JAMBURA GEO EDUCATION JOURNAL
P-ISSN: 2721-7000 | E-ISSN: 2721-7019
Volume 6 Number 2, September 2025, 253-268
Journal Homepage: http://ejurnal.ung.ac.id/index.php/jgej

The Influence of Social Environmental Knowledge, Ecoliteracy, and Green Lifestyle on Senior High School Students' Environmental Concern Character

Ali Sya'ban[1], Alwin[1], Agung Adiputra[1], Mushoddik[1]

[1]*Department of Geography Education, Universitas Muhammadiyah Prof. Dr. Hamka, Jakarta Selatan, Indonesia*

ARTICLE INFO

Article History:
Received: 2025-06-03
Accepted: 2025-09-17
Published: 2025-09-30

Keywords:
Ecoliteracy; Environmental Knowledge; Environmental Concern Character; Green Lifestyle Social;

Corresponding author:
Alwin
Email alwin@uhamka.ac.id
DOI: 10.37905/jgej.v6i2.32944

ABSTRACT

This study aims to examine the influence of social environmental knowledge, ecoliteracy, and green lifestyle on students' environmental concern character within the school setting. Research on students' environmental concern character is very important to conduct because, despite the implementation of various environmental education programs in schools, many students still exhibit a lack of concern for the environment, raising questions about the effectiveness of the influencing factors. Furthermore, debates continue regarding the effectiveness of social environmental knowledge, ecoliteracy, and green lifestyle, which have not yet fully shaped students' environmental concern character. Therefore, this study seeks to examine whether social environmental knowledge, ecoliteracy, and green lifestyle influence students' environmental concern character within the school setting. This study employed a survey method, in which the data were collected using a closed-ended questionnaire with a five-point Likert scale for the environmental concern character variable and the green lifestyle variable. The variable of social environmental knowledge level was measured using a multiple-choice test, whereas the ecoliteracy variable was measured using an observation-based questionnaire. The data analysis technique employed was path analysis. All variable data, including the levels of social environmental knowledge, ecoliteracy, and green lifestyle, were entered into a correlation matrix to determine the degree of relationships among the variables. The respondents were 60 randomly selected students from SMA Muhammadiyah 23 Jakarta, who served as the unit of analysis. The findings indicate that students' environmental concern character is directly influenced by the level of social environmental knowledge, ecoliteracy, and green lifestyle. In addition, this study found that social environmental knowledge and ecoliteracy indirectly influence environmental concern character through green lifestyle. Similarly, ecoliteracy was also found to indirectly influence environmental concern through green lifestyle. Based on these findings, it can be concluded that variations in students' environmental concern character are influenced by variations in their levels of social environmental knowledge, ecoliteracy, and green lifestyle. Therefore, these three factors significantly contribute to shaping students' character to be more environmentally conscious in their school environment.

How to cite: Sya'ban, A., Alwin, Adiputra, A., & Mushoddik. (2025). The Influence of Social Environmental Knowledge, Ecoliteracy, And Green Lifestyle on Senior High School Students' Environmental Concern Character. *Jambura Geo Education Journal*, *6*(2), 253–268. https://doi.org/10.37905/jgej.v6i2.32944

1. Introduction

Sustainable development is one of the main goals of Indonesia's national development policie. This development direction is reinforced by the enactment of the Law of the Republic of Indonesia Number 32 of 2009 concerning Environmental Protection and Management. In realizing environmentally conscious development, one of the key factors that must be prepared for is human resources (Kuźniarska, 2018). Preparing human resources can be achieved through development in the field of education. Character education serves as a system for instilling character value in students, encompassing individual knowledge and awareness. Character education is understood as a system for internalizing character values that must be possessed by all members of the school community, including knowledge, awareness, willingness, and action (Agustina et al., 2024; Efendi et al., 2020). To apply these values, it is essential to incorporate the values of belief in the Almighty God, self-awareness, interpersonal relationships, social responsibility, and nationalism, thereby shaping a completecvirtuous individual.

Among the character values embedded in character education is environmental concern. Environmental concern refers to consistent attitudes and actions aimed at preventing environmental damage and restoring degraded environments (Ratnasari et al., 2024). This character is an integral part of character education, that aims to instill awareness, attitudes, and positive behaviors toward the environment. Environmental concern,

according to Narut and Nardi, refers to behaviors aimed at preventing damage to the surrounding natural environment and efforts to restore any environmental degradation that may or my have already occurred (Marlina et al., 2023). Environmental concerns may arise directly from the tangible impact of environmental degradation, which is largely driven by rapid economic growth. When environmental problems become severe enough to visibly affect daily lives, social awareness tends to increase, triggered by pollution, resource depletion, and ecological damage (Requena et al., 2025). Environmental issues must be addressed with a strong sense of responsibility, beginning in formal educational institutions through character education that fosters environmental concerns and responsibility.

Character education that fosters environmental concerns, particularly in schools, should be a shared responsibility among all members of the school community (Özgören et al., 2016). It must involve all stakeholders within the educational institution, including families, school environment, and broader community. Character education will not succeed without continuity and alignment with the surrounding educational environment (Panggestu et al., 2024). Environmental concern is a characteristic trait that must be implemented by all members of the school community at every level of education. Every individual within an educational institution is obliged to demonstrate concern for the environment by promoting awareness campaigns aimed at improving environmental quality and fostering a proactive attitude to prevent environmental degradation (Wan et al., 2022).

A study conducted by Qodriyanti revealed that nearly half (49.20%) of high school students fell into the moderate category of environmental concern, suggesting that while awareness exists, it has yet to reach an optimal level (Qodriyanti et al., 2022). The findings of Sumarlan's study also demonstrate that approximately 70% of high school students exhibit a high level of environmental concern, which is categorized as good. This suggests strong awareness among students that a clean environment positively influences teaching and learning activities, reinforcing the critical role of environmental conditions in shaping educational effectivenes (Sumarlan et al., 2024). The findings of this study underscore the obligation of all school members, particularly students, to maintain the quality of the environment within and around the school. These results highlight that concern for environmental issues must be addressed through the implementation of character education that emphasizes environmental concern and position schools as strategic agents in fostering sustainable environmental behavior.

The importance of character education in addressing environmental issues must be supported by students' social environmental knowledge, enabling them to understand and apply what they have learned throughout the educational process (Apoko et al., 2022). Environmental concern education is a structured and continuous process of developing citizens' awareness, knowledge, attitudes, skills, and commitment to the environment. This implies that environmental character cannot stand alone; it must be grounded in a solid foundation of knowledge and a critical understanding of the social dimensions of environmental issues (Yusuf et al., 2022). Furthermore, according to Stevenson, environmental education begins with the acquisition of knowledge to understand the environment and acts as a catalyst for raising awareness of environmental issues, while also fostering proactive efforts to build a healthy and sustainable living environment. This perspective emphasizes that knowledge is not merely informational, but transformational, serving as the foundation for cultivating responsible attitudes and long-term behavioral change in relation to environmental sustainability. Social environmental knowledge within students' social environment plays a crucial role in shaping attitudes and transforming behaviors toward developing consistent habits of environmental concern. This suggests that knowledge is not only a cognitive asset, but also a formative influence that gradually instills values and encourages behavioral adaptation aligned with environmental responsibility.

Character education related to students' environmental concerns requires intentional engagement with the environment, which in turn requires the learning and internalization of ecological literacy. As stated by Stone, ecological literacy is the ability to understand the basic principles of ecology, in which Earth's ecosystem processes support the life cycle system and maintain balance on Earth. This highlights that cultivating environmental character is inseparable from developing a deep understanding of ecological systems, enabling students to connect their values with the scientific foundations of environmental sustainability (Kadarisman et al., 2023). Reinforcing Kardarisman's assertion that the understanding of environmental ecoliteracy reflects a high level of awareness and comprehension regarding the importance of maintaining harmonious relationships between living beings and their surrounding environment. This suggests that ecoliteracy goes beyond theoretical knowledge it embodies a consciousness that motivates individuals to recognize interdependence within ecosystems and to act responsibly in preserving environmental balance (Kadarisman et al., 2023). In this study, environmental ecoliteracy was viewed as students' internalization of environmental sustainability values derived from their learning experiences and understanding of the environment. This includes the ability to comprehend fundamental ecological principles, prevent the emergence of environmental problems, propose

solutions to environmental issues, demonstrate empathy toward both fellow humans and nature, take responsibility for preserving the environment, and exercise wisdom in the use of natural resources. These dimensions of ecoliteracy emphasize not only cognitive understanding, but also the moral and behavioral transformation necessary to support sustainable living.

