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THE INFLUENCE OF FAMILY EDUCATION AND ENVIRONMENTAL HABITS ON STUDENTS' ENVIRONMENTAL CONSCIOUSNESS: A SCIENTIFIC QUANTITATIVE STUDY

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ABSTRACT

Environmental awareness is important for shaping sustainable behavior, and the family, as the first educator, plays a role in instilling environmental values and habits. This study aims to analyze the influence of family education and environmental habits on college students' environmental consciousness. The study used a quantitative correlational design with a sample of 58 chemistry education students from Universitas Negeri Makassar, Class of 2025, selected via simple random sampling. Data were collected using a Likert scale questionnaire and analyzed using multiple linear regression. The results showed that the independent variables (parental support for environmental education and issues, discussions about environmental issues, use of environmentally friendly products, and family involvement in environmental activities) did not have a significant influence on college students' environmental awareness. However, the overall contribution of these variables to college students' environmental awareness was low, with a coefficient of determination (R^2) of 12.2%. This study concluded that although parental support and family environmental habits did not have a significant influence on students' environmental consciousness, their overall contribution was low.

Keywords: environmental issues; environmental consciousness; green chemistry; multiple linear regression

INTRODUCTION

Environmental consciousness among students has become an increasingly important issue in environmental education because environmental problems such as climate change, pollution, and ecological degradation directly affect students' daily lives and future responsibilities. Global studies show that students generally demonstrate moderate to high environmental awareness, particularly regarding global environmental issues such as climate change and pollution (Prandner & Hasengruber, 2024; Murzyn et al., 2025; Saleh & Al-Maamari, 2025). However, this awareness does not always translate into consistent pro-environmental behavior, and is often more focused on global rather than local environmental issues (Arshad et al., 2020; Calculli et al., 2021; Verma & Verma, 2022; Melnyk & Podorozhnyi, 2023). This indicates that environmental consciousness should be understood not only as knowledge but also as an integrated psychological construct encompassing awareness, values, and responsibility in daily life.

Young people are widely recognized as key agents of environmental change. They are not only affected by environmental problems but also actively contribute as solution providers through

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advocacy, environmental movements, and community engagement (Han & Ahn, 2020; Beukes, 2021; Rahman et al., 2023). Their participation in environmental activism and social campaigns has contributed to raising awareness and influencing policy discourse at both local and global levels (van den Hazel, 2019; Han & Ahn, 2020; Parsons et al., 2024; Romano et al., 2024). In addition, young people play an important role in disseminating environmental values within their social networks, including family, peers, and communities, through both direct communication and digital platforms (Hennessy, 2025). This positions them as key actors in the diffusion of sustainable behavior.

Environmental education in schools has been widely recognized as an effective approach to developing students' environmental attitudes, knowledge, and behavior. Numerous studies confirm that integrating environmental education into curricula enhances environmental awareness and promotes pro-environmental behavior (Altassan, 2023; Houmam & Aomar, 2023; Alas & Korutürk, 2024; Almencion et al., 2024; Chen et al., 2025; Irimia et al., 2025). However, most studies focus on general school populations and Western or non-Indonesian contexts, with limited attention to higher education students in Indonesia, particularly Chemistry Education students who are expected to become future science educators. Moreover, environmental consciousness, as a comprehensive psychological construct, remains less explored than knowledge and behavior outcomes.

In addition to formal education, informal learning environments such as the family also play a crucial role in shaping environmental behavior. The home learning environment contributes significantly to cognitive and socio-emotional development, including environmental attitudes and habits (Lehrl et al., 2020; Li et al., 2023; Deng, 2025; Libertus et al., 2025; Marah et al., 2025). Daily household practices such as waste management, energy conservation, and consumption behavior serve as early learning experiences that shape children's environmental habits (Jia & Yu, 2021; Gherheș & Fărcașiu, 2021; Alfiyanto et al., 2024; Hassan & Khalil, 2024; Ismawati et al., 2024). Through observation and imitation, children tend to adopt behaviors demonstrated by their parents, thereby strengthening the role of the family as an environmental socialization agent (Nabavi & Bijandi, 2012).

