Environmental Anxiety among Students in Islamic Boarding Schools: A Comparative Study

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Abstract: Environmental anxiety has increasingly been recognized as a significant psychological response to the global ecological crisis, particularly among adolescents within formal educational settings where climate change discourse is integrated into learning processes. As schools function as primary spaces for cognitive, emotional, and moral development, understanding how educational contexts shape students' ecological concerns become essential. This study examines the impact of educational background on students' environmental anxiety by comparing Islamic boarding schools (pesantren) and non-Islamic schools in South Tapanuli Regency. Employing a quantitative comparative design, data were collected from 60 students (30 pesantren and 30 non-pesantren) using an adapted Environmental Anxiety Scale. The analysis covered five dimensions: fear of ecological disasters, future anxiety, ecological guilt, ecological paralysis, and denial. Findings indicate that non-pesantren students reported significantly higher anxiety levels across all dimensions ($p < 0.05$), while also demonstrating stronger pro-environmental behavior ($p < 0.01$). In contrast, pesantren students exhibited lower anxiety levels, potentially reflecting the internalization of religious values and communal support as adaptive coping mechanisms. These findings suggest that educational background significantly influences adolescents' emotional and behavioral responses to environmental challenges. The study contributes to policy discourse by emphasizing the integration of ecological literacy with spiritual and ethical reflection to foster ecological resilience and responsible behavior among young learners.

Keywords: Adolescents; Comparative study; Environmental anxiety; Islamic boarding schools; Non-pesantren schools; South Tapanuli

Introduction

Educational background plays a foundational role in shaping students' perspectives on environmental issues. Different educational settings—formal, informal, or religious-based—transmit distinct systems of values, knowledge, and worldviews regarding nature and sustainability (Kondrla, 2023). Schools have institutionalized multicultural values in structured and systematic ways (Ma'rifah & Sibawaihi, 2023), thereby influencing how students interpret their relationship with the natural world. Through processes of value internalization, educational background (pesantren vs. non-pesantren) shapes the adoption of religious or secular value orientations, which subsequently construct a moral-ecological framework that defines whether environmental protection is viewed as a spiritual duty, a civic responsibility, or merely a scientific concern. Research by Guntoro et al. (2022) demonstrates that spiritual approaches enhance mental and emotional well-being, indicating that value-based education affects emotional regulation and perception.

Likewise, the successful internalization of religious values in the At-Tamur street children's pesantren (Yusuf et al., 2023) illustrates how structured spiritual education can transform attitudes and behavioral dispositions. Sustainable education, as noted by Jimenez et al. (2021), extends beyond knowledge transfer toward transformative value formation.

Within this hierarchical pathway, the moral-ecological framework influences students' emotional responses, particularly ecological anxiety. Students from pesantren and non-pesantren backgrounds may therefore display different levels of eco-anxiety depending on how environmental issues are framed institutionally. Emotional and cognitive bonds with nature strengthen pro-environmental attitudes and consistent sustainable behaviors (Cayolla et al., 2023). Climate change has been shown to threaten mental health by intensifying negative climate-related emotions (Ogunbode et al., 2023), and eco-anxiety is increasingly reported among adolescents (Clayton et al., 2023; Tam et al., 2023). In pesantren education, the concept of humans as khalifatullah fil ardh fosters spiritual accountability toward environmental stewardship (Pajarianto et al., 2022), potentially transforming ecological anxiety into constructive pro-environmental behavior. Conversely, secular education may emphasize scientific reasoning without embedding environmental concern within a transcendental moral obligation.

The process of internalizing religious values in the At-Tamur street children's pesantren has achieved a high level of success, indicating rapid development in the spiritual education approach applied to the students (Yusuf et al., 2023). According to Jimenez et al. (2021), sustainable education involves not only the transfer of information but also the formation of attitudes, values, and critical skills that are transformative in nature. In this context, the educational process can serve as a strategic instrument in shaping the ecological paradigm of the younger generation.

