior, was a 22-item survey questionnaire adapted from the standardized survey for the Multi-dimensional Measure of Environmental Behavior by Gkargkavouzi et.al^[5]

2.4. Statistical Tools

Mean was used to determine the level of nature relatedness, awareness of environmental consequences, and the pro-environmental behavior of undergraduate students. Pearson Moment Product Correlation Coefficient was used to determine the significant relationship between nature relatedness and pro-environmental behavior as well as awareness of environmental consequences and pro-environmental behavior. Multiple Regression was used to determine the degree of nature relatedness and awareness of environmental consequences to the pro-environmental behaviors of undergraduate students enrolled in science and environment related programs in the University of Mindanao, Davao City.

3. RESULTS AND DISCUSSION

3.1. Level of Nature Relatedness of Undergraduate Students

In Table 1 is shown the level of nature relatedness of the undergraduate students enrolled in science and environment related programs at the University of Mindanao, Davao City. As shown in the table,

the mean ranges from $\bar{x} = 2.34$ to $\bar{x} = 4.41$ with an overall mean score of $\bar{x} = 3.63$ which was high. The standard deviation value was 0.56 which means that the data is relatively homogeneous. The analysis of the level of nature relatedness of undergraduate students was described in terms of the following indicators, ordered from lowest to highest based on the mean: nature relatedness (perspective) has the lowest mean score $\bar{x} = 2.34$ (SD = 1.14) which was low. This was followed by nature relatedness (experience) with a mean of $\bar{x} = 4.14$ (SD= 0.56) which was high. Lastly, nature relatedness (self) appeared to have the highest mean $\bar{x} = 4.41$ (SD= 0.50) which was very high. In addition, the following order was unchanged in terms of the dispersion of the data with nature relatedness (experience) being the most dispersed and nature relatedness (self) being the least dispersed. The overall level of nature relatedness of undergraduate students was revealed as high with the indicator nature relatedness (self) being very high. This is suggestive of the strong connection felt by the respondents towards nature and themselves.

Table1. *Level of Nature Relatedness of Undergraduate Students*

Indicator	SD	Mean	Descriptive Level
Nature Relatedness-Self	0.50	4.41	Very High
Nature Relatedness-Perspective	1.14	2.34	Low
Nature Relatedness-Experience	0.62	4.14	High
Overall	0.56	3.63	High

3.2. Level of Awareness of Environmental Consequences of Undergraduate Students

Presented in Table 2 is the level of awareness of environmental consequences of undergraduate students enrolled in science and environment-related programs at the University of Mindanao, Davao City. As seen in the table, the means were on both ends having low and very high values. The overall mean was $\bar{x} = 4.12$ which was high with a standard deviation of 0.41 which represents are fairly homogeneous data. This was nearly consistent with the spread of data in Table 1. In terms of the indicators for the variable, only benefits of inaction had a low mean of $\bar{x} = 2.16$ while the remaining indicators being benefits of action, costs of action, and costs of inaction had very high means of $\bar{x} = 4.92$, $\bar{x} = 4.71$, and $\bar{x} = 4.69$ respectively. This means that their understanding of environmental implications was often evident. The low level of benefits of inaction actually reflects a positive connotation and corresponds to the aforementioned finding; as it means that respondents did not agree with the notion that they do not need to be concerned about the world around them because it is in the hands of future generations, and that pollution and environmental destruction are exaggerated and have little impact in fact.

Table2. *Level of Awareness of Environmental Consequences of Undergraduate Students*

Indicator	SD	Mean	Descriptive Level
Benefits of Action	0.20	4.92	Very High
Costs of Action	0.49	4.71	Very High
Benefits of Inaction	1.28	2.16	Low
Costs of Inaction	0.56	4.69	Very High
Overall	0.41	4.12	High