However, existing literature tends to treat school-based environmental education and family environmental socialization as separate domains. A preliminary review indicates that few studies integrate both contexts within a unified empirical model. Environmental learning in students' lives is actually a continuous process that occurs across multiple environments, including school, family, peers, and digital spaces. Family-based environmental experiences, including parental communication, guidance, and household ecological practices, contribute to the internalization of environmental values and the development of environmental consciousness.

From a theoretical perspective, this study is grounded in three main frameworks. First, Social Learning Theory, Bandura explains that environmental behavior is acquired through observation, imitation, and reinforcement, particularly within the family context (Hirt & Reilly, 2008; Nabavi & Bijandi, 2012). Second, the Theory of Planned Behavior, Ajzen suggests that environmental consciousness influences behavioral intentions through attitudes, perceived norms, and perceived behavioral control (Buess, 2012). Third, Ecological Systems Theory, Bronfenbrenner emphasizes that human development is shaped by interactions between multiple systems, including microsystems such as family and school (Paquette & Ryan, 2020). However, empirical studies rarely examine how these systems interact in shaping environmental consciousness, especially in higher education contexts.

Based on these gaps, several limitations in existing research can be identified. First, most studies focus on formal environmental education while underexploring the integrated role of family-based environmental socialization. Second, environmental consciousness is often fragmented into knowledge, attitudes, or behavior, rather than treated as a holistic psychological construct. Third, existing studies rarely model the interaction between school and family within a multisystem ecological framework.

Building on these gaps, this study investigates environmental consciousness among Chemistry Education students in Indonesia, a Global South context where environmental education is increasingly emphasized but still under-researched at the higher education level. Specifically, the study examines family environmental education and environmental habits as predictors of students' environmental consciousness using a quantitative approach. The study focuses on direct relationships within a simplified explanatory model, rather than covering all possible determinants of environmental behavior.

The novelty of this study lies in its empirical examination of family environmental edu-

cation and environmental habits as predictors of environmental consciousness in a higher education context in Indonesia. Unlike previous studies that emphasize school-based learning or peer influence alone, this study highlights the role of family as an informal educational system that may shape environmental values and responsibility. However, the findings also suggest that family influence may not operate as a strong direct predictor, but rather as an indirect factor that interacts with other mechanisms such as formal education, peer norms, environmental self-efficacy, and campus engagement.

The implications of this study suggest that environmental education should not rely solely on either school or family, but should be understood as an integrated system connecting formal and informal learning environments. Therefore, educational strategies should combine classroom learning with experiential environmental activities, green campus initiatives, reflective learning, and engagement of students in real-world environmental practices.

Based on this framework, the research questions are: 1) To what extent does family environmental education influence students' environmental consciousness? 2) To what extent do students' environmental habits influence their environmental consciousness? 3) To what extent do family environmental education and environmental habits jointly influence students' environmental consciousness?.

METHODS

This study employed a quantitative research design with a correlational approach. A correlational design is used to examine statistical relationships between variables without manipulating any experimental conditions. In this study, the approach is appropriate because the research aims to determine the relationship between family environmental education, environmental habits, and students' environmental consciousness.

Quantitative research was chosen because it enables objective measurement of relationships among variables using numerical data and statistical analysis (Changjun & Xiaowen, 2025). Accordingly, the study focuses on testing the influence of family environmental education and environmental habits on students' environmental consciousness, using survey data collected from respondents. The study population consisted of students in the Chemistry Education Study Program at Universitas Negeri Makassar (UNM), Class of 2025. The sample was selected using simple random sampling to ensure that each member of the population had an equal chance of being included in the study.

The sample size of 58 students was determined based on the total accessible population size and follows general guidelines for minimum sample requirements in correlational studies. According to Cohen (1992), a minimum sample size of around 50–60 participants may be acceptable for detecting medium effect sizes in correlational research designs under limited population conditions. Therefore, the sample size of 58 is considered adequate for a preliminary correlational analysis in this study.

