Journal of Digital Sociohumanities
ISSN: 3032-7865 **Vol. 2 No. 2 2025**
Website : https://jds.unand.ac.id
Email : jds@hum.unand.ac.id | digitalsociohumanities@hum.unand.ac.id

Youth and the Environment: Assessing Awareness, Attitudes, and Action

Mohammed El Messaoudi[1*], Mohamed Bouftira[2], Aboulrhit Lamiae[3]
[1]Applied Linguistics and Artificial Intelligence Research Group, Moulay Ismail University, Meknes, Morocco
[2]University of Electronic Science and Technology of China, China
[3]Ibn Tofail University, Kenitra, Morocco

Article information

DOI : 10.25077/jds.2.2.111-127.2025
*Correspondence :
m.elmessaoudi@umi.ac.ma

Submission Track

Submission : May 04, 2025
Final Review : June 25, 2025
Accepted : June 27, 2025

Keywords

Environmental awareness, youth engagement, pro-environmental behavior, university responsibility, mixed methods, higher education, sustainability

Abstract

Environmental degradation necessitates urgent action, yet a gap often exists between awareness and behavior, particularly among youth who are crucial for future sustainability. Higher education institutions potentially play a significant role in shaping student environmentalism. This study addresses the persistent disconnect between environmental awareness and consistent pro-environmental action among university students. It specifically investigates factors influencing this gap, including the perceived environmental responsibility of the students' university. The study aimed to: (1) Assess university students' environmental knowledge (particularly regarding marine litter), attitudes, and awareness; (2) Identify factors influencing engagement in specific pro-environmental behaviors; (3) Evaluate how perceptions of university environmental responsibility affect student attitudes and behaviors; and (4) Explore perceived barriers and facilitators to environmental action. This research employed a mixed-methods approach with 122 university students. Quantitative survey data measured environmental knowledge (true/false, multiple choice), attitudes (Likert scales, e.g., interest, worry), and self-reported behaviors (e.g., household actions, waste separation). Qualitative data from open-ended questions explored perceptions of barriers, facilitators, and the university's role. Statistical analyses included descriptive statistics, correlations, t-tests, ANOVA, and regression; thematic analysis was used for qualitative data. Students demonstrated high environmental interest (Mean=4.01/5) and worry (Mean=3.96/5). However, a significant awareness-action gap was evident; for instance, while 81.1% reported using cloth bags, only 39.3% consistently separated household waste. Knowledge varied, with strong understanding of microplastic impacts (89.3% aware of health effects) but misconceptions about local issues (only 41.8% correctly disagreed the Adriatic Sea is clean). Social media emerged as the dominant information source (41%). Crucially, perceived university environmental responsibility significantly influenced student attitudes and behaviors. Qualitative findings highlighted inadequate university infrastructure (e.g., lack of recycling bins, prevalent single-use plastics) as a key barrier. These results underscore universities' critical role in bridging the awareness-action gap. Institutions must actively cultivate environmental responsibility through visible initiatives, improved infrastructure (like accessible recycling), and curriculum integration. Targeted interventions should leverage peer influence, address specific knowledge gaps (e.g., local pollution realities), and translate student concern into tangible, sustainable actions within the campus and community.

INTRODUCTION

Youth environmental awareness has emerged as a critical area of study within the broader context of environmental activism, reflecting the growing concern among younger generations regarding ecological sustainability and climate change. This phenomenon has been significantly influenced by historical events, such as the establishment of Earth Day in 1970 and the work of environmental justice advocates like Dr. Robert Bullard, which have underscored the importance of inclusive practices in environmental

discourse (Shutaleva et al., 2021). Notably, youth engagement has been catalyzed by recent global movements, including Fridays for Future and Extinction Rebellion, highlighting a shift in youth agency as they increasingly challenge existing political structures to address environmental crises.

Research on youth environmental awareness has identified various factors that shape pro-environmental behaviors and attitudes among adolescents, particularly the role of personal values, social influences, and educational interventions. For example, studies have shown that biospheric values—those that prioritize ecological wellbeing—are significantly linked to an individual's environmental self-identity and pro-environmental actions (Cruz & Tantengco, 2017; Thomas et al., 2022). Despite this, many young individuals report feeling disillusioned about their capacity to effect change, leading to a paradox where awareness does not always translate into active engagement (Balundė et al., 2020; Powell et al., 2019). This disconnect underscores the need for enhanced educational frameworks that empower youth to participate actively in environmental decision-making. However, existing literature reveals notable gaps and limitations in research methodologies, particularly concerning the underrepresentation of marginalized demographics and the over-reliance on self-reported data. Many studies primarily draw participants from high-income countries, resulting in findings that may not be generalizable across diverse cultural contexts (Balundė et al., 2020; Dittmer et al., 2023; Mititsina et al., 2021; Shutaleva et al., 2021). Additionally, the psychological dimensions of youth experiences, including feelings of helplessness and the need for community support, have been insufficiently explored, indicating a need for a more nuanced understanding of the emotional factors influencing youth engagement (Hofman-Bergholm, 2023; Moula et al., 2022; Pedersen Gurholt, 2024; Vasiliades et al., 2021). Future research should aim to broaden geographic representation, incorporate diverse demographic backgrounds, and establish causal relationships to better inform policies and practices aimed at fostering youth environmental activism. By addressing these gaps, researchers can enhance the understanding of how young people perceive and engage with environmental challenges, ultimately leading to more effective interventions and educational programs tailored to their needs (Chen, 1997; Corpuz et al., 2022; Falanga, 2024; Hoang et al., 2021; Hofman-Bergholm, 2023; Hua, 2004; Lasino et al.; Manning, 1998; Omran et al., 2014; Omran & Yarmohammadian, 2015; Pedersen Gurholt, 2024; Powell et al., 2019; Rukmana et al., 2023).

