



Sustainability Awareness and Single-Use Plastic Reduction Practices: The Mediating Role of Environmental Attitude Among College Students

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ABSTRACT

Rising single-use plastic consumption is a global concern. This study examined the mediating role of environmental attitude on the relationship between sustainability awareness and single-use plastic reduction behavior among college students. Through predictive design, data surveyed from 638 college students, selected through simple random sampling, were analyzed using mediation analysis. The study revealed that the interest variable partially but significantly mediates the predictor-criterion correlation, supporting the Knowledge–Attitude–Practice (KAP) Theory. Future research may explore other potential mediating or moderating variables through qualitative approaches, while educational leaders and policy makers may strengthen experiential sustainability programs that foster positive environmental attitudes and promote consistent single-use plastic reduction practices.

Keywords: Sustainability awareness, single-use plastic reduction practices, mediating role of environmental attitude, college students

INTRODUCTION

The Problem and Its Scope

The continued use of single-use plastic is a major environmental issue among students worldwide. Studies show that students often demonstrate limited engagement in plastic reduction practices. For instance, Thai university students demonstrate low participation in reduction behaviors (Oludoye & Supakata, 2024). A study conducted at the University of the Witwatersrand in South Africa showed that students continued to rely heavily on single-use plastics despite being aware of the environmental consequences of plastic pollution (Van Heyde & Butcher, 2024). Research conducted at Lakehead University found that students continued to improperly use and dispose of plastic, even though most respondents were already aware of the environmental consequences of plastic pollution (Auld, 2020). A university-based study in Vietnam on plastic-free campuses found that students consumed high volumes of plastic bottles, cups, and bags, showing a continued heavy reliance on single-use plastics despite rising environmental concerns (Nguyen et al., 2022).

In the Philippines, a gap between environmental awareness and actual behavior has been documented among students. A study in Tarlac, Philippines, found that despite the implementation of provincial plastic bans, consumer reliance on single-use plastic bags persisted due to inconsistent enforcement and limited behavioral change (Crowley, 2024).

Although there are ongoing sustainability initiatives, many Filipino college students' awareness remains insufficient to drive consistent behavioral change. This indicates a gap in translating knowledge into action, particularly in developing strong environmental attitudes necessary for cutting single-use plastic use. (Masongsong, 2021, pp. 1-10) Furthermore, limited research examining the relationships among sustainability awareness, environmental attitudes, and behavior constrains efforts to address this issue, eventually hindering progress toward key Sustainable Development Goals (SDGs 4, 12, 13, 14, 15, and 17). (Garcia et al., 2017, pp. 1-10) If left unaddressed, this gap may weaken the role of higher education institutions in encouraging sustainability literacy and responsible environmental behavior. (Meskani et al., 2026)

Significance of the Study

This study is significant as it contributes to international sustainability efforts by supporting the United Nations Sustainable Development Goals, particularly SDG 4 (Quality Education) and SDG 12 (Responsible Consumption and Production), through examining how sustainability awareness and environmental attitudes influence students' single-use plastic reduction behavior. It is also consistent with the principles of *Laudato Si'* (Pope Francis, 2015), which emphasize ecological care and responsible living. At the national level, the study supports Philippine environmental policies, such as RA 9003, the Ecological Solid Waste Management Act, which promotes proper waste management and environmental accountability. In the scholastic context, the study aids CHED initiatives by strengthening sustainability education and environmental awareness among students. Overall, the study supports institutional and public efforts to develop environmentally responsible, sustainability-oriented communities. (Allasiw et al., 2017).

Statement of the Problem

This study aimed to determine the mediating effect of environmental attitude on the relationship between sustainability awareness and single-use plastic reduction practices. Specifically, the following objectives were pursued:

1. To determine the levels of sustainability awareness in terms of their knowledge of sustainability and attitude concerning sustainability, single-use plastic reduction in terms of knowledge on single-use plastics, attitude, and awareness about plastic waste management, and environmental attitude; and environmental attitude in terms of support for interventionist conservation policies, environmental movement activism, conservation motivated by anthropocentric concern, altering nature, and personal conservation among college students.
2. To determine the significance of the correlation between sustainability awareness, single-use plastic reduction, and environmental attitudes
3. To determine the significance of the direct effect of sustainability awareness and single-use plastic reduction, controlling for environmental attitude.
4. To determine the significance of the indirect effect of sustainability awareness and single-use plastic reduction on environmental attitude.
5. To determine the total effect of environmental attitude on single-use plastic reduction behavior.

Hypotheses:

H01: Sustainability awareness and single-use plastic reduction behavior do not significantly correlate with environmental attitude.