The study began with the identification of variables and the development of a conceptual model based on relevant literature. The independent variables included parental support for environmental education and related issues, family discussions about environmental topics, the use of environmentally friendly products within the family, and family involvement in environmental activities. The dependent variable was students' environmental awareness, conceptualized as a combination of environmental attitudes, knowledge, and behavior.

Data were collected using a structured Likert-scale questionnaire. The questionnaire consisted of two main sections. The first section measured the independent variables related to family environmental education and environmental habits. This section included several dimensions: (1) parental support for environmental education and environmental issues, (2) frequency and quality of environmental discussions within the family, (3) use of environmentally friendly products in daily household practices, and (4) family involvement in environmental conservation activities such as cleaning and tree planting. This section consisted of 20 items. Example items include: "My parents encourage me to learn about environmental issues" and "My family regularly discusses environmental problems at home."

The second section measured students' environmental consciousness as the dependent variable, reflecting their awareness, values, and sense of responsibility toward environmental issues. This section consisted of 7 items, including examples such as "I actively seek information about household wastewater management" and "I am ready to be an agent of change in increasing environmental awareness in the community." The instrument was adapted from previous validated studies by Grønhøj & Thøgersen (2017) and Liu & Green (2024) on environmental education and environmental behavior, with modifica-

tions to fit the context of Indonesian Chemistry Education students. Content validity was assessed through expert judgment by 2 education and research methodology lecturers, ensuring that each item was relevant, clear, and representative of the construct being measured.

Construct validity was evaluated using Average Variance Extracted (AVE). Based on Table 1, all items met the required validity criteria (AVE > 0.50), and reliability was assessed using Cronbach's Alpha; all constructs demonstrated acceptable reliability with values above 0.70 (Hair et al., 2021).

Table 1. Cronbach's Alpha and AVE Score

Variable	Cronbach's Alpha	Average Variance Extracted (AVE)
X1	0.781	0.641
X2	0.763	0.558
X3	0.836	0.567
X4	0.720	0.664
Y	0.917	0.646

The first section aimed to measure the independent variables, which encompassed several important aspects: first, parental support for environmental education and issues, which assesses the extent to which parents support their children's education on environmental issues. Second, discussions about environmental issues within the family are measured by the frequency and depth of discussions. Third, the use of environmentally friendly products within the family examines the extent to which families incorporate them into their daily lives. Fourth, family involvement in environmental activities, which assesses family participation in various activities aimed at preserving the environment, such as cleaning or reforestation. The second part of this questionnaire measures students' environmental consciousness, the study's dependent variable.

Data collection was conducted through a single administration of a questionnaire, following a post-test-only design. No pre-tests or experimental manipulations were implemented, as this study aimed to capture participants' current state rather than measure change over time. The collected data were then analyzed using multiple linear regression analysis to determine the influence of four independent variables on environmental awareness (Adhikari, 2022; Roustaei, 2024). Prior to the regression analysis, normality was assessed using the Kolmogorov-Smirnov test (Habibzadeh, 2024). linearity using the residual deviation (Roustaei, 2024), multicollinearity using the Variance Inflation Factor (VIF) (Imdadullah et al., 2016), and heteroscedasticity using the Glejser Test (Ilori & Tanimowo, 2022). The analysis continued with the calculation of the coefficient of determination (R^2), the F test, and the t test to assess the contribution and significance of each independent variable (Holcomb & Cox, 2017; Sureiman & Mangera, 2020; Oh & Pyrczak, 2023).

The final stage of the research involved interpreting the regression results to explain the magnitude and direction of the relationship between family-related factors and students' environmental awareness. Conclusions were drawn based on the statistical findings, and their implications for environmental education in higher education were discussed. In contrast to the experimental research framework commonly cited in the quantitative methodology literature, this study modified the original procedure by excluding the treatment and pre-test phases. This modification was intentionally implemented to ensure methodological consistency across the research objectives, the post-test-only correlational design, the measurement instruments, and the selected statistical analyses. The research flowchart is presented in Figure 1.