Students from different educational backgrounds, such as pesantren and non-pesantren, show varied emotional responses to environmental degradation issues. Studies suggest that individuals' emotional and cognitive relationships with the environment can strengthen pro-environmental attitudes and trigger more consistent sustainable behaviors (Cayolla et al., 2023). Emotional responses, especially those related to ecological anxiety, are influenced by how educational institutions frame environmental issues as part of the moral and social responsibilities of students. For instance, climate change threatens mental health through increased negative climate-related emotions (Ogunbode et al., 2023). Anxiety about environmental damage, known as eco-anxiety, has become an increasingly common psychological reaction among teenagers and high school students (Clayton et al., 2023; Tam et al., 2023). In pesantren education, religious values often emphasize human responsibility as caliphs on earth (khalifatullah fil ardh), which can foster a sense of spiritual responsibility towards nature (Pajarianto et al., 2022). In contrast, secular non-pesantren education may place more emphasis on a scientific approach without a profound transcendental dimension.

Educational institutions play a strategic role in internalizing ecological awareness into learning (Zhou et al., 2021). Contextually designed and value-based education can strengthen students' understanding of the interconnections between human activities and environmental degradation. According to Hofman-Bergholm (2022), educational institutions must shift from instructional models to transformative models that enable students to develop critical awareness, social responsibility, and active participation in environmental sustainability. This is where the important role of both religious and non-religious schools lies, in creating a generation that is not only academically intelligent but also possesses high ethical and ecological sensitivity.

The varying methods of designing educational programs and the distinct principles emphasized within traditional schools versus Islamic boarding schools significantly shape the degrees of worry students feel about ecological issues. A curriculum that does not explicitly and contextually incorporate environmental issues tends to produce students with low ecological literacy and more extreme psychological reactions to information about the environmental crisis (Frantz & Mayer, 2009). On the other hand, an education curriculum based on religious values, even if not always supported by scientific foundations, often links environmental responsibilities to spiritual obligations, which can stabilize students' emotional reactions to environmental events (Abubakar, 2022). The research by Abidin et al. (2024) found that the values developed in pesantren are integrity, friendship, jihad, piety, and morality. Linking local wisdom with character education based on religion can help students not only to understand traditional values but also to actively contribute to maintaining their ecosystem (Muhammad et al., 2021). Therefore, curriculum design plays an important role in how students interpret ecological threats and manage the anxiety it causes.

This comparative research contributes to a deeper understanding of the relationship between the education system and the psychological health of students' environmental well-being, particularly in the context of religious and non-religious institutions. Such research is very important, given the increasing phenomenon of environmental anxiety among adolescents, as well as the lack of studies revealing how educational dimensions affect such psychological

conditions (Hickman et al., 2021). Eco-anxiety in adolescents due to climate change affects global mental health (Comtesse et al., 2021). Therefore, climate change requires adaptive psychological strategies to support the resilience of individuals and communities (Mah et al., 2020). However, according to Geist et al. (2019), in nursing schools, awareness of climate change reduces anxiety by strengthening practical knowledge. By critically analyzing the emotional and cognitive aspects of two types of educational systems, this research provides an empirical basis for developing educational policies that are more sensitive to environmental and mental health issues. Thus, the results of this study are expected to serve as a reference in developing adaptive and holistic educational strategies to face current ecosocial challenges.

The majority of educational institutions, both formal and religious, have not systematically integrated environmental education into their curricula. However, an integrated environmental education curriculum effectively shapes responsible students who are aware of impacts and have environmental insights (Damoah et al., 2024). Furthermore, Harahap et al. (2024) elaborate that the vital role of environmental education and philosophy plays an important role in shaping an environmentally conscious and highly ethical society. The absence of structured and sustainable environmental education affects the low ecological literacy among students, especially in understanding the relationship between human activities and ecosystem damage (Debrah et al., 2021; Mencho, 2022). This is reinforced by findings from UNESCO (2018) which show that environmental education is still marginalized in many countries, often only presented as local content or extracurricular activities. Meanwhile, holistic and integrated environmental education is an important foundation in shaping critical thinking and pro-environmental behavior from an early age.