The evolution of environmental awareness among youth has deep roots in the broader environmental movements that emerged throughout the 20th century. Key figures, such as Dr. Robert Bullard, who is often referred to as the "father of environmental justice," played a pivotal role in advocating for inclusive practices within the environmental movement. This historical context has laid the foundation for contemporary youth engagement in environmental issues, emphasizing the importance of equitable treatment in environmental policy and activism (Dunlap & Mertig, 2014; Mol, 2000; Peterson, 2022; Rootes, 2004).

A significant turning point in the history of environmental activism was the establishment of Earth Day in 1970, which united millions around the globe in the fight for a healthier planet. This event not only raised awareness of pressing environmental concerns but also fostered a sense of collective responsibility among participants. The institutional framework established during this period led to the creation of organizations such as the Sierra Club and the World Wildlife Fund, which further mobilized efforts to advocate for environmental protection (Dunlap & Mertig, 2014). The formalization of environmental movements resulted in the establishment of regulatory bodies like the U.S. Environmental Protection Agency (EPA) in 1970, marking a transition toward structured governance in environmental protection. This period also allowed for collaboration among diverse stakeholders, including government entities, non-profits, and the private sector, to create a comprehensive approach to tackling environmental challenges (Dunlap & Mertig, 2014).

Modern environmentalism emerged in the mid-20th century as a reaction to industrialization and the consequent environmental degradation. This movement was characterized by an increasing public

consciousness regarding the need for sustainable practices and the protection of natural resources. Influential publications, such as Rachel Carson's "Silent Spring," were instrumental in galvanizing a broader environmental movement by highlighting the adverse effects of pesticides on ecosystems and human health (Carson, 2009).

The importance of environmental education cannot be overstated in fostering a sense of stewardship among youth. It promotes awareness of ecological interconnectedness and the significance of biodiversity, equipping young people with the knowledge to actively participate in environmental advocacy. Despite this, studies indicate that many youth feel disillusioned about their ability to effect change, with a significant number believing that individual actions have little impact on the larger environmental crisis (Shutaleva et al., 2021). This disconnect underscores the necessity for programs that empower youth and foster active engagement in policy discussions and decision-making processes (Vasiliades et al., 2021). As global movements such as Fridays for Future and Extinction Rebellion illustrate, young people are increasingly taking on leadership roles in advocating for environmental sustainability. However, their participation in policy-making remains limited, highlighting a critical gap that needs to be addressed to enhance youth engagement in shaping a sustainable future (Dittmer et al., 2023). Overall, the historical context of environmental movements reveals a complex interplay between activism, education, and youth involvement, which continues to evolve in response to contemporary environmental challenges.

Although initial evidence suggests potential causal relationships between values, environmental self-identity, and pro-environmental behaviors, definitive conclusions remain elusive. Past studies indicate that universalism values can predict adult environmental behavior over time, but further research is needed to determine if similar patterns exist among adolescents (Thomas et al., 2022). Additionally, the influence of social desirability on self-reported pro-environmental behaviors raises questions about the accuracy of participants' responses, highlighting the need for innovative methodologies that can mitigate such biases in future studies (Thomas et al., 2022).

Research emphasizes the importance of understanding how personal experiences shape youths' social worlds, including their family dynamics, peer interactions, and engagement in political systems. Many young people express a desire for support and empathy from adults regarding their concerns about the ecological crisis. For instance, participants in a recent study suggested that adults should not only acknowledge but also actively support youth initiatives aimed at addressing climate change. This sentiment is echoed in calls for adults to engage more openly in discussions about climate action and to model eco-conscious behaviors for younger generations (Balundė et al., 2020; McDonald, 1999).

Participants often reported feelings of helplessness when faced with the expectation of individual action toward climate change. This frustration may contribute to a lack of trust in older generations, as youth perceive insufficient action from adults. In contrast, collective action emerges as a source of empowerment and community, offering hope and a sense of efficacy. Research indicates that engaging in collective efforts can mitigate psychological distress linked to climate change, highlighting the significance of group involvement over solitary efforts (Halsall & Forneris, 2019; Thomas et al., 2022).

Perceived behavioural control is another critical psychological factor influencing youths' environmental engagement. The Theory of Planned Behavior suggests that when young individuals believe they have the means and resources to effect change, they are more likely to engage in pro-environmental behaviors. Conversely, feelings of disempowerment and lack of agency can hinder their actions (Bandura, 1990; Smith et al., 2000; Zafari & Koeszegi, 2021). This dynamic is further complicated by social norms within peer groups, which can dictate behavior and discourage environmentally friendly practices if alternative norms prevail (Smith et al., 2000).

The development of identity and sense of community plays a pivotal role in enhancing engagement in environmental actions. Studies have shown that when youths attend university or are part of supportive

communities, they experience increased competency and relatedness, which in turn fosters sustained environmental involvement. The fluctuating nature of community connections suggests that the presence of a supportive environment is crucial for maintaining youth engagement in pro-environmental behaviors (Christens & Zeldin, 2011; De Weger et al., 2018; Halsall & Forneris, 2019; Head, 2007).

Youths' moral obligations to act pro-environmentally are often rooted in their biospheric values and environmental self-identity. This connection between personal values and environmental behavior illustrates that individuals who strongly identify with ecological causes are more likely to engage in actions that support sustainability. Such findings highlight the importance of fostering an environmental self-identity in youth as a means of promoting sustainable behaviors and actions (Mititsina et al., 2021).