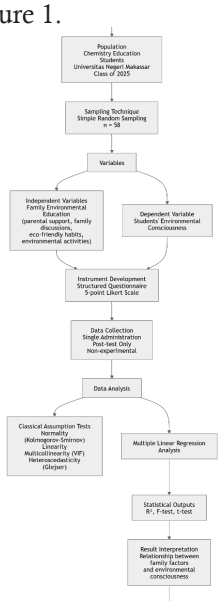

Figure 1. Research Flowchart

RESULTS AND DISCUSSION

This study used multiple linear regression to analyze the influence of several independent variables on students' environmental consciousness. The process includes variable selection, assumption testing, coefficient estimation, and model evaluation (R^2, F-test, t-test) (Adhikari, 2022; Jankovic, 2022; Roustaei, 2024). This results and discussion section addresses the research gap: whether family education and home environmental habits can explain students' environmental consciousness. Therefore, the analysis results are not only presented as statistical output but also interpreted to demonstrate the research findings' contributions, limitations, and novelty.

Based on the analysis results, the main findings of the tests are as follows. The first stage is the normality test, which is important in multiple linear regression to ensure that the model's residuals (errors) follow a normal distribution, which underlies the validity of statistical inferences such as the t-test and confidence intervals. Non-normal residuals can affect the accuracy of standard error estimates, p-values, and confidence intervals, especially in small samples (Schmidt & Finan, 2017; Chien, 2020; Midway & White, 2025). If the residuals are normally distributed, the multiple linear regression model can produce more precise estimates and a more robust statistical test. The normality test was performed using the Kolmogorov-Smirnov (K-S) test. This test examines whether the residual data follow a normal distribution. The results of this test will provide a p-value. If the p-value is greater than 0.05, the data are normally distributed. If the p-value is <0.05, the null hypothesis is rejected, indicating that the data are not normally distributed (Habibzadeh, 2024).

Table 2. Results of the Kolmogorov-Smirnov Test

Statistic	Value
Sample Size (N)	58
Mean	0.0000
Standard Deviation	0.3451
Asymptotic significance (2-tailed)	0.200
Monte Carlo Significance (2-tailed)	0.871

Table 2 shows that the results of the normality test (Table 2) indicate that the research data are normally distributed, as the Asymp. Sig. (2-tailed) value is 0.200, which is greater than 0.05. This indicates that the assumption of normality is met for further analysis. With the normality assumption met, the regression results can be interpreted more accurately because the model residuals do not exhibit significant departures from normality. This strengthens the model's suitability for use in testing the influence of family variables on students' environmental consciousness.

The second stage is a linearity test to ensure that the relationship between the independent and dependent variables is linear. One frequently used indicator is the Deviation from Linearity Sig value generated from the linearity test in SPSS output. Deviation from Linearity Sig. is a significance value (p-value) that indicates whether there is a significant deviation from a linear relationship between variables. If the Sig value is > 0.05, there is no strong evidence of a deviation from linearity; thus, the relationship between the variables can be considered linear, and the linearity assumption is met (Roustaei, 2024; Adhikari, 2022). If the Sig value is ≤ 0.05, there is a significant deviation from linearity; this means the relationship between the variables is not completely linear, and the linear regression model may be inappropriate (Lim, 2024).

Table 3. ANOVA Results for Environmental Consciousness and Family Activity Engagement

Between Groups	Sum of Squares	df	Mean Square	F	Sig.
Combined	1.329	9	0.148	1.107	0.376
Linear	0.176	1	0.176	1,321	0.256
Deviation from Linearity	1.153	8	0.144	1.081	0.392

Table 3 shows that the linearity test results indicate a Deviation from Linearity (Sig.). value of 0.392, which is greater than 0.05, indicating a significant linear relationship between the independent and dependent variables. These results indicate that the relationship between family and environmental consciousness can be analyzed using linear regression. Therefore, there are no deviations from linearity that could interfere with the interpretation of the relationships between variables in the research model.

The third step is to test for multicollinearity. Multicollinearity is a condition in which two or more independent variables in a multiple linear regression are highly correlated. This can lead to unstable regression analysis results, insignificant regression coefficients, and biased model interpretation. Multicollinearity can be detected

by checking the Variance Inflation Factor (VIF) results. A VIF value above 5 or 10 indicates serious multicollinearity (Imdadullah et al., 2016; Kim, 2019; Shrestha, 2020; Upendra et al., 2023).