Students from various educational backgrounds often fail to demonstrate reflective abilities in facing environmental issues, especially in the context of daily life. The gap between the theories learned in class and everyday practices is one of the reasons many students are unable to apply sustainability principles in a real sense (Lutz et al., 2023; Savari et al., 2023). Many educational institutions produce graduates who are intellectually smart but lack ecological sensitivity (Chiu & Chai, 2020; Kondrla, 2023). However, educational institutions that involve their students in environmental organization activities and admonish environmental polluters tend to have higher environmental awareness and sensitivity (Gok & Kilic, 2021). This occurs because education does not sufficiently emphasize the interconnectedness between humans and nature. This condition shows the need for a more contextual and applicative pedagogical approach in environmental learning.

Although education based on religious values has great potential in building environmental ethics, its effectiveness is still limited in reducing students' ecological anxiety in the midst of the global climate crisis. The principle of environmental ethics is to minimize harm (Nawari et al., 2022). because these attitudes can reduce environmental damage in the future (Sholahuddin et al., 2021). Environmental damage causes high environmental anxiety among children and young people, as shown in research by Hickman et al. (2021), which indicates that children and young people in ten countries show significant concerns and anxieties about climate change and government responses to it, with negative impacts felt in their daily lives and a frightening perception of the future. Ecological anxiety is a psychological condition that arises from excessive worry about the future of this planet, and it requires educational interventions that are not merely moralistic. A science-based approach and reinforcement of psychological resilience are needed (Clayton et al., 2023). Without a balance between spiritual dimensions and scientific literacy as well as adaptive skills, students may experience confusion and helplessness in confronting the complexities of global environmental issues.

The difference in pedagogical approaches between pesantren (Islamic boarding schools) and non-pesantren institutions also hampers the development of comprehensive environmental awareness. Indonesia is currently the center of the largest Islamic education system in the world, with thousands of madrasahs and pesantren growing not only in number and management but also in diverse ideologies (Malik, 2024). Pesantren prioritize traditional Islamic education through the 'kitab kuning' to deepen religious issues (Zulmuqim et al., 2020). However, there are also moderate pesantren curricula, such as Pesantren Al-Ilahiyyah, which integrate moderate Islamic values into the daily activities of students implicitly.

Curricula that are too theoretical, non-contextual, or thematically fragmented make it difficult for students to connect environmental learning with their real-life experiences. Fang et al. (2023) assert that traditional educational frameworks continue to embrace a fragmented approach and fail to foster the incorporation of environmental principles throughout the complete educational journey. state that conventional education systems are still reductionist and do not encourage the integration of ecological values into the entire learning process. As a result, students are not trained to become active subjects in environmental transformation, but rather just passive recipients of information.

One of the main factors causing students' understanding of ecological issues to be incomplete is the limited access to credible environmental information. In the digital era, the flow of uncurated information can trigger misinformation or even ecological paralysis, a condition where individuals feel too overwhelmed to act (Pihkala, 2020). The lack of media literacy and minimal guidance from teachers in filtering information sources makes students vulnerable to misleading narratives about climate change and ecological disasters (Bibri et al., 2024; Mishra et al., 2021). This situation underscores the importance of critical education and digital literacy within the framework of contemporary environmental education.

The gap in educational approaches to environmental issues and students' psychological health highlights the urgent need to carefully examine how educational systems, both religious and non-religious, impact the level of ecological anxiety among young people. Research by Tam et al. (2023) reveals that climate change can increase global anxiety, triggering activism and the need for cross-cultural research. This underscores the importance of in-depth research in understanding how various pedagogical approaches influence ecological awareness and students' mental resilience. According to Raman et al. (2024), it is important for young people to engage in actions such as tree planting, which will enhance biodiversity, resilience, ecological awareness that will impact mental health and sustainability.