The instillation of environmental concern values must be embedded in school students so that it evolves into a culture of care and ultimately fosters a green lifestyle. As discussed in a journal on the consequences of green lifestyles within communities, a green lifestyle is defined as a way of living that considers the environmental consequences of every action by weighing its positive and negative impacts on the surrounding environment. This indicates that the development of character values in schools is not limited to moral education alone, but also encompasses the formation of daily habits and decision-making patterns that align with the principles of ecological responsibilit (Pramesti et al., 2022). Furthermore, a journal on environmentally conscious behavior emphasizes that a green lifestyle is demonstrated through tangible actions that prioritize environmental sustainability. This underscores that adopting a green lifestyle is not merely about awareness, but fundamentally involves engagement in consistent and responsible behaviors toward the environment, actively contributing to the preservation of ecological resilience (Novita et al., 2020). Such environmental concerns and resilience must be reflected in environmentally friendly practices while continuously maintaining ecological sustainability, thereby serving as essential steps toward achieving long-term environmental sustainability. This perspective emphasizes that sustainable environmental practices should integrate both responsible behavior and enduring commitment to preserve ecosystem integrity.

Previous studies have examined the influence of environmental knowledge or ecoliteracy separately on environmental concerns. Very few studies have comprehensively investigated both the direct and indirect relationships with green lifestyle as a mediating variable. In a study on "environmental education research in Indonesia," the focus was solely on students' ecoliteracy in schools without exploring the extent of its application in real life (Husamah et al., 2022). This study seeks to fill this gap by analyzing how social environmental knowledge and ecoliteracy influence environmental concern characteristics through green lifestyles among senior high school students. A similar tendency can be seen in the study "Pro-environmental behaviors and well-being in adolescence, which emphasized pro-environmental behavior and adolescents' personal and social well-being but did not link them to the role of green lifestyle (Bartolo et al., 2023). Likewise, the study "Environmental literacy, ecological footprint awareness, and environmental behavior in adults" only examined the relationship between environmental literacy, ecological footprint awareness, and environmental behavior in adults (Yildirim et al., 2025).

In fact, studies focusing on senior high school students in Indonesia, particularly in Jakarta, remain limited, even though adolescence is a crucial phase in shaping environmental concern. In addition, the study "Environmental literacy among youth movement members" placed greater emphasis on environmental literacy in the cognitive aspect without testing the role of green lifestyle as a mediator and was limited to integrating only the cognitive, affective, and conative dimensions (Goldman et al., 2017). Few studies have examined the interaction of these three variables simultaneously in the school context. Based on this gap, the present study offers novelty by integrating social environmental knowledge and ecoliteracy simultaneously, while introducing a green lifestyle as a mediating variable in shaping adolescents' environmental concern. The focus on senior high school students in Indonesia, particularly in SMA Muhammadiyah 23 Jakarta, provides relevant local empirical evidence and enriches the theoretical discourse on environmental education. The findings of this study are expected to serve as an important foundation for formulating more effective, practical, and character-oriented environmental education policies aimed at fostering a sustainable youth generation.

Based on the background described previously, this study aimed to examine the extent to which students internalize and embody the character of environmental concern in preserving their surrounding environment. Additionally, this research sought to analyze the depth of students' social environmental knowledge, specifically their understanding of environmental issues and their ability to apply knowledge acquired from family, relatives, neighbors, peers, and others. Furthermore, the study investigates students' ecoliteracy, exploring their awareness of the importance of comprehending ecological principles and applying them in daily life to support environmental sustainability. Finally, the study also evaluates the degree to which students' green lifestyles enable them to responsibly engage with and maintain a clean and sustainable environment. These dimensions collectively offer insights into the holistic integration of knowledge, awareness, attitudes, and behaviors necessary for fostering sustainable environmental stewardship among students.

2. Method

This study employs a quantitative approach using a survey research design. This approach was chosen because it is suitable for measuring relationships among variables through the statistical analysis of numerical

data. The survey design was used to obtain both a general and in-depth understanding of the influence of socio-environmental knowledge, ecoliteracy, and green lifestyles on students' environmental concerns.

The research population comprised 150 students from SMA Muhammadiyah 23 Jakarta. The sample was determined using purposive sampling, a technique chosen because the study required respondents with specific characteristics relevant to its objectives, namely, students who possess knowledge and experience related to the environment and are involved in activities or learning that incorporate environmental concern values (Husin et al., 2025). In quantitative research, purposive sampling is appropriate to ensur data quality by selecting respondents who fully meet the research criteria. In addition, random sampling was conducted among students who met these criteria. The primary consideration was to ensure that respondents possessed relevant experience and knowledge related to the research topic.

The sample size was set at 40% of the total population, resulting in 60 student respondents. The sample consisted of 28 male and 32 female students. Based on grade level, there were 20 students from Grade X, 21 from Grade XI, and 19 from Grade XII, with ages ranging from 15 to 18 years. All sampled students received environmental education materials through the subjects of Environmental Education, Science, or Geography at school. This selection aimed to ensure that the respondents possessed sufficient knowledge and experience so that the data obtained could accurately represent the relationships among socio-environmental knowledge, ecoliteracy, green lifestyles, and environmental concerns.

This study involved four variables: 1) dependent variable (Y): environmental concern character, with indicators including environmental concern attitudes (cognitive, affective, and conative); behaviors aimed at preventing environmental damage; involvement in environmental conservation activities; consistency in environmentally friendly behavior at school and home; and concern for environmental health (Angelin et al., 2023; Nurdin et al., 2024; Yulianingsih et al., 2025); 2) independent variable (X_1): socio-environmental knowledge, with indicators including understanding of environmental pollution concepts; knowledge of natural resource conservation; understanding of the community's role in environmental preservation; and knowledge of environmental policies and regulations (Wan, 2022; Yusuf, 2022); 3) independent variable (X_2): ecoliteracy, with indicators including understanding of basic ecological principles; knowledge of human–environment interrelationships; ability to analyze environmental problems; ability to formulate sustainable solutions; and responsibility in environmental conservation (Kadarisman, 2023; Kuo et al., 2019); and 4) independent variable (X_3): Green lifestyle, with indicators including waste reduction behavior; energy conservation; consumption of environmentally friendly products; active participation in environmental conservation activities; and adherence to environmentally friendly rules at school (Chwialkowska, 2019; Pramesti et al., 2022).

The data collection instruments were tailored to the characteristics of each variable as follows: 1) Environmental concern character (Y), measured using a closed-ended questionnaire with a five-point Likert scale. The validity test results showed values above 0.361, and the reliability coefficient was 0.887, indicating very good internal consistency; 2) socio-environmental knowledge (X_1) was measured using multiple-choice tests. The validity test results showed values above 0.361, and the test reliability coefficient was 0.965, indicating a very high level of reliability, 3) ecoliteracy (X_2), measured using an observation questionnaire with a Likert scale. Content validity was examined by experts in geography, ecology, and education, followed by construct validity analysis to ensure the relevance of each item; 4) green lifestyle (X_3): Measured using a closed-ended questionnaire with a Likert scale. The validity test results showed values above 0.361, and the reliability coefficient was 0.941, indicating a very high level of data reliability.

Data were analyzed using path analysis with SmartPLS software. This analysis was employed to examine both the direct and indirect effects among tha variables and to assess the strength of causal relationships. Through this technique, a deeper understanding of the factors influencing the formation of students' environmental concerns was obtained.

3. Description of research data

3.1. Description of the character of environmental concern

Based on the data analysis results, the distribution of students' environmental concern characteristics is illustrated in Figure 1. Figure 1 explains the percentage of student data regarding the character of environmental concern, particularly in relation to the culture of discipline and environmental sustainability, showing a score of 35.71%. The students' environmental attitudes are reflected in the bar chart. This percentage indicates that students in SMA Muhammadiyah 23 Jakarta have developed consistent habits in maintaining environmental sustainability through disciplined behavior—both at home, during transit, and at school. These habits include maintaining cleanliness, preserving the school environment, disposing waste properly, washing

hands at designated facilities before engaging in learning or eating activities, and regularly conserving electricity when not in use.

