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RESEARCH ARTICLE

Conservation Behavior Among Students in a University in Metro Manila: The Moderating Role of Attitudes on the Impact of Environmental Knowledge

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Abstract: Specialists and practitioners in many fields acknowledge the importance of the consumption of natural resources as a development factor. However, studies have also shown that many other development forms have caused severe depletion of natural resources and degradation of the environment. This study posits the need for responsible, conservative, and sustainable actions related to conservation behavior. Specifically, this study aims to describe environmental knowledge and attitude toward conservation behavior as predictors of conservation behavior among university students. This study used a cross-sectional descriptive correlational research design utilizing an online survey among 303 university students. Various statistical analyses were done, which include ANOVA, regression, and moderation analysis. Results indicate a significant positive association between environmental knowledge and conservation behavior. The results also suggest that attitudes toward conservation behavior positively moderate or enhance the relationship between environmental knowledge and conservation behavior. Implications and discussions about the enhancing role of attitudes in conservation behavior are discussed in the paper.

Keywords: conservation behavior, university students, moderation effect, pro-environmental behavior

Professionals and practitioners in various disciplines assert the need to utilize natural resources as a determinant of development (Perman et al., 1999). However, research has shown that industrialization, urbanization, and modernization have caused severe depletion of natural resources and degradation of the environment (Satterthwaite et al., 2010). This reality is among many other forms of development, hence the need for responsible, conservative, and sustainable actions, which are also the Sustainable Development Goals (SDG) aims. Globally, a lack of human interest and pro-environmental behaviors threaten ecosystems. Various efforts are made to change behaviors to reduce harmful impacts on the environment. The Philippines, being part of the Global South, is seen to be part of the most problematic countries in the world on having low scores on the Environmental Performance Index,

indicating poor pro-environmental behaviors practices of Filipinos (Hsu et al., 2015).

Pro-environmental (PEB) refers to the actions of individuals and communities that aim to benefit and ease the harm to the natural environment (Bradley et al., 2020). Understanding pro-environmental behaviors are vital in protecting and reducing harmful effects on the environment (Joseph, 2020; Palupi & Sawitri, 2018). PEB takes on several domains, such as environmental activism and conservation behavior (Dalton, 2015; Dursun et al., 2018). Water and energy conservation behavior and other pro-environmental behaviors include recycling, green conduct, eco-initiative, and green behavior (Dursun et al., 2018).

What leads to conservation behaviors? According to a commentary by Blumstein (2015), behaviors related to conservation lack explanation. Hence, there is a need to further look into conservation behavior at different levels, such as the group and the community and its effects on the environmental and social aspects. We argue that environmental knowledge can lead to conservation behaviors. Past research shows that action-related knowledge has a higher impact on conservation behavior (Frick et al., 2004). However, knowledge alone is not sufficient to make people display conservation behaviors. Some studies show that environmental knowledge will only lead to environmental behavior if there is environmental emotional arousal (Carmi et al., 2015). We propose that positive attitudes about conservation can further enhance the relationship between environmental knowledge and conservation behaviors. Though this research will focus on the importance of environmental attitudes, this is in line with the theory of planned behavior (TPB), which posits that it is vital to focus on attitude towards behavior, subjective norms, and perceived behavioral control to understand people's behaviors (Ajzen, 1991). This model is widely utilized in analyzing behaviors concerning pro-environmental behaviors and their factors in the TPB (Heath & Gifford, 2002; Mancha & Yoder, 2015; Niaura, 2013; Rivis & Sheeran, 2003; Yuriev et al., 2020).

This research aims to describe conservation behaviors and to understand the factors and extent of engagement in conservation practices among university students. Specifically, it aims to describe the important roles of knowledge and attitude in understanding conservation behavior among students. Knowledge significantly predicts behavior (Ajzen et al., 2011). The meta-analysis of Carlisle et al. (2021) showed that change in behavior might not necessarily be due to information gathered. We propose that attitude towards conservation is an important moderator in understanding the relationship between knowledge about conservation and conservation behaviors because attitudes enhance the effect of environmental knowledge on pro-environmental behaviors (Liu et al., 2020).

Review of Related Literature

Conservation Behavior

Conservation behavior (CB) refers to "the public's willingness to recycle or live a lifestyle that has a smaller environmental impact" (Dalton, 2015, p. 533). CB also explores many domains and measures but primarily focuses on three key issues: energy, water, and forest conservation (Suwannobol et al., 2012). Along with the CB, domains are practices that include soil conservation, sustainable energy consumption, agricultural conservation, and good irrigation practices in work, school, and home.