Table 4. Coefficients for the Environmental Consciousness Model

Model	t	Sig.	Collinearity Statistics	
			Tolerance	VIF
Parental support for environmental education and issues	1.787	0.080	0.961	1.041
Discussions about environmental issues within the family	1.232	0.224	0.582	1.717
Use of environmentally friendly products within the family	0.544	0.589	0.718	1.393
Family involvement in environmental activities	-0.343	0.733	0.565	1.771

Table 4 explains that the results of the multicollinearity test show that there are no symptoms of multicollinearity in the regression model, because the tolerance values for variables X1, X2, and X3 are greater than 0.10 and the VIF value is less than 10.00. The negative coefficient for family involvement in environmental activities (β = -0.343, p = 0.733) should be interpreted with caution, as the effect is statistically non-significant. In multiple regression analysis, the sign and magnitude of non-significant coefficients may be unstable, particularly in relatively small samples, and should not be interpreted as evidence of a true negative relationship. The emergence of a negative coefficient may also be explained by the shared variance among family-related predictors included simultaneously in the model. When multiple correlated constructs (i.e., parental support, family discussions, environmental habits, and family environmental activities) are entered together, the unique variance of each predictor is isolated, which may lead to suppression effects or changes in coefficient direction.

This finding is consistent with prior research indicating that family environmental engagement does not always translate directly into internalized environmental consciousness, particularly when such activities are performed as routine practices without explicit value internalization (Kollmuss & Agyeman, 2002; Bamberg & Möser, 2007). In some cases, household environmental behavior may be influenced by external expectations rather than deeply internalized environmental values, limiting its direct predictive effect on environmental consciousness.

The fourth step is to test for heteroscedasticity. The Glejser test is a popular method for detecting heteroscedasticity, a condition where the residual variance is not constant in a multiple linear regression model. Heteroscedasticity can lead to inefficient parameter estimation and invalid statistical inferences. If the regression coefficient in the Glejser test is statistically significant (p-value <0.05), heteroscedasticity is present (Onifade & Olanrewaju, 2020; Ilori & Tanimowo, 2022). These results indicate that the residual variance in the model is constant, suggesting that the regression estimates are stable. By meeting the assumptions of normality, linearity, absence of multicollinearity, and absence of heteroscedasticity, the regression model is suitable for understanding the direction and strength of relationships between variables.

The fifth step is determining the R-squared (R^2) in the Model Summary. Multiple linear regression is a key measure of how much of the variation in the dependent variable can be explained by the independent variables in the model. The R^2 value ranges from 0 to 1, with the higher the value, the better the model explains the data (Oh & Pyrczak, 2023). A negative R^2 indicates a very poor model, worse than a model with no predictors at all (Chicco et al., 2021).

Table 5. Output of R-Square

R	R Square	Adjusted R-Square	Std. Error of the Estimate	Durbin-Watson
0.349	0.122	0.055	0.35791	1.498

Table 5 shows that the coefficient of determination (R^2) of 0.122 indicates that 12.2% of the variation in environmental awareness is explained by the independent variables (parental support for environmental education, discussions about environmental issues, use of environmentally friendly products, and family involvement in environmental activities). This finding indicates that family variables still explain only a relatively low portion of students' environmental consciousness. In other words, 87.8% of the variation in students' environmental awareness is likely ex-

plained by factors outside the model, such as formal environmental education, campus learning experiences, peer influence, academic culture, social media, student organizations, and students' personal values.

The final stage of the analysis involved the F-test and t-test as the primary procedures in multiple linear regression to evaluate the overall model fit and the partial effect of each independent variable. The F-test assesses whether all independent variables collectively explain a significant proportion of variance in the dependent variable (Sureiman & Mangera, 2020). The t-test examines the individual contribution of each predictor after controlling for other variables (Holcomb & Cox, 2017).