As an effort to respond to these conditions, this research proposes a comparative approach in analyzing the pedagogical differences that contribute to the formation of ecological awareness and the mental resilience of students. By comparing various educational approaches, it is hoped that a relationship can be found between educational background and the environmental anxiety experienced by students. This study aims to critically identify how educational background can influence students' perceptions and attitudes towards environmental issues.

The main objective of this research is to produce evidence-based recommendations that can be used to design adaptive, transformative, and contextual educational strategies in facing contemporary ecosocial challenges. These recommendations are expected to provide concrete solutions to enhance ecological awareness and strengthen students' mental resilience, considering various educational factors that influence them. Thus, the educational approach is anticipated to be more responsive to the needs of the times and able to prepare the younger generation to face increasingly complex environmental challenges.

Method

The research method used in this study is a comparative quantitative method aimed at identifying the differences in environmental anxiety levels between two groups of students with different educational backgrounds, namely students from pesantren-based schools and students from regular junior high schools (non-pesantren) in South Tapanuli Regency. The quantitative method involves the collection and analysis of numerical data to systematically and objectively examine specific variables (Meng, 2022). The comparative method in quantitative approaches is often used to determine whether there are statistically significant differences between two or more independent groups.

This study involved 60 respondents, consisting of 30 students from a pesantren school and 30 students from a non-pesantren school. All respondents were in the eighth grade and were selected using purposive sampling techniques, considering geographical similarities, access to environmental education, and comparable school characteristics. This was intended to ensure contextual equivalence between the two groups of students so that the comparisons made would be meaningful.

Environmental anxiety integrates classical psychology concepts with contemporary ecological challenges, effectively combining perceived and ecological threats within a single instrument (Chan et al., 2024). This research instrument is in the form of a structured questionnaire with a 5-point Likert scale. The questionnaire is based on an adaptation of the Environmental Anxiety Scale developed by Clayton et al. (2020), which measures five dimensions of environmental anxiety: fear of ecological disasters, future-oriented anxiety, ecological guilt, ecological paralysis, and denial, consisting of 22 items, which were then adjusted to the geographical conditions of South Tapanuli Regency and the age of children aged 12-13 years in the seventh grade, resulting in a total of 15 items. Before being used in the main data collection, this instrument was trialed to evaluate its validity and reliability. Validity was tested using Pearson's product-moment correlation, while reliability was measured using Cronbach's Alpha coefficient, which indicates an adequate level of internal consistency.

All data were collected through the direct distribution of printed questionnaires during class hours, after obtaining official permission from the school principal and verbal consent from the students. The collected data were analyzed using SPSS version 26. The assessment employed descriptive statistical methods, including mean and standard deviation, for delineating

the characteristics of environmental anxiety within each distinct group. Assessments of normal distribution were carried out utilizing the Kolmogorov–Smirnov and Shapiro–Wilk tests, accompanied by Levene's test to ascertain the homogeneity of variance across the various groups. If the assumptions of normality and homogeneity were met, an independent t-test was used. However, if the assumptions were not met, the Mann–Whitney U test was used as a non-parametric alternative.

Results and Discussion

The subsequent segment details the findings from a quantitative study comparing environmental concerns in students attending Islamic boarding schools versus those in regular schools. The goal of this study is to ascertain whether significant disparities exist in the degree of ecological apprehension among students from diverse educational backgrounds, assessed across five key aspects: fear of ecological disasters, future-oriented anxiety, ecological guilt, ecological paralysis, and denial. Data were collected from 60 students, namely 30 from pesantren schools and 30 from non-pesantren schools, using the Environmental Anxiety Scale adapted from Clayton et al. (2020). The descriptive statistical results and inferential analysis of the independent two-sample t-test on environmental anxiety based on school background are presented in the following Tables 1 and 2.