H02: The direct effect of sustainability awareness and single-use plastic reduction through environmental attitude is not significant.

H03: The indirect effect of sustainability awareness and single-use plastic reduction through environmental attitude is not significant.

H04: The total effect of environmental attitude on single-use plastic reduction behavior is not significant.

Theoretical and Conceptual Framework

This study is anchored in the Knowledge–Attitude–Practice (KAP) Theory proposed by Everett M. Rogers (1962), which explains that behavior develops through a sequential process in which knowledge influences attitudes, and attitudes, in turn, shape practices. The theory emphasizes that awareness serves as the cognitive foundation for the formation of favorable dispositions that ultimately lead to observable behavioral outcomes. This perspective is widely applied in environmental and sustainability studies, as it explains how individuals transition from awareness to action (McKenzie Mohr, 2021; Geiger et al., 2021).

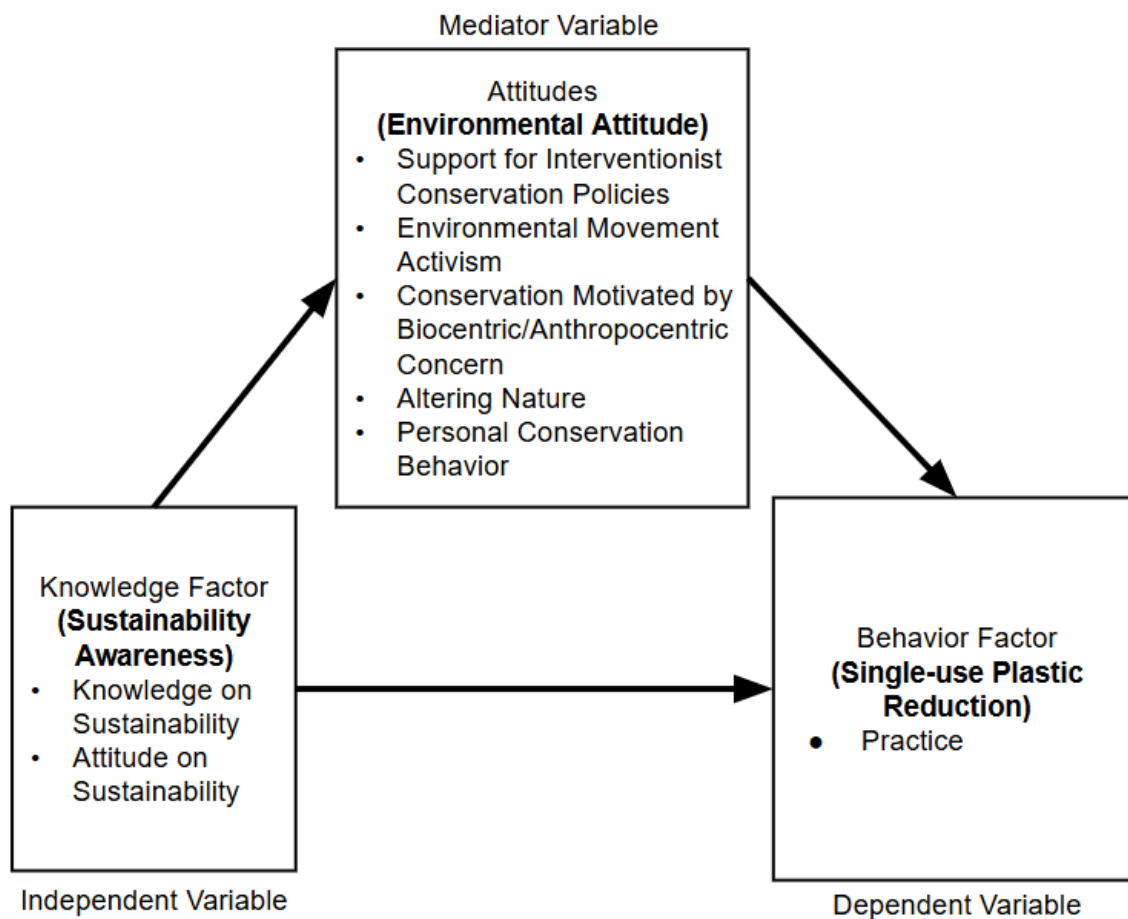


Figure 1. Conceptual Framework of the study

In this study, sustainability awareness is considered as the input component of the theory (knowledge), reflecting students' understanding of environmental issues, environmental accountability, and the impacts of single-use plastic consumption. Environmental attitude serves as the process component (attitudes), encompassing students' beliefs, feelings, and dispositions toward environmental protection and plastic reduction. These attitudes serve as motivational drivers that influence behavioral intention and choices, as supported by Steg et al. (2021), who emphasized that pro-environmental attitudes are key predictors of sustainable behavior. Lastly, single-use plastic reduction practices represent the output component (practices), referring to the actual behaviors demonstrated by students, including minimizing plastic use, reusing materials, and following sustainable consumption habits. According to Geiger et al. (2021), behavioral outcomes result from both cognitive understanding and affective evaluation, strengthening the sequential logic of the KAP framework. Hence, this study is fully anchored on the Knowledge-Attitude-Practice (KAP) theory.