Factors Related to Conservation Behavior

Background Factors and Conservation Behavior

In the TPB, background factors on both individual-level and social levels are considered to have a more comprehensive understanding of certain behavior (Ajzen & Schmidt, 2020; Willis et al., 2020). Research shows that socio-demographic factors have different effects on conservation behavior and pro-environmental behavior. Regardless of age, people are aware and actively engage in conservation behavior across time (Dalton, 2015). In terms of gender, females are more inclined to engage in pro-environmental behaviors (Gong et al., 2020). Lastly, in relation to educational attainment, Mullendore et al. (2015) found that completing a bachelor's degree significantly affects engaging in conservation behaviors. However, other studies show that age, gender, and educational attainment do not significantly impact energy conservation behavior (Shen et al., 2019; Trotta, 2018; Wang et al., 2019).

Environmental Knowledge and Conservation Behavior

As a domain of pro-environmental behavior, conservation behavior has numerous influences or associated factors. These behaviors heavily influence knowledge and awareness about environmental issues (Joseph, 2020). This states that literacy in studying environmental issues leads to pro-environmental behaviors, precisely conservation behavior. This study further concludes that these behaviors are products of positive attitudes and high intentions of taking care of the environment (Joseph, 2020). To address the lack of conservation behaviors among students, teachers equip them with environmental knowledge and train them with pro-environmental behaviors (Krasny et al., 2015). However, although knowledge is an important factor in pro-environment behavior, is knowledge enough? Environmental knowledge, used in this study as a factor, has a parallel concept with environmental education and literacy, which refers to having information materials regarding environmental consequences (Grilli & Curtis, 2020). According to Ardoin et al. (2020), environmental knowledge contributes to environmental action, whether conservation or other pro-environmental behavior. As for Dursun et al. (2018), environmental education or knowledge can promote sustainable energy consumption practices. However, Singh et al.'s (2020) findings showed that adolescents' environmental education does not significantly impact parents' pro-environmental behavior.

Being knowledgeable influences and rationalizes the need to adapt conservation behavior. Knowing the consequences of engaging and not engaging in conservation behavior also affects their intention to engage in such behavior. In a study by Zheng et al. (2017), the manifestation of pro-environmental behavior through the perception of environmental problems can be attributed to environmental knowledge. The same study further claimed that environmental ability is correlated to environmental behavior. Thus, this study hypothesizes that the higher level of environmental knowledge, the stronger the engagement in conservation behavior is.

Hypothesis 1*: There is a direct and positive relationship between environmental knowledge and engagement in conservation behavior.*

Lastly, this study also looks into attitudes toward conservation behavior. Attitude towards conservation behavior refers to "the combination of the beliefs toward the special conditions of the environment, the entire environment, and the people or objects directly relevant to the environment" (Zheng et al., 2017, p. 54). A change in the attitudes of individuals is vital to address environmental concerns and achieve sustainable development (Waltner et al., 2019).

This study looks into the moderating effect of attitudes on the relationship between environmental knowledge and engagement in conservation behaviors. According to Kaiser et al. (1999), attitudes tend to enhance the effect of factors on behaviors. In the local setting, there is a dearth of studies on the attitudes of students. The study of Bernardo (2010) among students in the north showed positive attitudes of students toward the environment—showing concern for air and water pollutions. Meanwhile, Reyes (2014) emphasized the importance of environmental problems and fatalism as predictors of the negative attitudes of Filipinos. We posit that universities can be good avenues to educate students about the environment because educational attainment is a significant predictor for people to engage in environmental activism (Mullendore et al., 2015).

Similar to the claims of the TPB and theory of reasoned action (TRA), it is assumed that the attitudes towards conservation behavior of the individuals influence the intention to engage in conservation behavior. This is consistent with the claim that environmental attitude is an important moderating variable in the relationship between knowledge and pro-environmental behaviors (Liu et al., 2020). This study argues that the more favorable the individuals' attitudes concerning conservation behavior, the stronger the prediction of engagement with such behavior is.

Hypothesis 2: *Positive attitude toward conservation moderates the relationship between environmental knowledge and environmental concern towards conservation behavior.*

Conceptual Framework

This conceptual framework presents the association of university students' level of conservation behavior

in Metro Manila with their level of environmental knowledge with attitudes toward conservation behavior as a moderating factor (see Figure 1).