3.3. Level of Pro-environmental Behavior of Undergraduate Students

The analysis for the level of pro-environmental behavior of undergraduate students enrolled in science and environment-related programs at the University of Mindanao, Davao City are displayed in Table 3. The table shows the overall mean value $\bar{x} = 3.79$ which was high with a standard deviation of 0.66. Comparing it to the spread of data from the previous variables presented, the standard deviation from IV₁, IV₂, and the DV were rather consistent. In addition, the mean of the indicators which defines the level of pro-environmental behavior of undergraduate students came out to be moderate for civic actions ($\bar{x} = 3.35$, SD = 0.95) and policy support ($\bar{x} = 3.35$, SD= 1.16); high for recycling ($\bar{x} = 4.05$, SD = 0.91), transportation choices ($\bar{x} = 3.96$, SD = 0.92), and consumption ($\bar{x} = 4.05$, SD = 0.77); and very high for household setting ($\bar{x} = 4.21$, SD = 0.77). This shows that the pro-environmental behavior was manifested most in the household setting and least when in larger contexts like civic activities and policy implementation. The high level of pro-environmental behavior of undergraduate students corresponds to the frequent practice of pro-environmental behaviors. Based on these findings, respondents are more inclined towards saving energy in the household, buying more sustainable

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products, recycling, and making more environment - friendly transportation choices other than participating in the larger context of pro-environmental activities, participating in environmental groups and community events, donating money, taking part in reforestation and clean up drives, signing petitions, and being involved in the establishment of environmental legislations.

Table3. Level of Pro-environmental Behavior of Undergraduate Students

Indicator	SD	Mean	Descriptive Level
Civic Actions	0.95	3.35	Moderate
Policy Support	1.16	3.10	Moderate
Recycling	0.91	4.05	High
Transportation Choices	0.92	3.96	High
Household Setting	0.77	4.21	Very High
Consumption	0.77	4.05	High
Overall	0.66	3.79	High

3.4. Significance of the Relationship Between Nature Relatedness and Pro-environmental Behavior of Undergraduate Students

In Table 4. is presented the analysis on the significance of the relationship between nature relatedness and pro-environmental behavior of students enrolled in science and environment-related programs at the University of Mindanao, Davao City. As seen in the table, the *r*-value for the overall correlation between nature relatedness and pro-environmental behavior was .515 which indicated a high positive correlation with a *p*-value of .000. This denoted the rejection of the null hypothesis with the *p*-value being lower than 0.05. In this case, it can be established that there was significant relationship between the nature relatedness and pro-environmental behaviors of the undergraduate students who participated in the study.

Table4.1. Significance of the Relationship Between Nature Relatedness and Pro-environmental Behavior of Undergraduate Students

Relatedness to Nature	Pro-Environmental Behavior						
	CA	PS	RE	TC	HS	CO	Overall
Nature Relatedness - Self	.359** .000	.326** .000	.404** .000	.199** .001	.364** .000	.458** .000	.481** .000
Nature Relatedness - Perspective	.247** .000	.391** .000	.170** .003	.222** .000	.039 .502	.196** .001	.311** .000
Nature Relatedness - Experience	.361** .000	.400** .000	.430** .000	.132* .023	.143* .013	.366** .000	.433** .000
Overall	.408** .000	.512** .000	.395** .000	.259** .000	.188** .001	.405** .000	.515** .000

Legend: CA - civic actions, PS - policy support, RE – recycling, TC - transportation choices, HS - household setting, CO – consumption

3.5. Significance of the Relationship between Awareness of Environmental Consequences and Pro-environmental Behavior of Undergraduate Students

In Table 4.2 is summarized the significance of the relationship between awareness of environmental consequences and pro-environmental action among students enrolled in science and environmental programs at the University of Mindanao in Davao City. The *r*-value for the overall correlation between awareness of environmental consequences and pro-environmental behavior was .286 in the table, which represented a positive, but moderately low correlation with a *p*-value of .000. This indicates that the null hypothesis was rejected with a *p*-value less than 0.05. With this, we can state that there was a significant relationship in the undergraduate students' awareness of environmental consequences and pro-environmental behaviors. Although it is also worth noting that the indicator of the independent variable (*IV*₂), benefits of action, showed no significant relationship with the pro-environmental behavior of undergraduate students. According to the results of the study there is a significant relationship in the undergraduate students' awareness of environmental consequences and pro-environmental behaviors. Although the correlation of between the two variables is rather low, it is positive which means an increase in the awareness of environmental consequences of the respondents can lead to a considerable increase in their pro-environmental behavior.