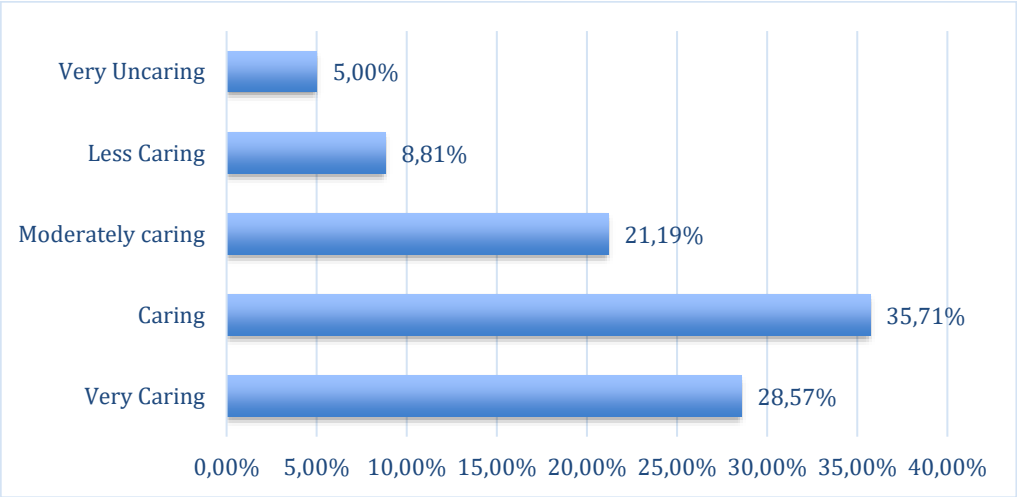

Figure 1. Bar Chart of Environmental Concern Character Data Analysis Results

The development of students' environmental concern characteristics is cultivated through routine morning activities conducted before entering class. These routines include the repeated delivery of moral values such as the importance of maintaining politeness, mutual respect, and environmental cleanliness. According to research by Syahri, there is evidence that students who receive education and discipline regarding environmental concerns will experience a very effective strengthening of their environmental care characteristics. This suggests that consistent exposure to moral and ecological values within a school setting plays a critical role in shaping students' long-term commitment to environmental responsibility (Hassan et al., 2010; Syahri et al., 2021).

Environmental concern is the result of an educational process, not an innate talent or instinct. Therefore, improper educational approaches may lead individuals to develop poor attitudes toward understanding and engaging with their environment. This notion further emphasizes that environmental concerns are reflected in deliberate efforts to prevent environmental degradation, such as maintaining cleanliness and order in the surrounding environment, reducing plastic usage, and sorting waste according to its type (Handayani et al., 2024; Wu et al., 2024). Thus, it can be concluded that students have developed a positive character of environmental concern toward their school environment and its surroundings.

3.1.1. Description of socio-environmental knowledge

The results of the data analysis of the social environmental knowledge variable among students are illustrated in Figure 2.

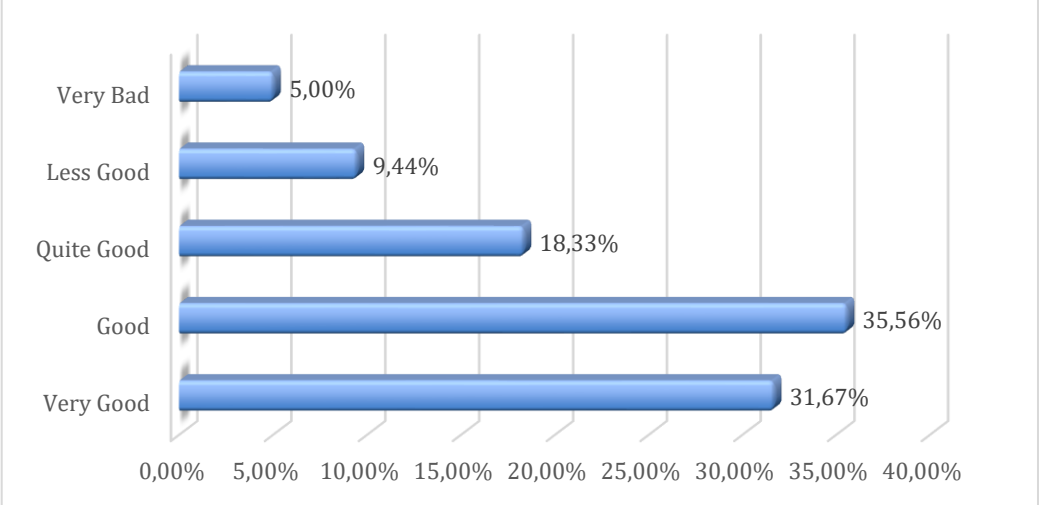

Figure 2. Bar Chart of Social Environmental Knowledge Data Analysis Results

Figure 2 explains the percentage of student data regarding social environmental knowledge, showings that 30.56% of the students possessed a good level of understanding. This knowledge, as illustrated in the previously presented bar chart, reflects the students' ability to comprehend and apply social environmental concepts in their daily lives, fostering habits that support environmental stewardship. The integration of this knowledge into students' routines, particularly in maintaining the quality of their living environment, demonstrates the role of social environmental understanding as a foundation for sustainable behavior. This finding is consistent with a statement by Rohman in his study, which indicates that 445 Aboriginal students from Pahang, Malaysia, possessed environmental knowledge categorized as good, general environmental knowledge as moderate, and knowledge of environmental actions as good." Consequently, the students demonstrated a caring attitude toward the environment. This finding supports the notion that knowledge, when internalized and practiced, can significantly influence attitudes and behaviors toward ecological responsibility. In addition, this finding is consistent with the research conducted by Sasea, who found that students at SMA Negeri 1 Banyuputih possessed a good level of environmental knowledge, and that there wais a positive correlation between their knowledge and their environmentally caring attitudes. This further reinforces the argument that environmental knowledge plays a pivotal role in shaping students' pro-environmental attitudes, suggesting that cognitive understanding is a key driver in fostering consistent and responsible environmental behaviors (Sasea et al., 2023). Students' social environmental knowledge, particularly that shaped within the family setting, generally contributes to the development of positive environmental behaviors. This is largely because the family serves as the first and most immediate environment in which students are introduced to ecological values and norms. Early exposure to practices such as maintaining cleanliness, conserving resources, and respecting nature within the household context provides essential formative experiences that influence students' long-term attitudes and behaviors toward environmental stewardship.

The family environment constitutes a fundamental social setting that significantly influences the development of an individual's personality, particularly in instilling values such as politeness, cleanliness, health consciousness, neatness, mutual respect, and respect for nature (Syah et al., 2021). Through these moral principles and social ethics, environmental knowledge is cultivated within households and subsequently applied in daily life. In the school environment, students generally exhibit respectful and courteous behavior toward their teachers, and demonstrate adherence to established school rules and regulations. The school serves not only as a place for acquiring academic knowledge but also as a critical arena for character formation and the internalization of ethical norms. Social behavior among students within the school context reflects a consistent pattern of respectful and disciplined conduct, both inside and outside the classroom. Students show respect for teachers and educational staff, engage in positive peer relationships, and demonstrate prosocial behavior, including mutual assistance and cooperation. This suggests that the school, in conjunction with the family, plays a pivotal role in reinforcing social and environmental knowledge and fostering values that support harmonious interactions and environmentally responsible citizenship.

3.1.2. Description of ecoliteracy

The results of the analysis of the ecoliteracy variable among students are show in Figure 3.