Many studies identified the gap in environmental views, attitude, and actual behavior (Paswan et al., 2017; Lavelle et al., 2015; Joshi & Rahman, 2015). Currently, there is a dearth of local research focusing on factors associated with conservation behaviors. Consistent with the importance of attitudes in the TPB, this study aims to extend the theory by describing the moderating role of attitudes towards conservation amongst Filipino university students in Metro Manila. This research looks into the conservation behavior through energy and water conservation practices of the respondents. Literature suggests that environmental knowledge is associated with the level of engagement in conservation behavior. In addition, knowledge has a significant positive effect on environmental behaviors (Liu et al., 2020). Furthermore, the attitudes toward conservation behavior are hypothesized to be a moderating variable in this study. It is assumed that the more favorable the attitude toward conservation behavior is, the more likely the person will engage in conservation behavior.

Environmental attitudes are conceptually defined as "the collection of beliefs, affect, and behavioral intentions a person holds regarding environmentally related activities or issues" (Milfont, 2012, p. 270). This study will be based on environmental attitudes in the context of conservation behavior. Liu et al. (2020) stated that environmental attitude and behavioral intentions are considered crucial variables. It moderates environmental knowledge and pro-environmental behaviors because attitudes concern the individual relatedness, either positive or negative, to environmental issues that significantly affect their intention to engage in pro-environmental behaviors. Attitude is also considered as an evaluation expressed to an entity with a degree of favor or disfavor that varies within individuals (Liu et al., 2020).

Method

Research Design

This study used a cross-sectional descriptive correlational research design. Researchers used an online survey to address the research objectives. This study intended to identify the effect of the moderating and associative factors of conservation behavior among university students in Metro Manila.

Participants and Sampling Design

Participants of the study were recruited from a private university in Metro Manila. This research made use of a purposive snowball sampling technique. The criteria state that students must belong to the target university and must be 18 years or older. A total of 315 respondents answered the online survey, which is above the required sample size of G*power of 292 with medium effect size and acceptable power.

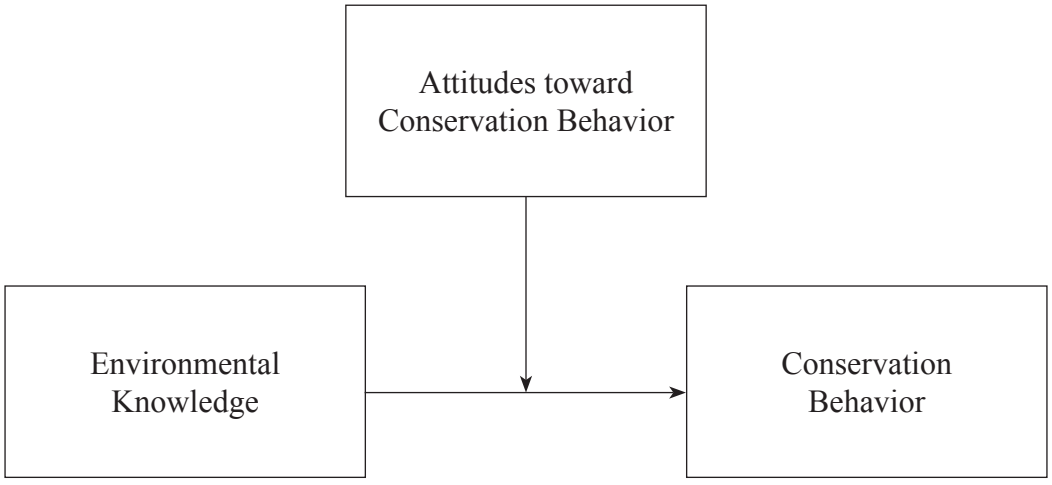

Figure 1. Conceptual Framework of the Study

Table 1 presents the profile of the respondents for this study. In terms of sex, a great majority are female (63%), and only some are male (37%). Moreover, most of the respondents are aged between 18 and 20 years old (69.6%), followed by 21-23 years old (25.4%), 27 years old and older (2.6%), and 24–26 years old (2.3%). As also seen in Table 2, majority of the respondents' family income are Php 60,001 and above (64.7%), and only a few are within Php 40,001–Php 60,000 (18.8%), Php 20,000–Php 40,000 (11.9%), and Php 20,000 and below (4.6%). As for student type, almost all of the respondents are undergraduate (92.4%), and very few are graduate students (7.6%). Lastly, in terms of year level, many of the respondents are in their second year (35%) and first year (32%).