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Table 4.2. Significance of the Relationship between Awareness of Environmental Consequences and Pro-environmental Behavior of Undergraduate Students

Awareness of Environmental Consequences	Pro-Environmental Behavior						
	CA	PS	RE	TC	HS	CO	Overall
Benefits of Action	-.080 .167	-.096 .097	.079 .172	.179** .002	.182** .002	.107 .065	.069 .235
Costs of Action	.125* .030	.173** .003	.089 .125	.181** .002	.166** .004	.269** .000	.228** .000
Benefits of Inaction	.260** .000	.270** .000	.146* .011	.085 .144	-.057 .322	.109 .059	.205** .000
Costs of Inaction	.026 .655	.014 .814	.133* .021	.081 .162	.239** .000	.137* .018	.133* .021
Overall	.243** .000	.259** .000	.198** .001	.173** .003	.109 .058	.228** .000	.286** .000

Legend: CA - civic actions, PS - policy support, RE – recycling, TC - transportation choices, HS - household setting, CO - consumption

3.6. Significance of the Influence of Nature Relatedness and Awareness of Environmental Consequences on the Pro-environmental Behavior of Undergraduate Students

In Table 5 is displayed the analysis of data to determine the singular and combined influence of nature relatedness and awareness of environmental consequences on the pro-environmental behavior of undergraduate students enrolled in science and environment related programs at the University of Mindanao in Davao City. Based on the multiple regression analysis result, an R^2 of .267 and an F of 54.182 with a p -value of .000 was obtained. The p -value being lower than 0.05, the null hypothesis was rejected, indicating that the determinants nature relatedness and awareness of environmental consequences have a significant combined influence on the pro-environmental behavior of undergraduate students. Nevertheless, it must be noted that, individually, only the variable (IV_1) nature relatedness appeared to had a significant singular influence on the pro-environmental behavior of undergraduate students with a p -value of .000 (<0.05) while the variable (IV_2) awareness of individual consequences had a p -value of .336 (>0.05) which implied that it did not have a significant singular influence on the pro-environmental behavior of the undergraduate students. More specifically, the indicator of IV_1 , nature-relatedness (self) had the highest beta co-efficient of 0.329 with a p -value of .000 suggestive of its significant influence on the DV while the indicator of IV_2 , benefits of inaction, had the lowest beta co-efficient of -.026 with a p -value of .681 indicative of its lack of influence on the DV. Furthermore, results showed that IV_1 and IV_2 influenced pro-environmental behavior (DV) altogether by 26.7 %. The remaining 73.3% are deemed to be factors not covered in the study. The nature relatedness and awareness of environmental consequences altogether had a significant combined influence on the pro-environmental behavior of the undergraduate students who participated in the study. This connotes that the two variables combined had a significant impact on the respondents' performance of actions that are deemed beneficial to nature. However, it is noteworthy that when treated separately, only relatedness to nature (IV_1) was shown to have a significant influence over pro-environmental behavior while awareness of environmental consequences has no shown significant influence over it. This means that there is no extent to which the respondent's cognizance of the negative impacts of their actions towards the environment drive them to do pro-environmental actions.

Table 5. Significance on the Influence of Relatedness to Nature and Awareness of Environmental Consequences on Pro-environmental Behavior of Undergraduate Students of Davao City

Pro-environmental Behavior					
(Variables)		B	β	t	Sig.
Constant		1.830		5.485	.000
Relatedness to Nature		.652	.553	8.673	.000
Awareness of Environmental Consequences		-.100	-.061	-.963	.336
R			.517		
R^2			.267		
ΔR			.262		
F			54.182		
ρ			.000		

4. CONCLUSION

Based on the findings of the study, the following conclusions were reached: the level of nature relatedness of undergraduate students enrolled in science and environment related programs at the University of Mindanao, Davao City was high. Particularly, it was very high in terms of nature relatedness (self). The level of awareness of environmental consequences of the students was also high. Specifically, it was very high in terms of benefits of action, costs of action, and costs of inaction. In the same manner, the level of pro-environmental behavior of the students was high. It was very high in terms of household setting, high in terms of recycling, transportation choices, and consumption, and moderate in terms of civic actions and policy support.

Furthermore, the significance of the combined influence of nature relatedness and awareness of environmental consequences on pro-environmental behavior was confirmed, thereby proving the Connectedness to Nature Model^[11] and the Value-Belief-Norm Theory^[18] used in the study to establish the grounds for analysis. However, it should be noted that when treated separately, only nature relatedness had a significant influence on pro-environmental behavior, supporting the theory that there was no found significance in the influence of awareness of environmental consequences on said dependent variable, contradicting the theory that holds that awareness of environmental consequences drives pro-environmental behavior.

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