Recent studies emphasize the role of nature-related and culturally relevant art activities in fostering youth participation in urban communities. Projects designed to enhance inclusion and belonging through artistic methods, such as nicho boxes and garden art, have shown positive feedback from young participants, indicating that they feel their voices are valued and their contributions matter to their communities (Barnason et al., 2022; Halsall & Forneris, 2019; Jenkins et al., 2020; Narksompong & Limjirakan, 2015; Riemer et al., 2014). This highlights the potential of integrating environmental education with creative expression as a means to engage youth in civic and ecological responsibilities.

The literature indicates a divide in political engagement among youth in different cultural contexts. U.S. youth are characterized by their active involvement in peer organizations and protests, often feeling the need to form coalitions to enact change, driven by the historical precedents of civil rights activism (Thomas et al., 2022). Conversely, French youth express frustration over limited options for political involvement, often perceiving adult-led initiatives as nominal. This suggests that the effectiveness of youth political engagement may be influenced by cultural and structural factors that either empower or disenfranchise them.

A recurring theme in the literature is the necessity for an environmentally aware curriculum that empowers students. Successful strategies for implementing such curricula include ongoing professional development for educators, the establishment of support networks, and the development of adaptable curriculum frameworks (Hoang et al., 2021). The literature emphasizes the importance of experiential learning opportunities—such as community projects and hands-on activities—as essential for instilling a personal connection to environmental issues among students.

Social media is identified as a key platform for young people's engagement with environmental issues, with platforms like Instagram being favored for obtaining information on sustainable practices (Shutaleva et al., 2021). However, there are limitations noted in the efficacy of social media as a tool for inspiring action beyond mere awareness, suggesting that while young people are aware of environmental practices, a significant portion remains disengaged from active participation (Thomas et al., 2022).

The literature indicates that while young people recognize various environmental practices, actual engagement is inconsistent. Many youth express the belief that their individual actions have minimal impact on broader environmental issues, leading to a sense of helplessness (Berthoû, 2013; Hargreaves, 2011; Krasny, 2020). Moreover, the infrequent application of certain sustainable behaviors—like vegetarianism and choosing eco-friendly transportation—highlights a gap between awareness and action. This disconnect emphasizes the need for initiatives that not only educate but also motivate and facilitate sustainable practices among youth.

There is a broad concern about the environmental crisis and the need for youth engagement in solutions. Your research explores youth environmental awareness, attitudes, and behaviors. Preliminary data suggests a significant proportion of young people are not actively participating in environmental activities, despite having awareness. While there is existing research on youth environmental awareness, gaps remain in understanding specific motivators and barriers to engagement. These gaps

include how factors such as gender, academic level, and information sources influence behavior, as well as the role of the educational system in encouraging sustainable actions.

This study aims to assess university students' knowledge and perceptions of environmental issues, with a particular emphasis on their awareness of marine litter. It seeks to determine the relationship between students' environmental knowledge, attitudes, and their engagement in environmentally responsible behaviours, while also identifying key factors that influence their environmental actions. Additionally, the study evaluates how students' perceptions of their university's commitment to environmental responsibility impact their own environmental attitudes, behaviours, and willingness to become more actively involved. Finally, it explores the main barriers and facilitators that affect students' participation in environmental initiatives and sustainable practices.

METHODS

Data Collection

This study employed a mixed-methods approach to assess youth environmental awareness, utilizing a comprehensive survey instrument. The survey, designed by the ML-FREE project and adapted for this research, incorporated a range of question types to gather both quantitative and qualitative data. Quantitative measures included Likert-scale items to assess attitudes, perceptions, and willingness to engage in environmental protection. Specifically, scales measured participants' interest in nature and environmental protection, their concerns about the state of the environment, their belief in their ability to make a difference, and their readiness to participate in environmental activities. Additionally, participants responded to knowledge-based questions through multiple-choice and true/false formats, testing their understanding of ecological principles, waste management practices, and the impact of marine litter. The survey also included questions to measure specific household behaviors related to sustainability, and to determine student perceptions of the role and responsibility of their school in promoting environmentally responsible behaviour. To complement the quantitative data, open-ended questions were used to capture rich qualitative insights into participants' understanding of the impact of marine litter and the challenges and opportunities for environmental action, as well as information sources and awareness of environmental organisations. This multi-faceted approach allowed for a thorough exploration of environmental awareness among the youth participants.

Data Analysis

To effectively address the research questions and meet the study objectives, several statistical tools were employed. Descriptive statistics, including means, standard deviations, and frequencies, were calculated to assess the overall levels of environmental awareness, attitudes, and reported behaviors among university students (Objective 1). To determine the relationships between environmental knowledge, attitudes, and engagement in environmentally responsible behaviors (Objective 2), Pearson's correlation coefficients were calculated to measure the strength and direction of linear relationships between different variables. Where group comparisons were required, particularly to examine differences in awareness and attitudes based on demographic factors (gender, academic level) and levels of action, independent samples t-tests and one-way ANOVAs were used. Furthermore, linear regression analysis was conducted to determine the influence of environmental knowledge and perception of university responsibility on their own environmental behaviour and attitudes (Objective 3). This regression model helped to identify the extent to which specific variables predict students' participation in environmentally responsible activities. Finally, to explore the underlying reasons for participation and non-participation, thematic analysis was used to explore and describe the perceived barriers and facilitators to environmental action (Objective 4). This combined approach of descriptive, inferential, and thematic analysis allowed for a comprehensive examination of environmental awareness and engagement among the university students sampled

RESULTS

Quantitative Results

Demographics (age, gender, academic level, and Current GPA)

Table 1 reveals the distribution of survey participants by age and gender. The data indicates a higher participation of females (76) compared to males (46), with a diverse age range represented. The most frequent age group is 19 (25 participants), followed by 20 (27 participants).