Table 1

Profile of the Respondents

Variable	*Frequencies*	*%*
Sex		
Female	191	63%
Male	112	37%
Age		
18-20 y.o.	211	69.6%
21-23 y.o.	77	25.4%
24-26 y.o.	7	2.3%
27 y.o. and older	8	2.6%
Family income		
Below Php20,000	14	4.6%
Php 20,001-40,000	36	11.9%
Php 40,001-60,000	57	18.8%
Higher than Php 60,000	196	64.7%
Student type		
Undergraduate Student	280	92.4%
Graduate Student	23	7.6%
Year level		
1st Year	97	32%
2nd Year	106	35%
3rd Year	49	16.2%
4th Year	27	8.9%
5th Year or higher	24	7.9%

N=303

Instrumentation

This study made use of a 5-paged online self-administered questionnaire. The survey form is divided into five sections. The first section gathers information on the personal profile such as the sex, age, family income, educational information such as college, year level, type of student, and situationer about the educational background such as environmental values, courses, and activities.

The second section is an 8-item environmental knowledge scale that ascertains the respondents' level of environmental knowledge. The measure is adapted from Kaiser et al. (1999) and Kirmani and Khan (2016). The respondents were asked to respond to a five-point Likert agreement scale on each item (1-strongly disagree, 2- disagree, 3-neutral, 4-agree, and 5-strongly agree). Sample statements include "Global warming is the long-time increase in the overall temperature of the planet" and "The world climate will probably massively change if CO2 continues to be emitted into the atmosphere in as huge amounts as it is now" (See Appendix B: Cover letter and Questionnaire). For the present study, the scale has a Cronbach's $\alpha = .89$.

The third section is a 6-item attitude towards conservation behavior scale. The measure is adapted from Lavelle et al. (2015) and Tafli & Ates (2016). The respondents were asked to respond to a five-point Likert agreement scale on each item (1-strongly disagree, 2- disagree, 3-neutral, 4-agree, and 5-strongly agree). Sample statements include "I would be willing to pay higher prices for goods and services if it helped conserve natural resources" and "I would be willing to sacrifice some personal comforts, to save energy" (See Appendix B: Cover letter and Questionnaire). For the present study, the scale has a Cronbach's $\alpha = .78$.

The fourth section is a 6-item conservation behavior scale that determined the level of engagement to conservation behavior of the respondents. The measure was adapted from Paswan et al. (2017), Zhao et al. (2019), and Fan et al. (2014). The respondents were asked to respond to a five-point Likert agreement scale on each item (1-strongly disagree, 2- disagree, 3-neutral, 4-agree, and 5-strongly agree). Sample statements include "I have purchased products because they cause less pollution" and "I have purchased high-efficiency light bulbs that were more expensive but saved energy." (See Appendix B: Cover letter and Questionnaire). For the present study, the scale has a Cronbach's $\alpha = .81$.

Data Gathering Procedure

The data collection commenced in the whole month of January 2021. We contacted university students

within Metro Manila. The collection of data started as soon as the identified university students had met the criteria. These criteria state that students must belong to the target university and must be 18 years or older.

The data collection followed the highest ethical standards in collecting data. The study abided with the International Sociological Association (ISA) standard in data collection, which recommended the need to disclose methods and the general sources of the data, to respect the security, anonymity, and privacy of research subjects and informants, and that the consent of research subjects shall be obtained in advance.

Data Analysis

Before the main analysis of data, various assumptions were checked. Moreover, the database was further cleaned by removing outliers based on the z-scores basis (Gravetter & Wallnau, 1992). From the initial 315 collected responses, only 303 were used for this study after data cleaning. The interpretation of data for this study uses a quantitative approach through Jamovi software. Descriptive statistics such as frequency percentages and mean scores were used to analyze the personal characteristics of the respondents. The mean scores and standard deviation were computed for the level of environmental knowledge, attitude towards conservation behavior, and conservation behavior. Table 2 presents the scoring matrix that was used for analyzing the data gathered from the respondents who answered the survey questionnaire.

The scales are 5-point Likert scales and were divided as follows: 1.00–2.33 for low, 2.34–3.66 for moderate, and 3.67–5.00 for a high level of environmental knowledge, attitude towards conservation behavior, and conservation behavior.