METHODOLOGY

Included in this chapter are the research design, locale of the study, sample and sampling technique, data gathering technique, data analysis technique, and ethical consideration..

Research Design

This study used a predictive research design. It is a quantitative approach used to examine relationships among variables and predict possible outcomes based on existing data patterns. Predictive research design focuses on detecting trends and associations among variables to determine how one variable may forecast or influence another rather than establish direct causality (González-Díaz & Bustamante-Cabrera, 2021). This design is commonly used when the objective is to estimate future outcomes, trends, or behavioral patterns from existing relationships among variables. Rather than emphasizing explanation solely, this design stresses prediction and

the identification of variables that substantially affect anticipated results (Shmueli, 2010).

Locale of the Study

This study was conducted in three higher education institutions affiliated with the Davao Association of Catholic Schools.

Sample and Sampling

A total of 638 bona fide first-year college students from selected institutions under the Davao Association of Catholic Schools (DACS) in Davao City during the Academic Year 2025–2026 participated in the study. To maintain a consistent foundation of sustainability concepts among respondents, the sample was limited to first-year students officially enrolled in the Science, Technology, and Society (STS) course.

The study utilized simple random sampling, a probability sampling technique in which every individual in the population has an equal and independent chance of being selected into the sample. This approach uses random selection methods, such as lotteries or random number generators, to promote fairness and minimize selection bias. As defined by Thomas (2023), simple random sampling refers to “a randomly selected subset of a population” in which “each member of the population has an equal probability of being selected.”

Data Gathering Technique

The researcher utilized a survey technique. It is a systematic approach to collecting data from a selected sample using structured tools created to describe the characteristics, opinions, or behaviors of a larger population, and it is applied in research to efficiently assess, test, or generalize findings within a defined group (Zina, 2024). It is widely used in quantitative research to generate findings that can be generalized from the sample to the broader population (Ginevičius, 2023). In this study, three adapted and modified questionnaires were utilized to measure the key variables. The Sustainability Awareness Questionnaire, adapted from an assessment of sustainability knowledge and attitudes among undergraduate students on Penang Island, was developed by Syed Azhar et al. (2023) and consisted of 17 items measuring students' understanding of sustainability concepts related to environmental and social responsibility. The Environmental Attitudes Inventory (EAI), originally developed by Milfont and Duckitt (2010), included 25 items measuring multidimensional environmental attitudes. The Single-Use Plastic Reduction Questionnaire, adapted from the Center for Southeast Asian Studies (CSEAS) and developed by Appleby et al. (2024), comprised 19 items evaluating behavioral patterns related to the use, reuse, and reduction of single-use polymer items. The three instruments consisted of 61 items in total. The respondents used this 4-point Likert scale to answer the questionnaire: 1 as Strongly Disagree, 2 as Disagree, 3 as Agree, and 4 as Strongly Agree.

The three questionnaires were adapted and refined to correspond to the respondents' context and the study's objectives. Each employed a Likert scale with defined indicators, and reliability testing showed strong internal consistency, with all items achieving a Cronbach's alpha of 0.95. (Salahange et al., 2024)

Data Analysis

Descriptive statistics were computed to summarize and organize the data, providing an overview of the distribution, central tendencies, and patterns of the variables, thereby facilitating an initial understanding of the dataset (Ghanad, 2023). Pearson product-moment correlation analysis was used to determine the significance of the relationship between variables by examining the strength and direction of their linear association, with correlation coefficients computed and interpreted accordingly (Schober et al., 2023). Furthermore, a mediation analysis was performed to test the hypothesized mediated pathways through which the independent variable influenced the dependent variable via the mediator. This procedure estimated direct, indirect, and total effects, using beta coefficients to interpret effect sizes and statistical relationships (Qin et al., 2024).

The matrix presenting the scale, descriptive level, and corresponding interpretation for each study variable is

provided and used specifically to describe sustainability awareness, environmental attitudes, and single-use plastic reduction practices.