Table 1. Age and Gender

Contingency Tables

	Age																							
Gender	17	18	19	20	21	22	23	24	25	26	27	29	30	32	34	35	36	37	39	42	44	45	52	62	Total
Female	1	2	17	18	7	4	8	3	3	0	0	1	0	2	0	1	1	1	1	1	1	2	2	0	76
Male	0	4	8	9	6	4	0	3	1	2	1	1	1	1	1	1	0	0	0	1	0	0	0	2	46
Total	1	6	25	27	13	8	8	6	4	2	1	2	1	3	1	2	1	1	1	2	1	2	2	2	122

Note. Each cell displays the observed counts

Table 2 presents the relationship between academic level and current GPA. A majority of the respondents are in Semester 2 (75), with a substantial portion reporting a "Good" GPA (70) across all semesters. Semester 1 students are mostly in "Good" or "Very Good" and show a more even distribution across GPA categories compared to the other semesters. Semester 2 students represent a higher portion of "Satisfactory" grades, where "Good" remains the most common response overall across the academic levels. Semester 3 students reported a higher number of participants with excellent GPAs, and it might be due to more courses being completed.

Table 2. Academic Level and Current GPA

	Current GPA				
Academic Level	Excellent (5)	Good (3)	Satisfactory (2	Very good (4)	Total
Semester 1	0	8	2	5	15
Semester 2	3	41	24	7	75
Semester 3	2	21	5	4	32
Total	5	70	31	16	122

Note. Each cell displays the observed counts

Environmental Knowledge

Table 3 reveals that a majority of participants (53.28%) understand the ecological view of humans as "connected to all" living beings, demonstrating a foundational understanding of interdependence within ecosystems. In contrast, a significant minority (33.61%) selected "the most important," suggesting an anthropocentric viewpoint that could negatively impact environmental stewardship by prioritizing human needs.

Table 3. The Ecological View

Ecology considers that human is in relation to other living beings in nature to be:	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
connected to all	65	53.279	53.279	53.279
special	9	7.377	7.377	60.656
the best	4	3.279	3.279	63.934
the most important	41	33.607	33.607	97.541
unimportant	3	2.459	2.459	100.000
Missing	0	0.000		
Total	122	100.000		

Furthermore, a small percentage chose "special," "the best," or "unimportant," indicating varying degrees of comprehension regarding ecological concepts, ultimately suggesting that a little more than half of the sample possesses a good grasp of ecological understanding, while the remainder could benefit from

improved education regarding human and nature interactions.

Attitudes and Awareness

Table 4 reveals a sample with a robust environmental awareness, demonstrating significant concern and worry about the present and future state of the environment, coupled with strong personal interest. While respondents express a good level of self-perceived environmental consciousness, they also recognize the need for improvement in this area. This is further supported by their demonstrated willingness to engage in various practical environmental actions, such as waste reduction and recycling, as well as their commitment to educating others and researching environmental issues.

Table 4. Participants' Personal Beliefs and Perceptions Environmental Issues

Category	Question	Mean	Most Frequent Response(s)
Environmental Attitudes	I am personally interested in nature and environment protection.	4.01	Very Much (40.98%)
	I am worried for the current state of the environment, and for the future.	3.96	Very Much (47.54%)
	I am conscious enough about nature and environment protection.	3.65	Much (31.15%)
	My peers are conscious enough about nature and environment protection.	2.84	Moderate (39.34%)
	Someone like me can't do enough for nature and environment protection.	2.58	Little (27.05%) or Moderate (27.87%)
	There is no sense to protect nature if others are not doing the same.	2.25	Very Little (45.08%)
	There is a lot of exaggeration when talking about the climate crisis.	2.02	Very Little (43.44%)
	It's hard to estimate how my daily activities impact the environment.	2.66	Moderate (31.97%)
	There are many more important issues in the world than nature and the environment protection.	2.33	Very Little (36.89%)
	Man is the master of the Earth and may use everything on it without limits.	2.19	Very Little (48.36%)
	Today, human is in full control of the most modern technology and can contribute to environmental protection with it.	3.54	Much (35.25%)
	Human is just one of the creatures on Earth and is completely dependent on its conditions and laws of nature.	3.15	Moderate (30.33%)
	The laws of nature are stronger than human aspirations and desires.	3.27	Very Much (29.51%)
Environmental Action	to explain to others how to protect the environment (to your family, peers, acquaintances, etc.).	3.57	Much (30.33%)
	to write leaflets, slogans, or petitions on environmental issues.	3.08	Moderate (23.77%) or Much (23.77%)
	to research about environmental protection problems (in books, on the internet, etc.).	3.36	Moderate (27.87%)
	to get involved in the work of an organization or initiative that deals with environmental protection.	3.26	Much (27.05%)
	to reduce waste/shop at second-hand stores or markets to reduce waste generation.	3.55	Much (27.05%) or Very Much (27.05%)
	to collect waste separately for recycling.	3.56	Very Much (31.15%)
School Environment	Are single-used plastic bags, cups, straws, cutlery, or similar products used at school? (1 = No, 2= Yes, 3= I don't know)	2.09	Yes (mode)
Multinomial Test		χ^2=206.721, df=11, $p < .001$	

Participants demonstrate a generally positive environmental attitude coupled with moderate environmental action, expressing significant personal interest in nature, worry about its future, and belief in technology's protective potential, while notably rejecting misconceptions surrounding climate change and the efficacy of individual action. Although they perceive their peers as less conscious and acknowledge limitations in individual impact, this does not lead to apathy but rather a resilient dedication to environmental protection, making peer-influence interventions, practical solutions, and technological applications promising areas of interest. The statistically significant multinomial test ($p < .001$) confirms that response distributions reflect genuine attitudes and beliefs, and the observed reliance on single-use plastics in the school environment presents a key area of concern and opportunity for student-led advocacy and policy change.