Moreover, inferential statistics, specifically regression and moderation analysis, were determined for the relationship of variables. Through performing diagnostics, the assumption of a large sample size and removal of outliers through z-test were met. However, the assumption of normality based on the Shapiro-Wilks test was not met because the variables, namely environmental knowledge ($W=0.763$, $p<0.001$), attitudes towards conservation behavior ($W=0.945$, $p<0.001$), and conservation behavior ($W=0.965$, $p<0.001$) do not have a normal distribution. Regression and moderation analyses were still performed due to the high sampling power.

Results

Descriptive Statistics

Table 3 shows the t-test and ANOVA results of the socio-demographic characteristics on environmental knowledge, attitude towards conservation behavior, and conservation behavior. In terms of sex, results show that it has a significant effect on environmental knowledge. Female university students (M = 4.60, SD = 0.48) reported to have higher environmental knowledge than male university students (M = 4.45, SD = 0.65), $t(299) = 2.280$, $p = .023$, $d = .271$. In addition, sex also has a significant effect on attitude towards conservation behavior. Female university students (M = 4.20, SD = 0.56) reported having higher attitudes toward conservation behavior than male university students ($M = 3.98$, $SD = .60$), $t(299) = 3.217$, p = .001, d = .382. However, sex does not have a significant effect on conservation behavior,

Table 2

Scoring of Variables

Variable and Measure	Score	Interpretation
Level of Environmental knowledge	1.00 – 2.33	Low
	2.34 – 3.66	Moderate
	3.67 – 5.00	High
Level of Attitude towards conservation behavior	1.00 – 2.33	Low
	2.34 – 3.66	Moderate
	3.67 – 5.00	High
Level of Conservation behavior	1.00 – 2.33	Low
	2.34 – 3.66	Moderate
	3.67 – 5.00	High

$t(299) = 0.491$, p=.491. This may mean that regardless of sex, engagement in conservation behavior is the same.

Moreover, an analysis of variance showed that the effect of age was significant on environmental knowledge, $F(3,18.9) = 3.52$, $p = .03$, $\eta^2 = .011$. Post hoc analyses using the Tukey post hoc criterion for significance indicated that university students aged 24–26 years old ($M = 4.68$, $SD = 0.31$) and 27 years old and older ($M = 4.81$, $SD = 0.23$) than university students aged 18–20 years old ($M = 4.51$, $SD = 0.61$) and 21–23 years old ($M = 4.59$, $SD = 0.40$). This means that older university students are more knowledgeable about environment-related matters than younger university students. However, age does not have a significant effect on attitude towards conservation behavior [$M = 4.54$, $SD = 0.56$, $F(3,16.5) = 0.006$, $p = .999$] and conservation behavior [$M = 3.84$, $SD = 0.75$, $F(3,16.5) = 1.466$, $p = .260$]. This may posit that older university students are more knowledgeable of environment-related matters. On the other hand, regardless of age, the attitude toward conservation behavior and the level of engagement in conservation behavior stay the same.

Furthermore, another analysis of variance showed that the effect of family income was significant with conservation behavior, $F(3,50.5) = 2.852$, $p = 0.046$, $\eta^2 = 0.012$. Post hoc analyses using the Tukey post hoc criterion for significance indicated that university students with a family income of Php 20,000 and below ($M = 4.24$, $SD = 0.537$) and Php 20,001–Php 40,000 ($M = 4.47$, $SD = 0.716$) have higher levels of conservation behavior as compared to university students with a family income of Php 40,001–Php 60,000 ($M = 4.50$, $SD = 0.665$) and Php 60,001 and higher ($M = 4.55$, $SD = 0.503$). However, income does not have a significant effect on environmental knowledge [$M = 4.54$, $SD = 0.56$, $F(3,48.8) = 1.904$, $p = 0.141$] and attitude towards conservation behavior [$M = 4.12$, $SD = 0.59$, $F(3,47.8) = 2.852$, $p = .949$]. This may posit that university students with lower family incomes engage in conservation more. In addition, regardless of family income, the levels of environmental knowledge and attitude towards conservation behavior stay the same.

On the other hand, student type does not have a significant effect on environmental knowledge [$t(299) = -1.463$, $p = .145$], attitude towards conservation behavior [$t(299) = -1.325$, $p = .186$], and conservation behavior [$t(299) = .548$, $p = .584$]. Similarly, year level also does not have a significant effect on environmental knowledge [$M = 4.54$, $SD = 0.56$, $F(4,96.6) = 2.176$, $p = 0.077$], attitude towards conservation behavior [$M = 4.12$, $SD = 0.59$, $F(4,84.8) = 0.802$, $p = 0.527$], and conservation behavior [$M = 3.84$, $SD = 0.75$, $F(4,86.5) = 0.276$, $p = 0.893$]. This may mean that regardless of the type of student and year level, the levels of environmental knowledge, attitude towards conservation behavior, and conservation behavior stays the same.