Table 1. Descriptive Statistics of Environmental Anxiety Scores by School Background

	School Background	N	Mean	Std. Deviation	Std. Error Mean
Future-Oriented Anxiety	Boarding	30	2.923	.8819	.1610
	Non-Islamic Boarding School	30	3.367	.7658	.1398
Fear of Disasters	Boarding	30	3.083	.7178	.1311
	Non-Islamic Boarding School	30	3.513	.7860	.1435
Ecological Paralysis	Boarding	30	2.650	.7075	.1292
	Non-Islamic Boarding School	30	3.087	.7565	.1381
Denial & Guilt	Boarding	30	2.553	1.0566	.1929
	Non-Islamic Boarding School	30	3.247	.7925	.1447
Pro-Environmental	Boarding	30	2.800	.9248	.1688
Behavior	Non-Islamic Boarding School	30	3.533	1.0080	.1840

Table 2. Inferential Analysis: Independent Two-Sample T Test

		F	t	df	Sig. (2-tailed)	Information
Future-Oriented Anxiety	Equal variances assumed	.603	-2.079	58	.042	Significant
	Equal variances not assumed.		-2.079	56.882	.042	Significant
Fear of Disasters	Equal variances assumed	.120	-2.213	58	.031	Significant
	Equal variances not assumed.		-2.213	57.529	.031	Significant
Ecological Paralysis	Equal variances assumed	.109	-2.309	58	.025	Significant
	Equal variances not assumed.		-2.309	57.742	.025	Significant
Denial & Guilt	Equal variances assumed	7.634	-2.875	58	.006	Significant
	Equal variances not assumed.		-2.875	53.786	.006	Significant
Pro-Environmental Behavior	Equal variances assumed	.485	-2.936	58	.005	Significant
	Equal variances not assumed.		-2.936	57.574	.005	Significant

The data in Table 1 shows that non-boarding school students have a higher level of future-oriented anxiety (M = 3.367, SD = 0.7658) compared to boarding school students (M = 2.923, SD = 0.8819). The independent t-test (Table 2) confirms that this difference is statistically significant t (58) = -2.079, p = 0.042. This phenomenon can be explained through the framework of the Environmental Anxiety Model, which positions future projections as the main trigger of ecological anxiety (S. Clayton, 2020). Non-boarding school students, who tend to be more exposed to global environmental information through social media and online sources, may have a higher awareness of future ecosystem risks, thereby triggering greater anxiety. This aligns with the findings (Ojala, 2012) that indicate exposure to climate crisis information without supportive adaptive coping can increase future-oriented anxiety in adolescents.

Non-boarding school students recorded a higher average score (M = 3.513) compared to boarding school students (M = 3.083), with a significant difference t (58) = -2.213, p = 0.031. This difference can be attributed to variations in the learning context. In non-boarding schools, the subjects of science and social studies tend to contain more information about natural disasters and climate change, while in boarding schools, the portion of such material is relatively limited due to the curriculum's focus on religious education (Kondrla, 2023; Lutfauziah et al., 2023). This indicates that students

in public schools tend to show stronger emotional responses to catastrophic environmental threats. This aligns with Chen et al. (2020), who revealed that natural disasters resulting from climate change test psychological resilience more than is empirically understood. This phenomenon may be caused by exposure to media or science curricula that emphasize the critical aspects of the ecological crisis without a spiritual approach or metaphysical responsibility. These findings support the research of Clayton et al. (2023), which states that the intensity of exposure to ecological disaster issues can influence the level of specific anxiety regarding those events. Media exposure affects ecological anxiety and pro-environmental behavior, with resilience as a key factor (Shao & Yu, 2023).

The average score of non-Pesantren students (M = 3.087) is also higher than that of Pesantren students (M = 2.650), and this difference is significant t (58) = -2.309, p = 0.025). Ecological paralysis describes a condition in which individuals feel powerless in the face of environmental damage, thus reducing their motivation to act (Clayton et al., 2023; Mebane et al., 2023). This difference may be due to differences in community support. Pesantren often emphasize collective action based on religious values such as amar ma'ruf nahi munkar in environmental management, which can reduce feelings of helplessness (Purnomo et al., 2024). In contrast, non-Pesantren students, despite having higher knowledge about ecological threats, may lack structured community support to address those feelings of helplessness.