Scale	Level	Sustainability Awareness	Environmental Attitude	Single-use plastic reduction behavior
3.26 – 4.00	Very high	Very Good	Very Strong	Very Strong
2.51– 3.25	High	Good	Strong	Strong
2.51– 3.25	Low	Poor	Weak	Weak
1.00 – 1.75	Very Low	Very Poor	Very Weak	Very weak
Standard Deviation Value Ranges and Interpretation				
Range	Description		Interpretation	
SD ≤ 0.50	High Consistent Responses		Strong and uniform perception	
SD = 0.51 – 1.00	Moderate Consistent Responses		Acceptable consistency	
SD = 1.01 – 1.50	Low Consistent Responses		Differing views or experiences	
SD > 1.50	Very Low Consistent Responses		High variability and lack of consensus	

In this study, the significance of the correlation is tested at a 0.05 confidence level. The following is the standard measure for interpreting the r-value on the interpretation scale. The following scheme is used:

Computed r	Descriptive Interpretation
+/- 1.00	Perfect correlation
Between +/- 0.75 – +/- 0.99	High correlation
Between +/- 0.51 – +/- 0.74	Moderately high correlation
Between +/- 0.31 – +/- 0.50	Moderately low correlation
Between +/- 0.01 – +/- 0.30	Low correlation
0.00	No correlation

The standard measure for the interpretation of the strength of the mediation is as follows:

Proportion Mediated	Interpretation
< 0.20	Weak Mediation
0.20 – 0.50	Moderate Mediation
> 0.50	Strong Mediation

Ethical Consideration

Ethical safeguards are essential in this study because respondents will share their views, behaviors, and personal perspectives regarding sustainability awareness, environmental attitudes, and single-use plastic reduction in their school environment. Since such reflections may include honest opinions about campus practices or the learning environment, the study guarantees that participants are protected from any potential discomfort or repercussions. To ensure proper ethical supervision, the institution's Research Ethics Committee (REC) will guide the study's ethical compliance. The researcher will adhere to the following ethical principles: informed consent, secrecy and data protection, avoidance of bias and discrimination, minimization of disruption to learning, and debriefing and

feedback. (Liebel & Chakraborty, 2021)

RESULTS

This chapter includes descriptive, correlational, and mediation tables, along with the corresponding analyses and interpretations of the statistical results. This chapter ends with a summary of findings

Descriptive Results

Table 1 presents the levels of sustainability awareness, environmental attitude, and single-use plastic reduction practices among students.

Table 1. Descriptive Table (N = 638)

Variable	Number of Samples	Standard Deviation	Mean	Descriptive Interpretation
1. Sustainability Awareness	638	0.520	3.39	Very High
1.1. Knowledge on Sustainability	638	0.538	3.43	Very High
1.2. Attitude on Sustainability	638	0.569	3.35	Very High
2. Environmental Attitudes	638	0.514	3.38	Very High
2.1. Support for Interventionist Conservation Policies	638	0.568	3.43	Very High
2.2. Environmental Movement Activist	638	0.584	3.30	Very High
2.3. Conservation Motivated by Anthropocentric Concern	638	0.575	3.42	Very High
2.4. Altering Nature	638	0.581	3.36	Very High
2.5. Personal Conservation Behavior	638	0.566	3.41	Very High
3. Single-Use Plastic Reduction	638	0.571	3.36	Very High

Specifically, the table shows that the sustainability awareness variable had an overall mean of 3.39, indicating very high sustainability awareness. This indicates that respondents possess strong awareness and understanding of sustainability concepts. The standard deviation of 0.520, considered low, indicates relatively consistent responses among respondents. Both indicators, knowledge and attitude, were interpreted as very high. Moreover, the environmental attitude variable had an overall mean of 3.38, indicating a very strong attitude toward environmental protection and conservation, suggesting that respondents favor it. The corresponding standard deviation of 0.514, which is considered low, indicates relatively consistent responses. All its sub-dimensions were also interpreted as strong. Furthermore, the single-use plastic reduction practices variable had a mean of 3.36, indicating very high and interpreted as always practiced. This indicates that respondents consistently engage in sustainable behaviors to reduce single-use plastic consumption. The corresponding



standard deviation of 0.571, considered low, indicates relatively consistent responses among respondents.

Correlation Results

Table 2 shows the relationships between sustainability awareness, environmental attitudes, and single-use plastic reduction, including the strength, direction, and significance of their correlations.