Table 4 presents the descriptive statistics of the level of environmental knowledge, attitude towards conservation behavior, and conservation behavior among students in a university in Metro Manila. It shows that university students have high levels of environmental knowledge (M=4.54), attitude towards conservation behavior (M=4.12), and conservation behavior (M=3.84). In addition, responses on conservation behavior (SD=0.75) are more dispersed as compared to responses on environmental knowledge (SD=0.56) and attitude towards conservation behavior (SD=0.59).

Furthermore, environmental knowledge and attitude towards conservation behavior were moderately positively correlated. In addition, environmental knowledge and conservation behavior had a weak and positive correlation. Lastly, attitude towards conservation behavior and conservation were moderately positively correlated.

Linear Regression Results and Moderation Analysis

The moderating effect of attitude towards conservation behavior on the relationship between environmental knowledge and conservation behavior was tested using a conditional process analysis using Model 1 of PROCESS (Hayes, 2013). Table 5 shows that the overall model fit is significant. This means that attitude towards conservation behavior has indeed a moderating effect on environmental knowledge and conservation behavior, $F(3,299)=21.96$, $p<.000$, $r^2=.18$. In addition, the model suggests that the moderating effect of attitude towards conservation behavior can be applicable on both levels of environmental knowledge and conservation behavior.

Table 3

T-test and ANOVA Test Results

Variable		Environmental knowledge	Attitude towards conservation behavior	Conservation behavior
Sex	*t*-Statistic Score	2.280*	3.217**	0.491
	Mean of Female	4.60	4.20	3.85
	Mean of Male	4.45	3.98	3.81
Age	*F*-Statistic Score	3.526*	0.006	1.466
	Mean of 18-20 y.o.	4.51	4.12	3.85
	Mean of 21-23 y.o.	4.59	4.12	3.79
	Mean of 24-26 y.o.	4.68	4.12	3.52
	Mean of 27 y.o. and older	4.81	4.14	4.29
Family income	*F*-Statistic Score	1.904	0.119	2.852*
	Mean of Below Php20,000	4.78	4.18	4.24
	Mean of Php 20,001-40,000	4.47	4.10	3.76
	Mean of Php 40,001-60,000	4.50	4.09	3.90
	Mean of Higher than Php 60,000	4.55	4.13	3.80
Student type	*t*-Statistic Score	-1.463	-1.325	0.548
	Mean of Undergraduate Student	4.53	4.11	3.84
	Mean of Graduate Student	4.71	4.28	3.75
Year level	*F*-Statistic Score	2.176	0.802	0.276
	Mean of 1st Year	4.50	4.18	3.88
	Mean of 2nd Year	4.52	4.13	3.85
	Mean of 3rd Year	4.66	4.02	3.74
	Mean of 4th Year	4.47	3.99	3.78
	Mean of 5th Year or higher	4.69	4.17	3.85

N=303; *p<.05, **p<.001

Table 4

Descriptive and Correlational Results

	M	***SD***	**1**	**2**	**3**
Environmental knowledge	4.54	0.56	--	--	--
Attitude towards conservation behavior	4.12	0.59	0.322*	--	--
Conservation behavior	3.84	0.75	0.193*	0.372*	--

*p-value is significant at .001

Furthermore, Table 6 shows the different effects on conservation behavior within the model. It shows that both environmental knowledge (β=0.212, p=.006) and attitude towards conservation behavior (β=0.483, p<.001) have a significant relationship with conservation behavior. In addition, the interaction between the two variables is also significant (β= 0.308, p<.001). This means that all hypothesized interactions are significant.

The conditional effect of attitude towards conservation behavior was analyzed at different values to analyze the interaction further. As seen in Table 7, the conditional effects at three levels— Average (at the mean), Low (one standard deviation below the mean), and High (one standard deviation above the mean)— were measured. Results show that the interactions are significant when the moderator is at the mean (β=0.212, p=.007) and at one standard deviation above the mean (β=0.395, p=.003) but not at one standard deviation below the mean (β=0.030, p=.694). This means that the moderating effect of attitude toward conservation behavior is only applicable when the level is at average and high (See Table 6 and Figure 2).