Attitudes and Awareness across Academic Levels

Since the p-value (0.523) is greater than the commonly used significance level of 0.05, we fail to reject the null hypothesis. This means that there is no statistically significant difference in "Attitudes and Awareness" across different "Academic Levels". In other words, academic level does not significantly impact attitudes and awareness based on this data.

Table 5. ANOVA Attitudes and Awareness

ANOVA - Attitudes and Awareness

Cases	Sum of Squares	df	Mean Square	F	p
Academic Level	0.457	2	0.229	0.651	0.523
Residuals	41.796	119	0.351		

Note. Type III Sum of Squares

These results suggest that as students progress through academic levels, their involvement and consistency in environmental protection activities increase. Further analysis, such as Tukey's HSD, would help identify specific group differences contributing to the overall variance. Therefore, with the available data we cannot establish a relationship between gender and the measured "Attitudes and Awareness". Based on the post-hoc comparisons, there are no statistically significant differences in «Attitudes and Awareness» between any of the pairs of academic level groups (Semester 1, Semester 2, and Semester 3). The effect sizes (Cohen's d) are small, further suggesting that any observed differences between groups are minimal.

Table 6. Post Hoc Comparisons -Academic Level

Post Hoc Comparisons - Academic Level

			95% CI for Mean Difference						95% CI for Cohen's d		
		Mean Difference	Lower	Upper	SE	df	t	Cohen's d	Lower	Upper	p_{tukey}
Semester 1	Semester 2	0.168	−0.230	0.566	0.168	119	1.004	0.284	−0.404	0.972	0.576
	Semester 3	0.206	−0.234	0.647	0.185	119	1.113	0.348	−0.414	1.110	0.508
Semester 2	Semester 3	0.038	−0.259	0.335	0.125	119	0.304	0.064	−0.449	0.577	0.950

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (ci for mean difference corrected using the tukey method; ci for effect size corrected using the bonferroni method).

Attitudes and Awareness across Gender

The independent samples t-test revealed no statistically significant difference in "Attitudes and Awareness" between the two groups examined ($p = 0.613$, which is above the conventional alpha of 0.05), leading us to fail to reject the null hypothesis. Moreover, the observed effect size, as measured by Cohen's d ($d = 0.095$), is exceedingly small, indicating that any actual difference between the groups is minimal and practically inconsequential.

Table 7. Independent Samples T-Test

Independent Samples T-Test

	t	df	p	Mean Difference	SE Difference	Cohen's d	SE Cohen's d
Attitudes and Awareness	0.507	120	0.613	0.056	0.111	0.095	0.187

Note. Student's t-test.

Adriatic Sea Worries

Table 8 reveals a significant level of concern among respondents, as indicated by the high mean scores and frequent selection of "Extremely Worrying" across most environmental issues. Specifically, the climate crisis (mean = 3.88) and freshwater pollution (mean = 3.85) are the leading concerns, suggesting a strong awareness of their broad and immediate impact. Problems such as hazardous litter accumulation, depletion of oil, overfishing, and endangerment of marine habitats also elicit substantial worry. Tourism presents the lowest level of concern (mean = 2.62), with "Moderately Worrying" as the most frequent response, suggesting a potentially underestimated perception of its negative impacts on the sea or belief that the climate crisis effects tourism instead.

Table 8. Adriatic Level of Concern Among Respondents

Category	Question	Mean	Most Frequent Response(s)
Adriatic Sea Worries	Accumulation of hazardous litter (from industry, medicine, etc.)	3.53	Extremely Worrying (36.07%)
	Depletion of oil from the sea	3.49	Extremely Worrying (33.61%)
	Pollution of fresh water (rivers and lakes)	3.85	Extremely Worrying (45.90%)
	Climate crisis	3.88	Extremely Worrying (36.07%)
	Tourism	2.62	Moderately Worrying (22.95%)
	Dying of coral and certain marine species	3.34	Extremely Worrying (36.07%)
	Improper disposal of municipal litter	3.41	Extremely Worrying (36.07%)
	Fishing, overfishing, fish-farms	3.53	Extremely Worrying (36.89%)
	Endangerment of the natural habitats of marine species (due to sea pollution, concreting and embankment of the coast)	3.59	Extremely Worrying (33.61%)
	Anchoring in meadows of Posidonia oceanica	3.16	Moderately Worrying (27.05%)
	Marine litter	3.37	Extremely Worrying (31.97%)

Overall, the findings underscore a widespread perception of the Adriatic Sea as vulnerable to various environmental threats, highlighting the need for targeted interventions and increased awareness, particularly in the area of sustainable tourism practices.

Associations and Environmental Awareness Sources

The pie chart illustrates the primary sources of environmental information for the survey participants. Social networks dominate as the main source, accounting for 41% of responses, significantly outpacing other sources. Television follows as the next most popular source at 18.9%, while the rest of the information sources (reading daily and other press, reading news portals, reading specialized online portals, the radio, conversation with peers and friends, reading professional literature, and information from parents and family) take a much smaller piece of the pie chart.