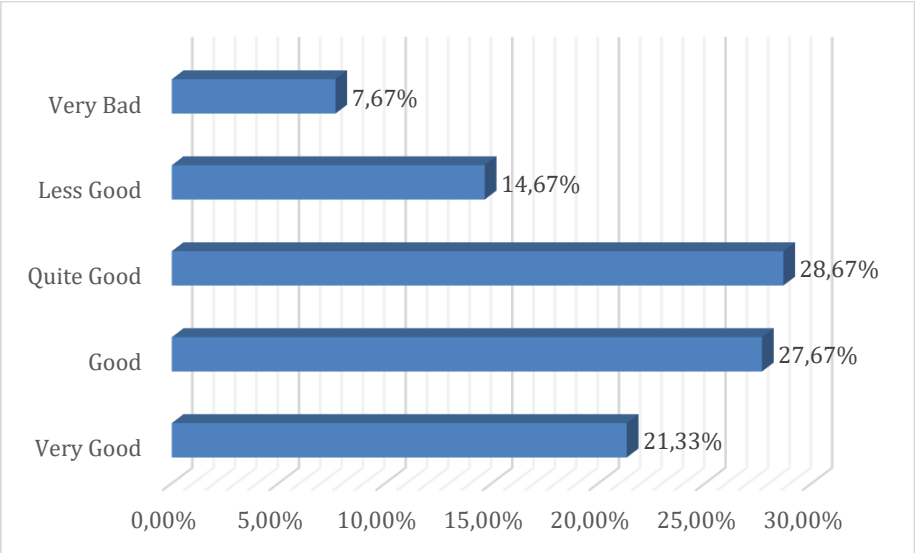

Figure 3. Bar Chart of Ecoliteracy Data Analysis Results

Figure 3 show that the percentage of student data regarding ecoliteracy showed a moderately good level, with 28.67% of students demonstrating adequate ecological understanding. These ecoliteracy data are illustrated in the previously presented bar chart. According to Stone, students ecoliteracy is their ability to understand the basic principles of ecology. The concept of ecoliteracy implies that individuals with a high level of ecological understanding also possess heightened awareness of the importance of maintaining the interrelationships between living organisms and their surrounding environment. Such awareness is a crucial foundation for active participation in efforts toward environmental sustainability (Kadarisman et al., 2023). The findings of this study are consistent with the research conducted by Sunarto, who found that the environmental concern practices demonstrated by students at Al Amaniyyah School were classified as very good. This is reflected in their high level of environmental literacy or ecoliteracy, as evidenced by their well-developed understanding and comprehension of their core ecological concepts (Sunarto, 2023). Based on the results of the data analysis, it can be concluded that, on average, students in SMA Muhammadiyah 23 Jakarta demonstrate a moderately good level of ecoliteracy. They provide an adequate understanding of basic ecological principles, the ability to analyze environmental problems, and the capacity to propose relevant solutions. Additionally, they exhibited a sense of responsibility in preserving the environment, reflecting a satisfactory level of ecological awareness and action.

3.1.3. Description of Green Lifestyle

The results of the analysis of the green lifestyle variables among students are illustrated in Figure 4.

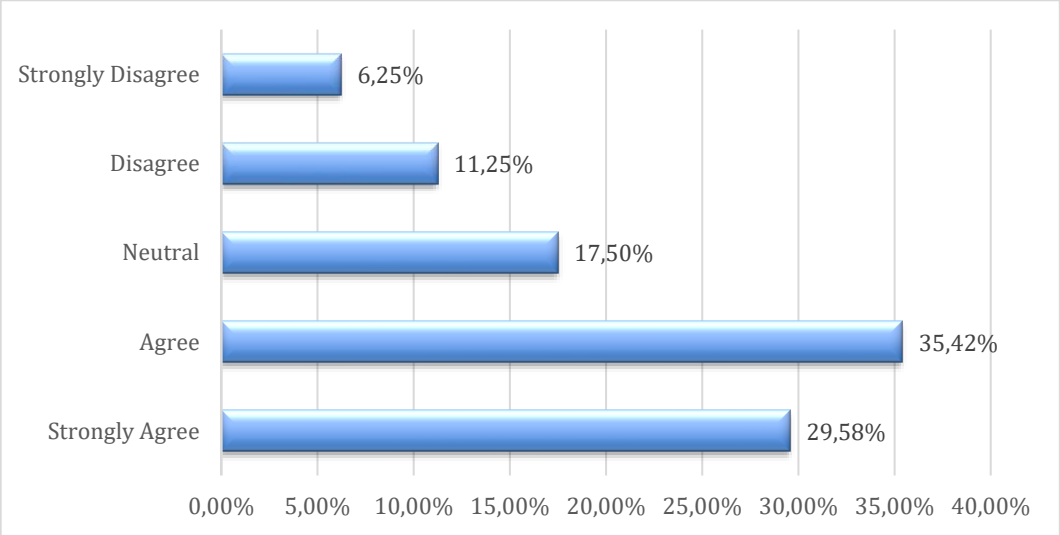

Figure 4. Bar Chart of Green Lifestyle Data Analysis Results

Figure 4 explains that the percentage of student data related to green lifestyle practices shows a good category, with 35.42% of students demonstrating environmentally conscious behavior. The data are illustrated in a bar chart. A green lifestyle is defined as a way of living that involves actions aimed at minimizing the negative impacts of environmentally harmful behaviors. This lifestyle is characterized by habitual patterns that prioritize environmental sustainability and involve conscious efforts to assess and reduce the environmental effects of daily activities (Farida et al., 2024; Meilinda et al., 2017). In relation to the aforementioned perspective, the results of the data analysis indicate that, on average, students demonstrate good practices in waste avoidance. Waste avoidance includes sorting waste based on its type of organic, non-organic, and hazardous (B3: hazardous and toxic materials) as well as making conscious decisions regarding food consumption and avoiding careless disposal of food waste.

Specifically, the majority of students disposed of food and beverage packaging, which is generally made of single-use plastic, into designated bins according to waste classification. Recyclable materials are then collected and delivered to the waste banks. Furthermore, most students actively participate in efforts to preserve ecological sustainability in the school environment (Farida et al., 2024). These findings indicate that habitual green lifestyle practices at schools have fostered consistent environmental awareness among students, particularly in terms of waste management and active involvement in environmental conservation.

3.2. The influence of social environmental knowledge, ecoliteracy, and green lifestyle on the character of environmental concern

The influence of social environmental knowledge, ecoliteracy, and green lifestyle on students' environmental concerns in the school setting is illustrated through the path analysis results, as presented in Figure 5.

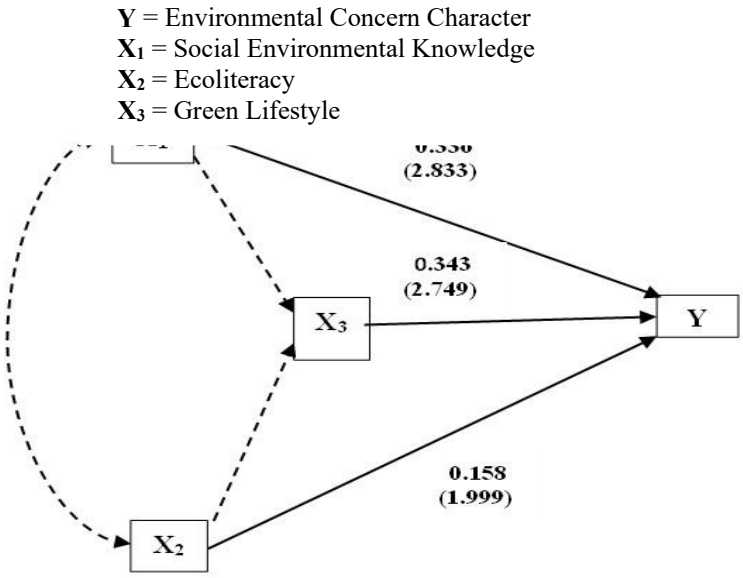

Figure 5. Causal Relationship in Substructure 1

Table 1. Path Coefficient Results of Substructure one

Variable	B	Standardized Coefficients	t	Sig.
(Constant)	71.204	–	12.065	$p < 0.05$
X_1	0.215	0.336	2.833	$p < 0.05$
X_2	0.078	0.158	1.999	$p < 0.05$
X_3	0.120	0.343	2.749	$p < 0.05$

Figure 5 and Table 1 show that in Substructure 1, the variables X_1, X_2, and X_3 have a significant influence on variable Y. Among the three, X_3 contributes the most to Y, followed by X_1, and finally X_2.

3.2.1. There is a direct influence of social environmental knowledge on the character of environmental concern.

The calculation results showed that the path coefficient score between students' social environmental knowledge and environmental concern character was 0.336, with a t-value of 2.833 and $p < 0.05$, indicating that students' social environmental knowledge hads a significant direct effect on their environmental concern.

3.2.2. There is a direct influence of ecoliteracy on the character of environmental concern.

The analysis yielded a path coefficient score of 0.158 between ecoliteracy and environmental concern, with a t-value of 1.999 and $p < 0.05$, suggesting that although ecoliteracy has a direct effect on environmental concern, the influence is statistically weak and marginally significant.