Table 2: Correlation Table (N = 638)

Variables	Single-use plastic reduction practices			
	r-value	p-value	Decision on H_0	Interpretation
Sustainability Awareness	0.697	0.000	Reject H_{01}	Moderately High Positive, Significant Correlation
Environmental Attitudes	0.768	0.000	Reject H_{01}	High Positive, Significant Correlation

Level of Significance: 0.05, Decision Rule: Reject H_0 if $p < 0.05$

Specifically, this table shows that sustainability awareness is moderately to highly correlated with single-use plastic reduction (p -value = 0.000), which is lower than the 0.05 level of significance; hence, the null hypothesis is rejected. The r -value of 0.697 shows a moderately high positive correlation. This implies that for every unit change in sustainability awareness, there is a corresponding unit change in the single-use plastic reduction practices. Similarly, the correlation between environmental attitude and single-use plastic reduction practice variables yielded a p -value of 0.000, which is lower than the 0.05 level of significance; hence, the null hypothesis is rejected, indicating that the correlation is statistically significant. The r -value of 0.768 indicates a strong positive correlation between environmental attitudes and single-use plastic reduction practices. This implies that in every unit change in environmental attitude, there is a corresponding unit change in the single-use plastic reduction practices.

Mediation Results

Table 3 reports the mediation analysis examining whether environmental attitudes significantly mediate the effect of sustainability awareness on single-use plastic reduction, including direct, indirect, and total effects.

Table 3. Mediation Table (n = 638)

Legend	Path/Effect	Estimate (B)	SE	z-value	p-value	Decision on H_0	Interpretation
A	Sustainability Awareness → Environmental Attitudes	1.680	0.037	45.408	0.000	Reject	Significant
B	Environmental Attitudes → Single-Use Plastic Reduction	0.671	0.052	12.903	0.000	Reject	Significant
C	Sustainability Awareness →	0.213	0.100	2.129	0.000	Reject	Significant

	Single-Use Plastic Reduction						
c'	Direct	0.213	0.100	2.129	0.033	Reject	Significant
a x b	Indirect	1.128	0.091	12.412	0.000	Reject	Significant
c	Total	1.340	0.055	24.557	0.000	Reject	Significant

Note. Bootstrap Replications: 5000; R² Single-Use Plastic Reduction = 0.592; R² Environmental Attitudes = 0.764

Level of Significance: 0.05

Decision Rule: Reject H₀ if $p < 0.05$

Proportion Mediated: indirect effect/ total effect = 0.840

The mediation analysis demonstrates that environmental attitudes significantly mediate the relationship between sustainability awareness and single-use plastic reduction. Path A (awareness → attitudes) is significant ($B = 1.680$, $SE = 0.037$, $z = 45.408$, $p < 0.001$), as is Path B (attitudes → plastic reduction) ($B = 0.671$, $SE = 0.052$, $z = 12.903$, $p < 0.001$), indicating strong direct effects. Path C (awareness → plastic reduction) remains significant ($B = 0.213$, $SE = 0.100$, $z = 2.129$, $p < 0.001$), while the direct effect (c') is also significant ($p = 0.033$), suggesting partial mediation. The indirect effect ($a \times b = 1.128$, $SE = 0.091$, $z = 12.412$, $p < 0.001$) further confirms that environmental attitudes significantly transmit the effect of awareness to behavior. The total effect ($c = 1.340$, $SE = 0.055$, $z = 24.557$, $p < 0.001$) is substantial, with model explanatory power indicated by $R^2 = 0.764$ for environmental attitudes and $R^2 = 0.592$ for single-use plastic reduction. Overall, the findings confirm that environmental attitudes play a crucial and significant mediating role in enhancing sustainable behavioral outcomes.

Summary of Findings

1. Sustainability awareness and single-use plastic reduction behavior significantly correlate with environmental attitude among college students.
2. The direct effect of sustainability awareness and single-use plastic reduction through environmental attitude is significant.
3. The indirect effect of sustainability awareness and single-use plastic reduction through environmental attitude is significant.
4. The total effect of environmental attitude on single-use plastic reduction behavior is significant

CONCLUSION

Based on the findings, environmental attitude partially but significantly mediates the relationship between sustainability awareness and single-use plastic reduction practice. Hence, the Knowledge–Attitude–Practice (KAP) Theory, which posits that knowledge influences attitudes that subsequently shape behavioral responses, was fully supported.

Recommendations

Based on the findings of the study, the following are proposed:

1. Educational leaders may integrate more experiential and action-based sustainability programs to strengthen not only awareness but also behavioral application among students.
2. Policy makers may strengthen and enforce national environmental policies and campus-based initiatives that encourage consistent single-use plastic reduction practices.



3. Students and communities may encourage active participation in environmental initiatives and campaigns to reinforce the translation of awareness and attitudes into consistent, sustainable actions.
4. Future researchers may explore other potential mediating or moderating variables to account for the remaining 24% variance in the strength of the mediation.

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