Table 6. Output of the F Test

Source	Mean Square	F	Sig.
Regression	0.235	1.836	0.136

Table 6 shows that the F-test indicates the overall regression model is not statistically significant ($F = 1.836$, $p = 0.136 > 0.05$). This suggests that the combination of family environmental education variables included in the model does not sufficiently explain variations in students' environmental consciousness.

The complexity of environmental consciousness may explain this finding as a multidimensional construct that cannot be adequately predicted by family-related factors alone. Previous research indicates that environmental consciousness is shaped by a broader set of psychosocial and contextual determinants, including exposure to environmental education, peer norms, environmental self-efficacy, climate-related emotions such as climate anxiety, and institutional engagement within educational settings (e.g., university- or campus-based environmental programs). These factors often exert stronger or more direct influences on students' environmental cognition and behavior compared to family-based variables alone.

Moreover, family environmental influences may not operate as direct predictors of environmental consciousness, but rather function indirectly through internal psychological mechanisms. Family-based environmental socialization contributes to the internalization of values and the formation of environmental identity, which, in turn, influences environmental attitudes and behavioral intentions (Kollmuss & Agyeman, 2002; Bamberg & Möser, 2007). In this sense, the effect of family environmental education may be mediated rather than directly observable in a simple linear regression model. Therefore, the non-significant model result in this study does not necessarily imply the absence of family influence, but rather indicates that the relationship is likely indirect, mediated, and embedded within a broader ecological system of influences that were not fully captured in the current model.

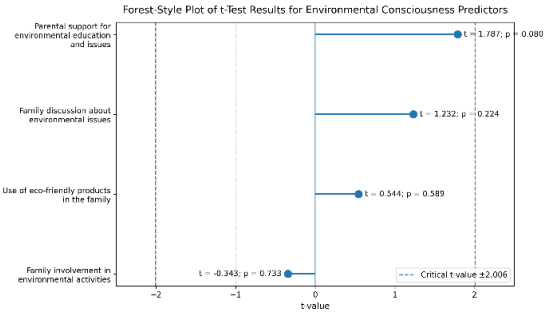

Figure 2. T-Test Output Results

Figure 2 illustrates the t-test results for each variable. The first independent variable analyzed was variable (X1), namely parental support for education and environmental issues. The t-value obtained was 1.787 with a p-value of 0.080, indicating that this variable was not statistically significant at the 0.05 level. Although there was a positive relationship between parental support and students' environmental awareness, the contribution was not large enough to be statistically significant. Although not significant, parental support had the highest t-value among the variables. This indicates that parental support still exerts some influence, but it is not strong enough to serve as a direct predictor of students' environmental consciousness in this research model.

These results align with a study of university students in Abu Dhabi, which found that social status, education, and parental encouragement did not significantly influence students' motivation or environmental awareness ($p > 0.05$). This means that neither socioeconomic status nor parental education level determines students' level of environmental awareness (Mubarak & Albayouk, 2024). Other research in China also shows that factors such as subjective norms (social pressure from peers and lecturers) and campus environmental education are more influential on students' environmental attitudes and awareness than family or parental background (Li et al., 2024). Several studies indicate that formal environmental education in higher education, peer interactions, and lecturers' influence are more effective than family influence in increasing students' pro-environmental awareness and beha-

vior (Edsand & Broich, 2019). The second independent variable, discussions about environmental issues within the family (X2), showed a t-value of 1.232 and a p-value of 0.224 ($p > 0.05$), indicating that this variable does not have a statistically significant direct effect on students' environmental consciousness. This suggests that, within the overall regression model, family environmental discussions alone are insufficient to explain variations in students' environmental consciousness.

However, when these findings are interpreted alongside the other independent variables in the model, a more integrated pattern emerges. The results consistently indicate that family-based environmental factors, whether in the form of parental support, environmental discussions, the use of environmentally friendly products, or involvement in environmental activities, do not, individually, show a strong direct contribution to environmental consciousness. This suggests that environmental consciousness is likely shaped by a more complex set of influences beyond isolated family interactions.

Taken together, these results imply that family environmental socialization may function more as a supporting or background factor rather than a direct determinant. Its influence is likely embedded within broader psychological and contextual mechanisms, such as value internalization, peer influence, and educational experiences, rather than operating independently as a single predictor.