Table 5

Overall Model Fit

	r	r^2	*MSE*	*F*	*df1*	*df2*	*p*
Model	.425	.180	.465	21.966	3.000	299.000	.000

Table 6

Moderation Estimates

			95% Confidence interval			
	Estimate	**SE**	**Lower**	**Upper**	**z**	**p**
Environmental knowledge	0.212	0.076	0.062	0.362	2.77	0.006
Attitude towards conservation behavior	0.483	0.065	0.354	0.613	7.33	<.001
Interaction	0.308	0.083	0.144	0.471	3.70	<.001

Table 7

Conditional Effect

	β	p	LLCI	ULCI
Average	0.212	0.007	0.057	0.368
Low (-1SD)	0.030	0.694	-0.121	0.182
High (+1SD)	0.395	0.003	0.182	0.607

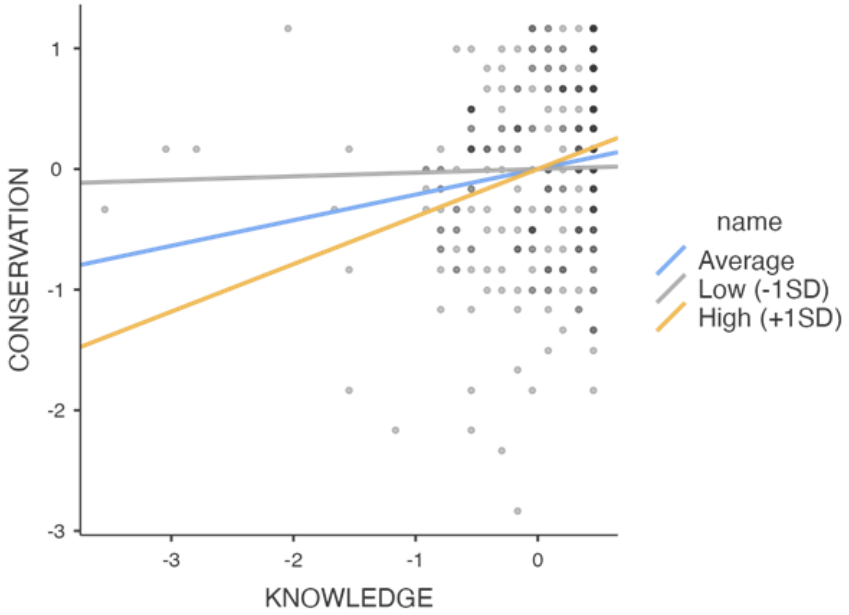

Figure 2. Conservation Behavior, Environmental Knowledge, and Attitudes Plots

Discussion

Background Factors, Environmental Knowledge, and Conservation Behavior

Results reveal that conservation behavior has been linked to certain sociodemographic characteristics. This study found that female university students, aged 27 years old and above, with a family income of Php 20,000 and below, undergraduate students, and are in their fifth year or higher have the highest level of engagement in conservation behavior. This may be because most university students who are 27 years old and above provide support for their families and themselves, making them limit the use of basic necessities and other spending (Weissman, 2014). Females are more inclined to engage in pro-environmental behaviors (Corral-Verdugo et al., 2006; Gong et al., 2020), and this maybe due to women's greater affinity and support for the environment (the University of Colorado at Boulder, 2019; Tindall et al., 2003). Educational attainment was also found to be a strong driver of environmental engagement. College students usually have positive attitudes towards the environment (Bernardo, 2010).

Moreover, this study found that environmental knowledge has a significant effect on conservation behavior. This result is in line with the hypothesis of this research and the study of Liu et al. (2020), who mentioned that environmental knowledge has a significant positive effect on environmental behaviors. These results attest to the relative importance of environmental knowledge in their contributions to environmental action, whether about conservation or other pro-environmental behaviors (Ardoin et al., 2020). This finding attests to the important need for schools to include environmental knowledge in their curriculum. This environmental knowledge they learn in universities can also be used to promote sustainable consumption practices (Dursun et al., 2018). However, this type of environmental knowledge should be action related so that it can have a direct impact on the corresponding behavior (Frick et al., 2004). From a TPB perspective, this knowledge should also correspond to their existing beliefs (e.g., behavioral, normative, or control) they hold, which determine the intentions and actions of individuals (Ajzen et al., 2011). Furthermore, they assert that instead of simply imparting knowledge, it is important to check the existing knowledge that people possess and how this affects intentions and actions. Hence, we recommend that as educators develop curricula and modules, there should be attempts to know the existing knowledge

as well as the normative expectations of individuals and groups.