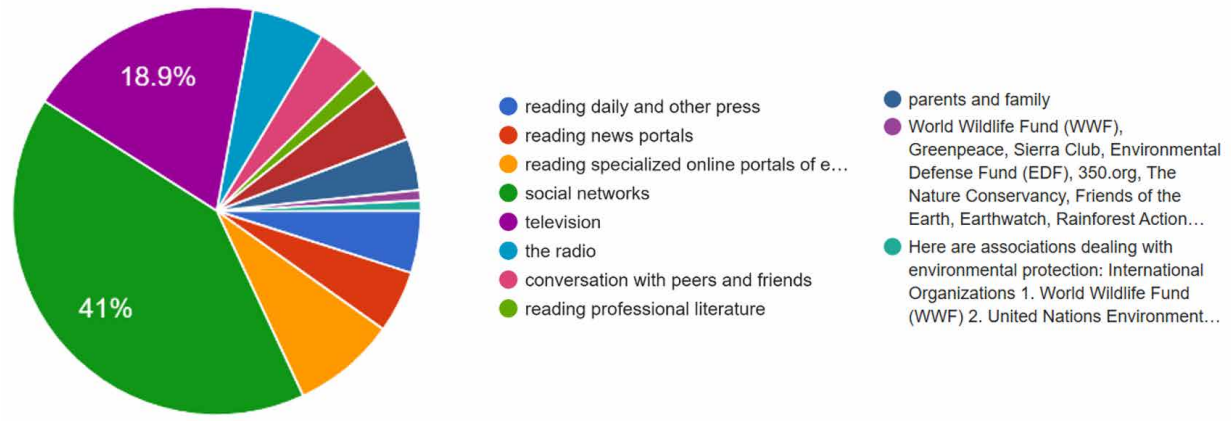


Figure 1. Associations and Environmental Awareness Sources

This distribution emphasizes the critical role of digital and social media in shaping environmental awareness among this population. The reliance on social networks presents both opportunities and challenges. While it allows for rapid dissemination of information and engagement with a wide audience, it also raises concerns about the potential spread of misinformation and the need for critical evaluation of sources. The notable, yet much smaller, influence of television indicates a continued, albeit diminishing, role for traditional media, while information from more traditional media is even less used. The list of organizations known by participants shows awareness of prominent environmental groups like WWF and Greenpeace, suggesting a foundation for further engagement with formal conservation efforts.

Measure of Ecological and Waste Management Knowledge

The assessment of ecological and waste management knowledge reveals both strengths and weaknesses in the respondents' understanding. Strikingly, a large majority correctly identifies microplastics as pollutants impacting both the environment (87.705% TRUE) and human health (89.344% TRUE), indicating awareness of this emerging concern. Similarly, concerns for the future are present among respondents, with a robust 82.787% agreeing that there will be more plastic than fish in the sea by 2050.

Table 9. Measure Of Ecological and Waste Management Knowledge

Statement	FALSE (%)	TRUE (%)
Unsanitary landfills cause air, underground and surface water and soil pollution.	18.033	81.967
Organic waste in unregulated landfills emits methane and CO2 and as such has a significant negative impact on climate change.	18.852	81.148
Reducing waste generation is more important in waste management than recycling.	31.967	68.033
The good thing about recycling is that it uses less energy than new production.	27.049	72.951
The production of recycled paper requires the same amount of energy as the production of conventional paper.	71.311	28.689
Composting increases the volume of waste at the landfill and the costs of disposal.	45.082	54.918
About 80% of marine litter comes from land.	28.689	71.311
Most of the marine litter that can be found in the Croatian and Italian part of the Adriatic comes from other countries.	37.705	62.295
85% of marine litter is bulky waste.	43.443	56.557
If it continues this way, by 2050 there will be more plastic than fish in the sea.	17.213	82.787
Every day, approximately 13 tons of plastic end up in the oceans.	29.508	70.492
The time required for plastic to decompose in the sea is 20 years.	58.197	41.803
Microplastics, tiny plastic particles formed by decomposition in seas and marine sediments, pollute the environment.	12.295	87.705
Microplastics affect human health.	10.656	89.344
Most of the marine litter is the result of direct human action (throwing waste directly into the sea, leaving waste on beaches...).	32.787	67.213
Marine litter has a negative impact on the environment, animals, human health and the economy.	13.115	86.885
The Adriatic Sea is one of the cleanest seas in the world and has very little marine debris.	58.197	41.803

However, significant knowledge gaps exist, with only 41.803% accurately disagreeing that the Adriatic Sea is clean, and a mere 41.803% correctly estimating the decomposition time of plastics. These discrepancies highlight the need for targeted educational efforts to address specific misconceptions and improve overall ecological literacy, particularly regarding local environmental conditions and waste management processes.

Household Actions

Table 9 summarizes household environmental actions taken by respondents in the past year. The most prevalent behaviors include using cloth bags instead of plastic (81.148% "Yes") and using paper responsibly (69.672% "Yes"), suggesting an adoption of easy-to-implement practices. Encouraging others towards environmentally responsible behavior is also common (67.213% "Yes"). Conversely, fewer households report writing leaflets or signing petitions (20.492% "Yes"), volunteering with environmental organizations (23.770% "Yes"), or participating in protests (25.410% "Yes"), indicating lower engagement in more active or outwardly facing environmental activism. Notably, a substantial proportion do not collect waste separately (39.344% "Yes"), suggesting a need for improved recycling infrastructure and awareness.