These findings suggest that family communication about environmental issues is insufficient without concrete practice, habituation, reflection, and direct experience. Family discussions can be part of the environmental education process, but among college students, their influence can be weakened unless reinforced by academic and social experiences on campus.

These findings are consistent with previous research conducted in Turkey, which reported that students who rarely engage in environmental discussions within the family tend to demonstrate lower levels of environmental problem recognition across both eco-social and human-oriented dimensions. However, this relationship is not dominant and is moderated by other contextual factors such as year of study, gender, and perceived global responsibility (Kocoglu-Tanyer et al., 2024).

From a theoretical perspective, this pattern can be explained by Bronfenbrenner's Ecological Systems Theory, which posits that while the family functions as a microsystem influencing early value formation, its relative influence may be reshaped by stronger microsystems, such as the higher education environment (Paquette & Ryan, 2020). As students progress into university life, the campus becomes a more dominant microsystem where structured learning, peer interaction, and disciplinary exposure contribute significantly to the development of environmental consciousness. This suggests that the university context may serve as a new and more influential developmental environment, partially supplanting earlier family-based socialization.

In addition, Social Learning Theory, as proposed by Bandura, explains why observational learning within the family may be insufficient in this context (Hirt & Reilly, 2008; Nabavi & Bijandi, 2012). Environmental consciousness is not shaped solely through verbal discussion but requires consistent behavioral modeling and reinforcement. When observable environmental practices do not accompany family discussions about the environment, their influence on internalized environmental values may be limited.

Empirical evidence from Indonesia further supports this interpretation, showing that structured learning experiences and environmental education in higher education institutions contribute significantly to students' environmental consciousness, particularly through the development of critical thinking and formal instructional approaches (Nursetiawati et al., 2020). This indicates that formal education may currently play a more dominant role than family-based communication in shaping environmental awareness among university students.

Moreover, studies on social influence mechanisms suggest that subjective norms originating from peers and educational institutions exert stronger effects on environmental attitudes and behavior compared to family background influences (Simiyu et al., 2022; Li et al., 2024). This aligns with the Theory of Planned Behavior, which emphasizes that behavioral intentions are more strongly shaped by prevailing social norms in the immediate decision-making environment, which in this case is increasingly centered in the university context rather than the household (Buess, 2012).

The third independent variable (X3) is the use of environmentally friendly products within the family, with a t-value of 0.544 and a p-value of 0.589. The use of environmentally friendly products within the family also did not significantly influence students' environmental consciousness. A p-value significantly greater than 0.05 indicates that this variable does not contribute significantly to the model. Recent research shows that using environmentally friendly products within the

family does not significantly increase students' environmental consciousness. The main factors shaping students' environmental consciousness and behavior come from formal environmental education and university learning experience. A study in China found that although students had positive knowledge and attitudes toward the environment, the adoption of environmentally friendly behavior was more influenced by the environmental education they received on campus, rather than by environmentally friendly practices at home. The impact of pro-environmental intentions on sustainable consumption behavior was significantly greater among students who received formal environmental education. Other research confirms that economic status, education level, and family habits (including the use of environmentally friendly products) do not significantly influence students' environmental attitudes and awareness. Instead, social norms and peer influence are more influential. Environmental knowledge and students' personal attitudes are the main predictors of environmentally friendly behavior, not just family habits (Li et al., 2023).

The fourth independent variable (X4) is family involvement in environmental activities, with a t-test value of -0.343 and a p-value of 0.733. A p-value significantly greater than 0.05 indicates that family involvement in environmental activities also has no significant impact on students' environmental awareness. The negative relationship in this variable cannot be interpreted as meaning that family involvement decreases students' environmental consciousness, as the results were not statistically significant. This finding is better understood as indicating that family involvement in environmental activities is not yet a dominant factor in explaining students' environmental awareness in this study sample.

The most influential factors in shaping students' environmental consciousness and behavior are formal environmental education and social influences within the campus environment. This aligns with a study in China that found that economic status, education level, and family characteristics (including involvement in environmental activities) did not significantly influence students' environmental attitudes and awareness.