3.2.3. There is a direct influence of students' green lifestyle on the character of environmental concern.

The results indicated a path coefficient of 0.343 between green lifestyle and environmental concern character, with a t-value of 2.749 and $p < 0.05$, providing evidence that students' green lifestyles have a significant direct impact on the development of their environmental concern character (Table 1). Substructure 2

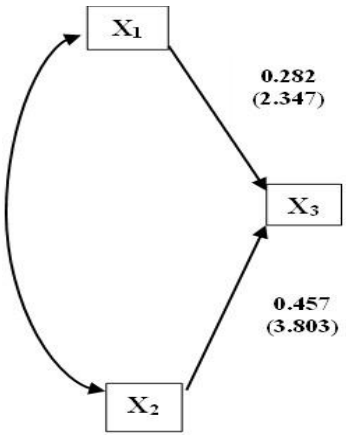

Figure 6. Causal Relationships in Substructure 2

Table 2. Path Coefficient Results of Substructure two

Variable	B	Standardized Coefficients	t	Sig.
(Constant)	-18.707	–	- 0.876	
X_1	0.515	0.282	2.347	$p < 0.05$
X_2	0.640	0.457	3.803	$p < 0.05$

Figure 6 and Table 2 explain Substructure 2, the variables X_1 and X_2 have a significant effect on X_3. The influence of X_2 is stronger compared to X_1. This shows that X_2 is the dominant predictor in influencing X_3 on the structure of this model.

3.2.4. There is a direct influence of social environmental knowledge on students' green lifestyle.

The analysis showed that the path coefficient between social environmental knowledge and students' green lifestyle was 0.282, with a t-value of 2.347, which was greater than the critical t-table value of 1.99 ($p < 0.05$). The path coefficient results are shown in figure 6. This finding demonstrates a significant relationship between social environmental knowledge and students' green lifestyles, indicating that students' environmental understanding contributes meaningfully to shaping behaviors aligned with sustainable living, which in turn supports the development of environmental concern.

3.2.5. There is a direct influence of ecoliteracy on students' green lifestyle.

The calculation yielded a path coefficient of 0.457 between ecoliteracy and students' green lifestyle, with a t-value of 3.803, exceeding the t-table value of 1.99 ($p < 0.05$). The path coefficient results are show in figure 6. This result confirms a strong and statistically significant relationship between ecoliteracy and students' green lifestyles, suggesting that students with a higher understanding of ecological principles are more likely to adopt environmentally conscious habits that reinforce their environmental concern.

Table 3. Summary of Hypothesis Testing

Variable	Path Coefficient	t	Sig.
$X_1 \Rightarrow Y$	0.336	2.833	$p < 0.05$
$X_2 \Rightarrow Y$	0.158	1.999	$p < 0.05$
$X_3 \Rightarrow Y$	0.343	2.749	$p < 0.05$
$X_1 \Rightarrow X_3$	0.282	2.347	$p < 0.05$
$X_2 \Rightarrow X_3$	0.457	3.803	$p < 0.05$

Table 4. Summary of Path Coefficients, Direct Effects, and Indirect Effects

Variable	Direct Influence	Indirect Influence Through X_3	Total Influence
$X_1 \Rightarrow Y$	0.336	0.115	0.451
$X_2 \Rightarrow Y$	0.158	0.212	0.370
$X_3 \Rightarrow Y$	0.343	–	0.343
$X_1 \Rightarrow X_3$	0.282	–	0.282
$X_2 \Rightarrow X_3$	0.457	–	0.457

The results of the path analysis of the empirical research model are shown in figure 7.

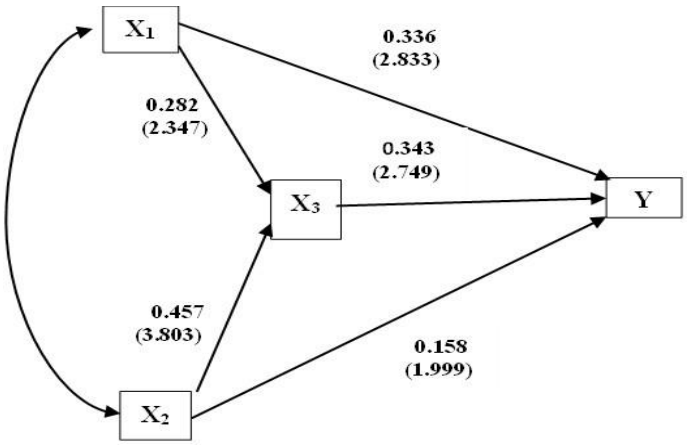

Figure 7. Final Results of the Path Analysis for the Empirical Research Model

Tables 3, 4 and figure 7 explain the empirical model showing that X_1 and X_2 contribute significantly to Y, either directly or through X_3 mediation. X_3 serves as an important intermediate variable, strengthening the relationship between X_1 and X_2 to Y. Among the existing pathways, X_1 has the greatest total influence on Y (0.451), followed by X_2 (0.370), and X_3 (0.343).

4. Results and Discussion

4.1. The character of environmental concern is directly influenced by the level of social environmental knowledge.

Empirically and theoretically, this study affirms that environmental knowledge significantly contributes to shaping students' environmental concerns in SMA Muhammadiyah 23, with a path coefficient of 0.336 t = 2.833 $p < 0.05$. The findings of this study are also supported by research on students' levels of environmental concern, which identified a positive correlation between students' environmental knowledge and their environmental care attitudes. Students' social environmental knowledge was initially shaped by the family environment (Dirawan, 2023; El Rizaq et al., 2025). As the primary agent of socialization, the family plays a crucial role in instilling the values of environmental care from an early age. Arents' and children's environmental knowledge mutually influence their pro-environmental behaviors, indicating a complex dynamic of intergenerational transmission. This study is supported by research on environmentally friendly role-modeling behavior, which shows that the role of educators as exemplars is highly effective in promoting pro-environmental behavior among students, particularly through positive actions such as a teacher picking up litter in front of students, which is then emulated by students in managing the school environment (Liang et al., 2022).

Integrated environmental education in schools has also been proven to cultivate deeper ecological awareness and promote sustainable behavior among students (Kukkonen et al., 2018). The accumulation of knowledge and experience in students' social environments significantly shapes their environmental concerns. Environmental knowledge fosters the development of positive environmental attitudes, which in turn mediate pro-environmental intentions and behaviors, as explained by the theory of planned behavior. Over time, these values and understandings evolve into cultural habits, especially within the school setting, thereby encouraging students to consistently engage in behaviors that support environmental sustainability. These findings align with the broader environmental education literature that emphasizes the importance of integrating environmental values, practices, and culture within the school community as a foundation for long-lasting pro-environmental culture.

4.2. Environmental concern character is directly influenced by ecoliteracy

Ecoliteracy has been shown to have a direct effect on students' environmental concerns, with a path coefficient of 0.158 t = 1.999; $p < 0.05$. This finding aligns with previous research emphasizing the importance of ecoliteracy skills in shaping environmental concerns, where students' ecoliteracy activities were at a fairly good level, allowing ecoliteracy attitudes to develop indirectly through social interactions in their environment (Tyas et al., 2022). Furthermore, this study is consistent with research on ecological literacy and social media, which demonstrates that ecological literacy can be strengthened through social media to enhance awareness and pro-environmental behavior in the community (Abdullah, 2023). These results are also supported by research on environmental literacy behavior, which states that students' ecoliteracy is formed through environmental experiences and knowledge based on fundamental ecological concepts (Sunarto, 2023).

Additionally, this study aligns with studies on ecological literacy and science for sustainability, highlighting the importance of ecoliteracy as a foundation for innovative and applicable sustainability solutions while simultaneously fostering environmental concerns (Husamah et al., 2025). Thus, ecoliteracy not only builds ecological knowledge but also plays a role in developing awareness and environmentally caring attitudes. Such knowledge enables students to critically analyze environmental problems and generate relevant solutions to the environmental issues they encounter.

The findings indicate that, on average, students in SMA Muhammadiyah 23 Jakarta have a good understanding of basic ecological principles and are able to apply this knowledge in real-world contexts. One manifestation of ecoliteracy at the school is students' responsibility for maintaining the environment, including waste management, efficient use of resources, and active participation in environmental conservation activities. Therefore, ecoliteracy is not only an indicator of ecological knowledge but also serves as a crucial foundation for shaping students' consistent and sustainable environments.