Table 10. Frequencies for Household Actions

Statement	No (%)	Yes (%)
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [collected waste separately (paper, plastic, glass, cans...)]	60.656	39.344
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [repair a product instead of throwing it away composted]	38.525	61.475
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [use biodegradable detergents and soaps]	58.197	41.803
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [use paper responsibly (double-sided printing, reuse of paper with empty space left)]	30.328	69.672
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [use cloth bags instead of plastic ones]	18.852	81.148
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [encouraged your family, peers, acquaintances, etc. to environmentally responsible behavior (separately collected or similar)]	32.787	67.213
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [wrote leaflets, slogans or signed petitions on issues of environmental protection]	79.508	20.492
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [volunteered at an environmental protection organization]	76.230	23.770
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [participated in the neighbourhood clean-up campaign]	42.623	57.377
In the last year, have you and/or your household done any of the following out of concern for nature and the environment? [organized or participated in protest meetings for the protection of nature and the environment]	74.590	25.410

The data suggests that environmental concern translates more readily into simple, personal actions rather than demanding or politically charged initiatives.

School actions

The bar graph presents responses regarding the presence of recycling bins for waste separation in schools. A significant portion of respondents indicated "No" (the largest count by far), suggesting a lack of recycling infrastructure in many schools. Moreover, a considerable number selected "I don't know," revealing a lack of awareness or transparency about existing waste separation programs.

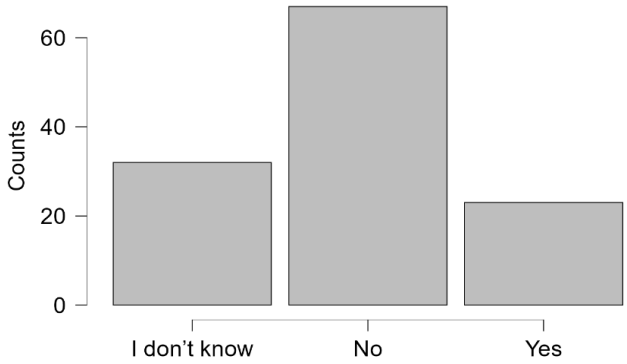


Figure 2. Are there recycling bins for waste separation in your school?

Only a small minority responded "Yes," confirming the absence of widespread recycling facilities. This points to a missed opportunity to promote environmental responsibility and engage students in practical waste management practices within their educational environment. Figure 3 depicts responses concerning the use of single-use plastic products at school. The graph reveals a concerning trend about the prevalence of single-use plastics in schools. The high number of "Yes" responses shows that single-use plastics are indeed present in the school system, while the substantial amount of "I don't know" responses

implies a lack of transparency about these products. Lastly, only a small number of participants claim that these single-use products are not used at their schools. This highlights that there is a need for more scrutiny, better policies, and better awareness regarding single-use plastics in the educational setting.

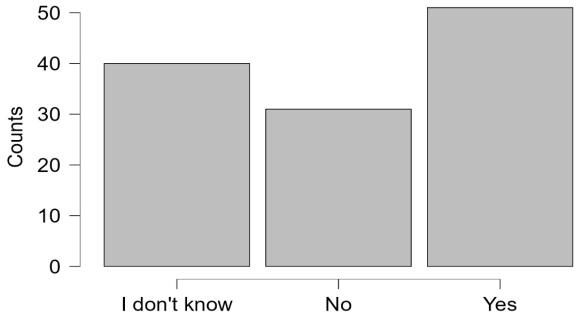


Figure 3. Are single-used plastic bags, cups, straws, cutlery, or similar products used at school?

Knowledge About Marine Liter Across Gender

The Independent Samples T-Test was conducted to examine gender differences in knowledge about the impact of marine litter among 122 university students. The analysis revealed no statistically significant difference between genders, as indicated by a t-value of -0.151 (df = 120, p = 0.881). With a p-value well above the threshold of 0.05, any observed differences in knowledge scores are likely due to chance rather than genuine disparities. Consequently, the null hypothesis, which posits no difference in knowledge between genders, cannot be rejected. The knowledge statements assessed participants' understanding of marine litter, pollution, and environmental impacts using a Likert scale.

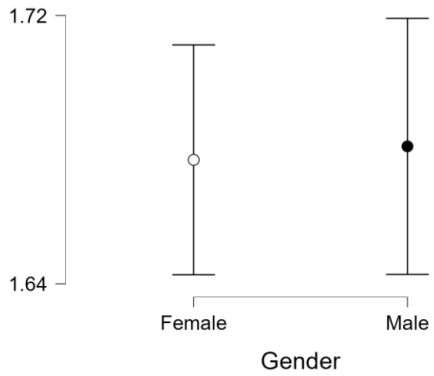
Table 11. Knowledge About Marine Liter Across Gender

Independent Samples T-Test

	t	df	p	Mean Difference	SE Difference	Cohen's d	SE Cohen's d
Knowledge about Marine Litter Impact	−0.151	120	0.881	−0.004	0.027	−0.028	0.187

Note. Student's t-test.

Figure 4. Knowledge About Marine Litter Impact across Gender



Given the lack of significant gender differences, it can be inferred that male and female students have similar levels of knowledge about these topics in this sample.

Qualitative Results (Open-ended Questions)

Theme 1: How Does Waste End Up in the Sea?