In contrast, environmental education in higher education, along with subjective norms shaped by peers and lecturers, appears to exert a stronger influence on students' environmental consciousness (Li et al., 2024). From a sociocultural perspective, this pattern may be explained by Indonesian society's collectivist orientation, in which behavioral formation is highly responsive to immediate social expectations and group-based norms. Within this context, university environments become highly salient normative spaces that shape students' attitudes and behavioral intentions more directly than family settings during early adulthood.

Empirical evidence further suggests that knowledge and experiences gained through formal environmental education, as well as social interactions within campus environments, are more effective in shaping pro-environmental consciousness compared to family-based involvement (Diaz et al., 2023). This is consistent with the Theory of Planned Behavior (Ajzen), which emphasizes that subjective norms from salient reference groups, such as peers and lecturers, play a critical role in shaping behavioral intentions. In university settings, these norms are often more immediate, visible, and behaviorally reinforced than those originating from family contexts.

Moreover, students' engagement in campus-based environmental activities, such as volunteering and participation in environmental organizations, contributes more significantly to the development of environmental consciousness and behavior than family-based environmental activities (Boca & Saraçli, 2019; Diaz et al., 2023). These findings indicate that student organizations function as identity-forming microsystems where environmental values are actively practiced, reinforced, and internalized through collective action, thereby strengthening their impact on environmental consciousness.

Overall, the results of this study indicate that none of the family variables tested significantly influenced students' environmental consciousness, either simultaneously or partially. This finding addresses a research gap: although families are often considered important informal educational environments, their influence on students' environmental awareness is not always direct or strong.

The novelty of this study lies in the empirical finding that family environmental education and environmental habits do not function as significant direct predictors of students' environmental consciousness in the regression model. Rather than operating as isolated determinants, the findings suggest that family-based environmental influences are likely indirect and may be mediated or moderated by factors such as formal environmental education, peer norms, environmental self-efficacy, campus-based experiences, and student participation in environmental activities.

The implications of this study extend beyond theoretical contributions by offering several practical directions for higher education in-

stitutions. Universities are encouraged to design integrated sustainability initiatives that bridge formal learning and informal environmental socialization. For example, family-based sustainability projects can be developed that involve students engaging parents or household members in structured environmental activities such as waste reduction programs, energy-saving campaigns, and household carbon-awareness challenges. In addition, universities can involve parents in campus-led environmental campaigns through webinars, community outreach programs, or sustainability awareness events to strengthen intergenerational environmental engagement.

Furthermore, strengthening green campus programs is essential to provide students with experiential learning opportunities that reinforce environmental consciousness through direct practice. This may include expanding student-led environmental organizations, embedding sustainability projects within coursework, and creating reflective learning spaces that connect academic knowledge with real-world environmental action. Through these integrated approaches, environmental education can be reconceptualized as a holistic ecosystem that involves collaboration among universities, families, peers, and the broader community to shape students' environmental consciousness.

CONCLUSION

This study shows that family education and environmental habits do not significantly influence students' environmental consciousness, with a relatively small contribution ($R^2 = 12.2\%$). This finding confirms that students' development of environmental consciousness is more influenced by factors beyond the family, such as formal education and exposure to social media. Consequently, efforts to increase environmental consciousness cannot focus solely on the family environment but must be strengthened through broader educational strategies and social interventions. However, this study has several limitations. First, the relatively small sample size (n = 58) and the use of a single university context may limit the generalizability of the findings. Second, the cross-sectional design does not allow for causal inference or for examining changes in environmental consciousness over time. Third, the study focuses only on selected family-related variables and does not include other potentially influential factors, such as peer influence, social media exposure, environmental self-efficacy, or psychological constructs that may better explain environmental consciousness. These limitations suggest that the findings should be interpreted as context-specific and exploratory rather than broadly generalizable. Future research is recommended to involve a larger, more diverse sample and to explore other factors, such as peer influence and social media, to obtain a more comprehensive picture of the formation of environmental consciousness among the younger generation.

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