4.3. Environmental concern character is directly influenced by green lifestyle

Green lifestyle has been proven to have a direct influence on the quality of students' environmental concern, with a path coefficient of 0.343bt = 2.749 $p < 0.05$. This finding is consistent with the study by Pramesti, which indicated that a green lifestyle positively affects pro-environmental behavior. In general, the use of environment friendly materials contributes to minimizing environmental damage, thereby reinforcing the role of sustainable consumption in shaping ecological responsibility (Pramesti et al., 2022). Similar results were also found in a study on the status of education for sustainable development, emphasizing that education and the adoption of a green lifestyle among students have a significant impact on the development of ecological character, particularly through the reinforcement of values such as responsibility, discipline, and empathy toward the surrounding environment (Al Naqbi et al., 2018).

On average, students' implementation of a green lifestyle demonstrated a commendable level of environmental concern. This is reflected in waste-sorting practices, such as separating waste into organic, inorganic, and hazardous (B3) categories, making conscious food choices, and avoiding careless disposal of food waste in plastic packaging (Farida et al., 2024). Zhao found that students' involvement in environmentally friendly activities at school, such as recycling programs and energy conservation, significantly reinforces the consistent development of pro-environmental behavior (Zhao et al., 2024). This highlights the importance of a collective approach within educational institutions, where green lifestyle practices are not only instilled individually but also strengthened through consistent school policies and a supportive learning environment.

In general, students actively participate in maintaining the sustainability of their school environment. The implementation of green lifestyle practices guided by school discipline and collectively applied by the entire school community has a direct influence on fostering students' environmental concerns. In this context, Goldman et al concluded that school environments that comprehensively apply sustainability principles are capable of cultivating a strong ecological culture among students (Goldman et al., 2018). This reinforces the finding that a green lifestyle is not merely a temporary behavior, but an integral part of shaping students' environmental character and sense of responsibility toward sustainable environmental development.

4.4. Green lifestyle is directly influenced by the level of social environmental knowledge

The results of this study indicated that social environmental knowledge had a direct influence on students' green lifestyles, with a path coefficient of 0.282 $t = 2.347$; $p < 0.05$. These findings are supported by research on students' conservation attitudes toward the environment, which revealed that within their social environment, students feel supported by family members and relatives in their environmental preservation efforts, whereas others are influenced by peers and information provided by teachers (Lestari et al., 2024). In line with this, the present study is also reinforced by research on the formation of environmental concern attitudes, which indicates that family, school, and community environments play a significant and meaningful role in shaping students' environmental awareness, directly contributing to the development of pro-environmental attitudes (Nainggolan et al., 2023). This pro-environmental knowledge is acquired through interactions with family, peers, teachers, and the community each playing a central role in internalizing sustainability values and encouraging concrete actions in everyday life.

The level of social environmental knowledge not only serves as a cognitive foundation but also acts as a catalyst to promote sustainable ecological behavior, particularly among the younger generations (Maurer et al., 2020). Students who are exposed to environmental information through social interactions at school and within the community tend to have a stronger commitment to environmentally friendly behaviors. Moreover, students'

involvement in discussions within their social environment significantly enhances their ecological awareness and fosters active participation in sustainability-related activities.
Therefore, the results of this data analysis confirm that students' social environmental knowledge significantly contributes to shaping their green lifestyle practices in the school context.

4.5. Green lifestyle is directly influenced by ecoliteracy

The results of the study revealed that ecoliteracy has a direct influence on students' green lifestyles, with a path coefficient of 0.457 $t = 3.803$; $p < 0.05$. These findings are supported by research on ecoliteracy and green consumption, which demonstrates a significant positive correlation, indicating that environmental behavioral skills and a sense of environmental responsibility play an important role in influencing an individual's green consumption behavior (Liu et al., 2024). Furthermore research on the determinants of a green lifestyle for environmental sustainability shows that the more responsible an individual's attitude toward the environment is, the stronger their green lifestyle, as reflected in their interactions with and treatment of nature (Farida et al., 2024). By learning the fundamental principles of ecology, students have developed the ability to critically assess environmental problems and formulate appropriate solutions. The responsibility they demonstrate to maintain the cleanliness and sustainability of the school environment is a tangible action that supports environmental conservation (Setiawati et al., 2020). Ecoliteracy fosters students' understanding of the interconnection between humans and ecosystems and cultivates ethical responsibility toward the natural environment.

A high level of ecoliteracy tends to enhance students' awareness of their ecological footprint and promote more responsible environmental consumption behavior. Research on learning experiences through nature emphasizes that students engagement in nature-based education significantly enhances their ecological literacy and increases their inclination toward a sustainable lifestyle (Kuo et al., 2019). The integration of ecoliteracy into the school curriculum not only leads to increased environmental knowledge but also contributes to the internalization of ecological values, which are reflected in students' green lifestyle practices. Therefore, the findings of this study confirm that students' ecoliteracy significantly contributes to the implementation of green lifestyle practices in SMA Muhammadiyah 23 Jakarta.

4.6. environmental concern character is indirectly influenced by social environmental knowledge through green lifestyle

Based on the empirical findings of this study, ecoliteracy has a direct influence on green lifestyles with a path coefficient of 0.457. Furthermore, a green lifestyle directly affected the environmental concern character with a coefficient of 0.343. The indirect effect of ecoliteracy on environmental concern through green lifestyle was 0.157, indicating a significant mediating relationship. Ecoliteracy plays a crucial role in shaping sustainable environmental behavior among students. Their understanding of ecological principles such as ecosystem balance, sustainability, and environmental responsibility positively correlates with the adoption of more environmentally conscious lifestyles, including reducing plastic waste, conserving energy, and participating in recycling programs (Torres et al., 2022). A green lifestyle serves as a vital bridge that connects cognitive awareness of ecological issues with tangible, everyday actions, ultimately reinforcing students' character of environmental concern. Ecological literacy is not only related to knowledge acquisition but also to the development of values, attitudes, and a consistent commitment to ecological actions. Therefore, sustainable behavior supported by ecoliteracy is not only instrumental but also transformative in shaping a holistic environmental concern character in students.

4.7. Environmental Concern Character is Indirectly Influenced by Ecoliteracy through Green Lifestyle

The results of this study indicate that ecoliteracy directly influences environmental concern character with a path coefficient of 0.158 and indirectly through a green lifestyle with a coefficient of 0.282. Given that green lifestyle has a direct effect on environmental concern with a coefficient of 0.343, the resulting indirect effect of ecoliteracy is 0.212. Therefore, the total influence of ecoliteracy both direct and mediated is 0.370. These findings reinforce the view that students' understanding of ecological principles encourages them to adopt habits that reflect environmental concerns, particularly in maintaining daily cleanliness and health in the school environment. Similarly, a study by Kesuma also revealed that improved ecoliteracy among students promotes engagement in environmental actions through the adoption of a greener lifestyle (Rahmatika et al., 2024).

This green lifestyle then evolves into a school-wide culture of discipline that demands adherence to environmental standards from all the members of the school community. Although some students may not yet exhibit a deep conceptual understanding of environmental concerns, ecoliteracy has nonetheless been functionally translated into behavior (Rudolph et al., 2024). This is reflected in their compliance with

established routines and policies designed to maintain the school environment, indicating that ecoliteracy plays a vital role in shaping and strengthening environmental concerns through behavioral regularity and institutional discipline. Furthermore, ecoliteracy serves as a bridge between ecological knowledge and real action through the internalization of values and systematic habituation (Mochizuki et al., 2015). Thus, students' ecoliteracy has a significant impact on their environmental concerns and indirectly contributes to the development of an environmentally friendly green lifestyle.

5. Conclusion

Based on the research findings, efforts to enhance the environmental care character of students in SMA Muhammadiyah 23 Jakarta require strengthening the green lifestyle aspect while considering the factors of social-environmental knowledge and ecoliteracy. The regression analysis shows that these two factors jointly contribute significantly to the development of environmental care characteristics, indicating a strong and positive relationship. The findings suggest that ecoliteracy and social-environmental knowledge are important predictors of pro-environmental behavior among students. Variations in social-environmental knowledge have been proven to strongly support the development of environmental care characteristics while also encouraging students' green lifestyle practices in the context of environmental preservation. This strengthens the evidence of a close relationship between social-environmental knowledge, green lifestyles, and environmental care characteristics. Similarly, variations in ecoliteracy levels play a significant role in shaping students' environmental care characteristics and contribute to promoting green lifestyle behaviors as tangible actions for environmental preservation.