The average score of denial and ecological guilt among non-religious boarding school students (M = 3.247) is higher compared to boarding school students (M = 2.553), with a significant difference t(58) = -2.875, p = 0.006. This trend indicates that non-religious boarding school students experience cognitive dissonance between environmental awareness and less environmentally friendly behavior, thus generating feelings of guilt (Barta et al., 2023; Marikyan et al., 2023; Sommerfeldt & Kent, 2020). On the other hand, boarding school students may hold religious views that emphasize surrender and the concept of humans as stewards on earth, which can reduce guilt while decreasing denial mechanisms (Abidin & Sirojuddin, 2024; Ok et al., 2022).

Interestingly, non-boarding school students have a higher pro-environmental behavior score (M = 3.533) compared to boarding school students (M = 2.800), with a significant difference t (58) = -2.936, p = 0.005). This supports the Value Belief Norm theory which states that high ecological anxiety can drive pro-environmental behavior, as long as individuals believe that their actions can have a positive impact (Ajibade & Boateng, 2021; Al-Hawari et al., 2021). The findings of Verplanken et al.

(Verplanken et al., 2020) are reinforced, where environmental concerns can motivate pro-environmental actions or reflect intrapersonal dysfunction. The study by Pickering et al. (2023) also reveals that personality and anxiety significantly influence pro-environmental attitudes and actions, as stated by Ágoston et al. (2024) in preventing ecosystem collapse, where the connection to nature affects pro-environmental behavior through eco-emotions. In this context, for non-boarding school students, anxiety seems to play a role as a trigger for action, not a barrier.

The results of fears regarding ecological disasters indicate that the differences in perceptions of ecological risks between the two groups are very strong. These findings reinforce the argument that curriculum, teaching methods, and exposure to environmental issues play a crucial role in shaping emotional responses to environmental changes, supporting the theoretical framework of Clayton et al. (2020), which states that eco-anxiety is multidimensional and contextual, shaped not only by knowledge but also by moral, existential, and institutional variables (Hogg et al., 2021; Wullenkord et al., 2021). Climate change anxiety is influenced by psychological, experiential, cognitive, and sociocultural factors (Chan et al., 2024). The significance of what these results reveal underscores the need for an educational framework regarding the environment that is both integrative and crosses disciplines, connecting knowledge of science with considerations of ethics and spirituality.

Thus, this research contributes to the discourse on environmental mental health, by empirically demonstrating that the educational context, particularly the integration of value-based ecological ethics, plays an important role in modulating teenagers' emotional responses to environmental crises.

Conclusion

This study shows that there is a significant difference in the level of environmental anxiety between students of pesantren (Islamic boarding schools) and non-pesantren in South Tapanuli Regency, where non-pesantren students have higher scores across all measured dimensions, namely future-oriented anxiety, fear of ecological disasters, ecological paralysis, denial, and ecological guilt, as well as pro-environmental behavior triggered by anxiety. The most striking difference is found in the dimensions of fear of ecological disasters and pro-environmental behavior triggered by anxiety, indicating that this group has a greater perception of ecological threat and tends to respond with concrete actions. On the other hand, pesantren students scored lower in all dimensions, which may be attributed to differences in educational approaches and

the values embraced, as well as strong socio-communal support that functions as a coping mechanism in facing ecological threats. The varying degrees of ecological worry observed across these cohorts highlight the influential part that academic background has in molding opinions, feelings, and actions connected to ecological subjects. The integration of environmental education relevant to cultural contexts and local values becomes an important strategy to build healthy ecological awareness, avoid ecological paralysis, and channel anxiety into motivation for action. Theoretically, this research expands the understanding of the relationship between educational background and environmental anxiety in adolescents, as well as enriches the study of the Environmental Anxiety Model with a comparative perspective between religious-based educational institutions and general ones. Practically, the findings of this research provide recommendations for curriculum designers and education policymakers to formulate environmentally adaptive learning strategies that consider student characteristics, so that environmental anxiety can be managed constructively and lead to sustainable pro-environmental behavior.

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