Moderating Effect of Attitude Towards Conservation Behavior

Results of the study supported our hypothesis that attitude towards conservation behavior has a moderation effect on the relationship between environmental knowledge and conservation behavior. Environmental attitude is considered a crucial variable as it moderates environmental knowledge and pro-environmental behaviors (Liu et al., 2020). Environmental knowledge alone is not sufficient for students to display CB. There should be a change in environmental attitude for them to display this CB. In fact, correlation results of the present study show that attitude towards conservation behavior is significantly correlated with conservation behavior. A change of attitudes among people is needed to address environmental issues and achieve sustainable development (Waltner et al., 2019). TPB highlights the importance of the type of knowledge people possess because they can influence the behavioral intentions to engage in a certain behavior (Ajzen, 1991).

Moreover, this study found that average and high levels of attitudes towards conservation significantly moderate conservation behavior engagement. The level of engagement with conservation behaviors and pro-environmental behaviors, in general, is influenced by attitudes. Attitudes tend to enhance or increase conservation behavior. As emphasized by Waltner et al. (2019), a change in the attitudes of individuals is vital to address environmental concerns. In a university setting, students are taught environmental knowledge with the influence on their attitudes through environmental education influences pro-environmental behaviors (Krasny et al. 2015). Based on the discussion of results, it is vital to positively enhance the attitudes of university students in relation to the environment. Although education about environmental knowledge is important, the existing beliefs of students are of important concern because these attitudes can also affect their engagement in conservation behavior. Attitudes are determinants of behavioral intention (Ajzen, 1991). In an era dominated by digital technology, more efforts and activities should be made through cyberspace like through Twitter, Facebook, Instagram, TikTok, and other forms of online environmental activism to enhance the attitudes of people in general (Thaler et al., 2012; Reyes, 2014). In the classroom setting, cooperative learning styles are recommended to enhance the attitudes of students towards conservation behavior (Akinbobola, 2009).

Conclusion

Overall, this study on predictors and moderators of students' conservation behavior in a private university in Metro Manila showed a significant relationship among the variables. The results reveal a significant relationship between environmental knowledge, attitude towards conservation behavior, and conservation behavior. This is also the case with the moderation effect of attitude towards conservation behavior on the relationship between environmental knowledge and conservation behavior. Thus, for the private university in focus, a high level of environmental knowledge suggests a high engagement level in conservation behavior. The average and high levels of attitude towards conservation behavior suggest a moderating effect on environmental knowledge and conservation behavior. In line with the TPB, the crucial role of attitudes as an enhancer is highlighted in this study. This suggests that more efforts should be given to shaping or enhancing the attitudes of individuals.

Recommendations

In line with the results of the study, interpreted data, as well as conclusion and implications, we suggest the following recommendations for university students, university administrations, environmentalists, other key stakeholders, and future studies.

Knowledge is a two-way street. Educational institutions should focus more on environmental topics that are action-oriented and promote sustainable practices. At the same time, students must also make an effort to be knowledgeable of environmental matters both inside and outside of their campuses. Because of this, there should be more efforts too in obtaining pre-existing knowledge and attitudes of university students about the environment. Because this study has established the moderating effect of attitudes on conservation behavior, it can be implied that positive attitudes are also important in reinforcing pro-environmental behaviors. Because knowledge is

a two-way street, there is a need to know the existing beliefs of individuals so that environmental programs will not solely focus on imparting knowledge but rather as venues where educators can challenge, strengthen, or modify the existing beliefs of individuals (Ajzen et al., 2011). Universities need not only to teach about conservation behavior but also perform practices and impose regulations that will help students have a positive look at conservation behavior. On account of research gaps and methodological limitations, it is recommended for future studies to explore other possible variables which might contribute to conservation behavior. Notably, in line with the TPB, researchers did not include subjective norms, perceived behavioral control, and behavioral intention to have a more comprehensive understanding. One limitation of the current study is that most participants are aged 18–20 years old; hence, age groups should also be considered in future studies. On a macro level, cultural influences and nuances of conservation behavior are also vital to having a deeper understanding of the conservation behaviors of Filipinos.

Declaration of Ownership

This report is our original work.

Conflict of Interest

None.

Ethical Clearance

This study was approved by our institution.

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