This study hads several limitations. First, the sample was limited to one school, thereby restricting the generalization of the findings to the broader population of high school students nationwide. Second, the research design was cross-sectional, which does not allow for the full determination of causal relationships among the variables. Third, external factors such as family support, media influence, and school environmental policies were not measured comprehensively, despite their potential influence on the research outcomes. Therefore, the research findings and discussion suggest that the close interrelationship between ecoliteracy, green lifestyle, and social-environmental knowledge forms tha fundamental basis for building a strong environmental care character. This character not only reflects values that support pro-environmental attitudes but also demonstrates students' readiness to actively engage in addressing future environmental challenges.

References

Abd Rahman, N., Halim, L., & Ahmad, A. R. (2014). Environmental Knowledge among Aboriginal Students. *Journal of Educational and Social Research*, *4*(6), 279–286. https://doi.org/10.5901/jesr.2014.v4n6p279

Abdullah, K. H. (2023). Eco-literacy and Social Media: A Bibliometric Review. *Journal of Scientometric Research*, *12*(3), 631–640. https://doi.org/10.5530/JSCIRES.12.3.061

Agustina, E., Rendrapuri, R. V., & Rustini, T. (2024). Implementation of character education to maintain a clean environment in social studies learning at elementary schools. In Cendikia : *Media Jurnal Ilmiah Pendidikan 4*(3). https://doi.org/10.35335/cendikia.v14i3.4586

Al-Naqbi, A. K., & Alshannag, Q. (2018). The status of education for sustainable development and sustainability knowledge, attitudes, and behaviors of UAE University students. *International Journal of Sustainability in Higher Education*, 19(3), 566–588. https://doi.org/10.1108/IJSHE-06-2017-0091

Angelin Rosalina Eka Agustin, & Suhari Suhari. (2023). The Cultivation of Environmental Care Character Values among Grade XI Students at SMA Kemala Bhayangkari 3 Porong. *Jurnal Kajian Dan Penelitian Umum*, *1*(1), 01–13. https://doi.org/10.47861/jkpu-nalanda.v1i1.93

Apoko, T. W., & Sya'ban, M. B. A. (2022). The impact of online learning implementation on satisfaction, motivation, quality of the learning process, and student learning outcomes. *AL-ISHLAH: Jurnal Pendidikan*, *14*(4), 5923–5932. https://doi.org/10.35445/alishlah.v14i4.2096

Bartolo, M. G., Servidio, R., Palermiti, A. L., Nappa, M. R., & Costabile, A. (2023). Pro-Environmental Behaviors and Well-Being in Adolescence: The Mediating Role of Place Attachment. *International Journal of Environmental Research and Public Health*, *20*(10). https://doi.org/10.3390/ijerph20105759

Chwialkowska, A. (2019). How Sustainability Influencers Drive Green Lifestyle Adoption On Social Media: The Process Of Green Lifestyle Adoption Explained Through The Lenses Of The Minority Influence Model And Social Learning Theory. *Management of Sustainable Development Sibiu, Romania*, *11*(1). https://doi.org/10.2478/msd-2019-0019

Dirawan, D. G. (2023). Analysis of Environmental Knowledge Level and Environmental Care Attitude of Students at SMA 3 Majene, West Sulawesi Province. *UNM Environmental Journals*, *6*, 7–12. https://doi.org/10.26858/uej.v6i2

Efendi, N., Barkara, R. S., & Fitria, Y. (2020). Implementation of Character Cares About The Environment in Elementary School Lolong Belanti Padang. *Jurnal Komunikasi Pendidikan*, *4*(2), 1–10. https://doi.org/10.32585/jkp.v4i2.460

El Rizaq, A. D. B., Utami, W. S., Abdullah, A. F. A., Romadhon, S., & Ibrahim, M. H. (2025). Analysis of environmental care attitudes based on students' ecological intelligence. *AL MA'ARIEF : Jurnal Pendidikan Sosial Dan Budaya*, *7*(1), 15–23. https://doi.org/10.35905/almaarief.v7i1.12983

Farida, D. N., Adhitya, F., & Rahmawati, F. (2024a). Determinants of Green Lifestyle Factors to Maintain The Sustainability of Environmental Tourism Business. *Keunis*, *12*(1), 44–55. https://doi.org/10.32497/keunis.v12i1.5059

Goldman, D., Ayalon, O., Baum, D., & Weiss, B. (2018). Influence of 'green school certification' on students' environmental literacy and adoption of sustainable practice by schools. *Journal of Cleaner Production*, 183, 1300–1313. https://doi.org/10.1016/j.jclepro.2018.02.176

Goldman, D., Pe'er, S., & Yavetz, B. (2017). Environmental literacy of youth movement members–is environmentalism a component of their social activism?. *Environmental Education Research*, *23*(4), 486–514. https://doi.org/10.1080/13504622.2015.1108390

Handayani, R., Noor, I. G., & Dewi, R. S. (2024). The Role of Environmental Care Character Education in Schools in Shaping a Smart and Responsible Generation toward Environmental Sustainability. *Ainara Journal (Jurnal Penelitian Dan PKM Bidang Ilmu Pendidikan)*, *5*(3), 372–377. https://doi.org/10.54371/ainj.v5i3.560

Hassan, A., Noordin, T. A., & Sulaiman, S. (2010). The status on the level of environmental awareness in the concept of sustainable development amongst secondary school students. *Procedia - Social and Behavioral Sciences*, *2*(2), 1276–1280. https://doi.org/10.1016/j.sbspro.2010.03.187

Husamah, H., Rahardjanto, A., Permana, T. I., & Lestari, N. (2025). The relationship between environmental literacy, ecological literacy, and science for sustainability: A systematic literature review. *Research and Development in Education (RaDEn)*, *5*(1), 351–364. https://doi.org/10.22219/raden.v5i1.39957

Husamah, H., Suwono, H., Nur, H., & Dharmawan, A. (2022). Environmental education research in Indonesian Scopus indexed journal: A systematic literature review. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *8*(2), 105–120. https://doi.org/10.22219/jpbi.v8i2.21041

Husin, A., Helmi, H., Nengsih, Y. K., & Rendana, M. (2025). Environmental education in schools: sustainability and hope. *Discover Sustainability*, *6*(1). https://doi.org/10.1007/s43621-025-00837-2

Kadarisman, I., & Pursitasari, I. D. (2023). Eco-literacy in Science Learning: A Review and Bibliometric Analysis. *Jurnal Pendidikan Indonesia Gemilang*, *3*(2), 134–148. https://doi.org/10.53889/jpig.v3i2.197

Kukkonen, J., Kärkkäinen, S., & Keinonen, T. (2018). Examining the relationships between factors influencing environmental behaviour among university students. *Sustainability (Switzerland)*, 10(11). https://doi.org/10.3390/su10114294

Kuo, M., Barnes, M., & Jordan, C. (2019). Do experiences with nature promote learning? Converging evidence of a cause-and-effect relationship. *Frontiers in Psychology*, 10. https://doi.org/10.3389/fpsyg.2019.00305

Kuźniarska Aneta. (2018). Pillars of Creating Sustainable Personnel in an Organization. *Entrepreneurship and Management*, 294, 2018. https://doi.org/oai:ruj.uj.edu.pl:item/55426

Lestari, W., Azhari, I., Haji, U., Utara, S., & Medan, U. N. (2024). The Influence of Social Environment on Students' Conservation Attitudes in Medan. *Entita*, 6(2). https://doi.org/10.19105/ejpis.v6i2.15783

Liang, M., Chen, Q., & Zhou, Y. (2022). The Influence of Various Role Models on Children's Pro-environmental Behaviours. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.873078

Liu, L., & Tobias, G. R. (2024). The impact of environmental literacy on residents' green consumption : Experimental evidence from China. *Cleaner and Responsible Consumption, 12*, 100165. https://doi.org/10.1016/j.clrc.2023.100165

Marlina, M., Mkumbachi, R. L., Mane, A., & Daud, L. R. (2023). Environmental Care Character Education Based On Local Wisdom For Marine Resource Management. *Jambura Geo Education Journal*, *4*(2), 199–207. https://doi.org/10.34312/jgej.v4i2.21920

Maurer, M., & Bogner, F. X. (2020). Modelling environmental literacy with environmental knowledge, values and (reported) behaviour. *Studies in Educational Evaluation*, 65. https://doi.org/10.1016/j.stueduc.2020.100863

Meilinda, H., Prayitno, B. A., & Karyanto, P. (2017). Student's Environmental Literacy Profile of Adiwiyata Green School in Surakarta, Indonesia. *Education and Learning*, *11*(3). https://doi.org/10.11591/edulearn.v11i3.6433

Mochizuki, Y., & Bryan, A. (2015). Climate Change Education in the Context of Education for Sustainable Development: Rationale and Principles. *Journal of Education for Sustainable Development*, *9*(1), 4–26. https://doi.org/10.1177/0973408215569109

Nainggolan, A., Sinurat, A., Purba, T., Arent, E., & Meilitasari, R. (2023). The Role of Social Environmental Education Learning in Shaping Students' Environmental Care Attitudes. *Journal on Education*, *5*(4), 13166–13171. https://doi.org/10.31004/joe.v5i4.2317

Novita, N., Nurdin, & Putri, R. D. (2020). The Influence of Green Perceived Knowledge and Environmental Concern on Eco-Friendly Behavior. *Economic Education and Entrepreneurship Journal*, *3*(1), 35–50. http://jurnal.fkip.unila.ac.id/index.php/E3J/article/view/21940

Nurdin, A. S., & Ratnasari, I. (2024). The Influence of Green Lifestyle, Green Product Knowledge, and Green Advertising on Green Purchase Intention of Volta Electric Motorcycles among the Community in Karawang Regency. *Journal Of Social Science Research*, 4, 11407–11418. https://doi.org/https://doi.org/10.31004/innovative.v4i4.14508

Özgören, A., & Erökten, S. (2016). The Environmental Knowledge Level of Classroom Teaching Students and their Views Toward the Environment. *Mediterranean Journal of Social Sciences*, *7*(6), 159–164. https://doi.org/10.5901/mjss.2016.v7n6p159

Panggestu, I. G. A., & Suhari, S. (2024). Application of Environmental Care Character Values for Class XI Students at SMAN 13 Surabaya. *Jurnal Pendidikan Sosiologi Dan Humaniora*, *15*(1), 376. https://doi.org/10.26418/j-psh.v15i1.77083

Pramesti, P., Cahyaningrum, Y. A. D., & Rahayu, F. (2022). The Consequences of Green Lifestyle, Product Knowledge, and Community. *Jurnal Ekonomi Trisakti*, *2*(2), 555–566. https://doi.org/http://dx.doi.org/10.25105/jet.v2i2.14303

Qodriyanti, A., Yarza, H. N., Irdalisa, I., Elvianasti, M., & Ritonga, R. F. (2022). Analysis of Students' Environmental Care Attitudes in One Islamic Senior High School (MAN) on Environmental Conservation Material. *Jurnal Eksakta Pendidikan (Jep)*, *6*(1), 111–116. https://doi.org/10.24036/jep/vol6-iss1/643

Rahmatika Kesuma, A., Suyatna, A., Bakri, S., Sari, R., & Sobby Kesuma, A. (2024). Eco-literacy and Environmentally Caring Behavior for Environmental Sustainability. *African Journal of Biological Sciences*, *6*(5), 6091–6101. https://doi.org/10.33472/AFJBS.6.5.2024

Ratnasari, J., Hakam, K. A., Hidayat, M., Kosasih, A., Karakter, U., & Indonesia, U. P. (2024). Strengthening Environmental Care Character Contextual Approach in Science Learning. *JPPIPA*, 10(11), 9234–9241. https://doi.org/10.29303/jppipa.v10i11.9024

Requena-i-Mora, M., Brockington, D., & Fleischman, F. (2025). Eco-paradox USA: The relationships between economic growth and environmental concern generally, and by different income groups. *Ecological Economics*, *235*, 108648. https://doi.org/10.1016/j.ecolecon.2025.108648

Rudolph, S., Isbester, S., Payne, A. L., & Delany, T. (2024). Understanding school discipline and exclusion in Australia: key issues. *Australian Educational Researcher*, *52*. https://doi.org/https://doi.org/10.1007/s13384-024-00773-6

Sasea, L. I., Ibrohim, I., & Sueb, S. (2023). The relationship of environmental knowledge and environmental care attitude of students. *Inornatus: Biology Education Journal*, *3*(2), 85–91. https://doi.org/10.30862/inornatus.v3i2.426

Sumarlan, A., Darmawan, M., Fahrezi, M. A., & Nurjaman, R. (2024). The Level of Environmental Awareness and Concern of Students at SMA Negeri 1 Talaga toward Their Surrounding Environment. *JMPB*, *2*(2), 66–72. https://doi.org/https://doi.org/10.59581/jmpb-widyakarya.v2i2.3341

Sunarto, S. (2023a). Environmental Literacy and Care Behavior Through Adiwiyata Program at Elementary School. *AL-ISHLAH: Jurnal Pendidikan*, *15*(3), 3040–3050. https://doi.org/10.35445/alishlah.v15i3.3887

Syah, N., Hidayat, H., Yuca, V., Ardi, Z., & Magistarina, E. (2021). Examining the Effects of Ecoliteracy on Knowledge, Attitudes, and Behavior through Adiwiyata Environmental Education for Indonesian Students. *Journal of Social Studies Education Research Sosyal Bilgiler Eğitimi Araştırmaları Dergisi*, *12*(4), 209–230. https://jsser.org/index.php/jsser/article/view/3470

Syahri, M., Widodo, M., & Sofwani, A. (2021). Environmental Awareness of Character Building For Students Through The Waste Bank Education. *Journal of Southwest Jiaotong University*, 1–95. https://doi.org/10.35741/issn.0258-2724.56.6.55

Torres-Soto, N. Y., Corral-Verdugo, V., & Corral-Frías, N. S. (2022). The relationship between self-care, positive family environment, and human wellbeing. *Wellbeing, Space and Society*, *3*. https://doi.org/10.1016/j.wss.2022.100076

Tyas, D. N., Nurharini, A., Wulandari, D., & Isdaryanti, B. (2022). Analysis of Elementary Students' Ecoliteracy Skills and Environmentally Caring Character During Online Learning Amid the COVID-19 Pandemic. *Faktor : Jurnal Ilmiah Kependidikan*, *9*(3), 213. https://doi.org/10.30998/fjik.v9i3.11173

Wan, Q., & Du, W. (2022). Social Capital, Environmental Knowledge, and Pro-Environmental Behavior. *International Journal of Environmental Research and Public Health*, *19*(3). https://doi.org/10.3390/ijerph19031443

Wu, J., Ahmad, S. F., Jaweria, Ali, Y. A., Al-Razgan, M., Awwad, E. M., & Bani Ahmad Ayassrah, A. Y. A. (2024). Investigating the role of green behavior and perceived benefits in shaping green car buying behavior with environmental awareness as a moderator. *Heliyon*, *10*(9). https://doi.org/10.1016/j.heliyon.2024.e30098

Yildirim, M. S., Elkoca, A., Gökçay, G., Yilmaz, D. A., & Yıldız, M. (2025). The relationship between environmental literacy, ecological footprint awareness, and environmental behavior in adults. *BMC Public Health*, *25*(1). https://doi.org/10.1186/s12889-025-21340-3

Yulianingsih, Laela, & Sardju, H. (2025). The Influence of Green Knowledge and Green Perceived Value on Purchase Intention Mediated by Green Lifestyle. *International Journal of Business, Law, and Education*, *6*(1), 682–691. https://doi.org/https://doi.org/10.56442/ijble.v6i1.1080

Yusuf, R., & Fajri, I. (2022). Differences in behavior, engagement and environmental knowledge on waste management for science and social students through the campus program. *Heliyon*, *8*(2), e08912. https://doi.org/10.1016/j.heliyon.2022.e08912

Zhao, Y., Liu, X., & Han, X. (2024). Enhancing pro-environmental behavior through nature-contact environmental education: an empirical analysis based on randomized controlled experiment design. *Frontiers in Environmental Science*, *12*. https://doi.org/10.3389/fenvs.2024.1491780