The responses consistently point towards direct human actions and the role of waterways as primary contributors to marine pollution. A significant theme is the attribution of marine waste to intentional or careless behavior, with numerous respondents emphasizing direct human activity. This includes actions such as "Stop dropping leftovers and trash in the ocean or sea", "Direct dumping of trash into rivers,

oceans or along beaches, as well as careless and improper waste disposal near shorelines.", "It IS humans who throw waste into the sea", and "People dispose of waste improperly on land, such as littering in public spaces, streets, or beaches." Careless littering, especially on beaches, and improper waste disposal are frequently cited, often paired with quotes like "Throwing in in the sea," and "By negligence, we either use plastic and not bother throwing it in teh trash bin where it is supposed to go." Another prevalent idea is the transportation of waste via natural water systems. As many participants stated that "Waste ends up in the sea through littering, improper disposal, and being carried by rivers" and "Litter can get blown into rivers and streams, also by direct littering, dumping," they highlight a link of land-based activities to marine debris. This includes "Wastewater, wind, rain and floods also carry plastic from the land into the oceans" and "waste reaches the sea through rivers, wind or direct dumping", which shows that respondents understand how the waterways contribute.

Beyond direct human actions and waterways, a substantial number of responses focused on industrial/maritime operations and systemic failings. Respondents noted "Also by industries. When they dump waste directly to rivers, lake or ocean" and how "It has many ways of arriving there, either by the factories dropping their toxic waste straight into the water," while also highlighting "Maritime Activities: Ships, fishing vessels, and offshore platforms contribute waste directly into the ocean.". This indicates an awareness that human activities other than careless individual actions, can be direct sources of marine pollution. Furthermore, there was an understanding that waste management systems often fail, with frequent statements such as "Waste enters the sea through improper disposal, stormwater runoff, rivers, industrial discharge, fishing activities, and accidental losses from ships," and "Mismanaged waste disposal." "Un-awarness of people" was also mentioned by some, as was the fact that "the waste can be carried to the ocean by wind or the rainwater". Additionally, a few respondents plainly stated "I don't know", "لا ادري" (Arabic for "I don't know"), or "No idea", emphasizing a lack of knowledge. The themes highlight a complex and interconnected problem where pollution is linked to individual behavior, industrial output, inadequate infrastructure, and a lack of information.

Theme 2: School Environmental Responsibility and Encouragement of Pro-Environmental Behavior

A significant portion of responses indicates a perceived lack of robust environmental responsibility from schools, or a lack of awareness from participants about their school's efforts. Many stated "I don't know", "They don't do much" or "I don't think that my university takes the environmental responsibility seriously." Some responses further highlighted that "my school are no responsible at all", "There is no environmental responsibility in my university", or that "The school's environmental responsibility appears limited, as there are few visible efforts to promote sustainability" and that there is no specific way that is used by the school to encourage environmental consciousness. This is coupled with reports of basic cleanliness and infrastructure maintenance being the primary activities such as "My school promotes environmental responsibility by providing bins for waste disposal. Additionally, dedicated staff members strive to maintain cleanliness throughout the campus.", or how "Our school shows environmental responsibility by keeping the school clean, which teaches us the importance of maintaining a clean environment" and that "Every day they clean the university". Although important, these responses, show a limited scope in the school's involvement.

Other responses highlighted more proactive approaches, centering on environmental education and promoting action through specific initiatives. Some schools encourage students "by educating them on the need to preserve the environment" and try "spreading awareness among the students", while also doing "Environmental Education: Including lessons on climate change, conservation, and recycling in the curriculum." Some also integrate "activities like recycling programs" or "organise awareness campaigns and activities to instill a culture of environmental consciousness among students". Other efforts include having "green spaces and gardens where students can learn growing plants, biodiversity and composting." Finally, some schools showed efforts to have "recycling challenges and sustainable projects", while also

"encouraging students to lead projects, such as tree planting, clean-up drives, or awareness campaigns." These statements reflect an understanding of the importance of education, awareness, and active involvement, but this is not a frequent enough response. Overall, these themes highlight an inconsistent and often inadequate approach to environmental responsibility in schools, calling for a clearer strategy focused on more active participation and awareness.

DISCUSSION

The results of this study align with existing research demonstrating a consistent "awareness-action gap" in environmental behavior (Kollmuss & Agyeman, 2002), where heightened awareness doesn't guarantee pro-environmental actions. This research also supports the established role of social media in shaping youth environmental attitudes (Hmielowski et al., 2014), although it also highlights the need to mitigate misinformation. Diverging from some studies suggesting gender differences in environmental attitudes (e.g., Zelezny et al., 2000), this research found no significant gender-based disparities in knowledge about marine litter. The study emphasis on the university's influence echoes the findings of previous research (e.g., Sharp, 2002) which indicates that institutions play a critical role in fostering sustainable practices among students. The significant level of concern expressed regarding Adriatic Sea issues converges with research highlighting the importance of local context in environmental attitudes (e.g., Stedman, 2003). The study results also underscore that concerns about local issues are extremely prevalent in the respondents' attitudes. The prevalence of household actions converges with findings showing that the lack of infrastructure is a strong influence on people adopting recycling actions. Overall, this study adds to the existing body of knowledge by providing a nuanced understanding of the factors influencing environmental behavior among university students, specifically in the context of the Adriatic Sea region. These results highlight the need for targeted interventions that address both individual and institutional barriers to sustainable action.

This study confirms that awareness of environmental issues does not automatically translate into action. Digital platforms, particularly social media, greatly influence environmental awareness, presenting both opportunities and challenges. Perceptions of a university's environmental commitment significantly impact student behavior, and local relevance and ease of implementation are key factors in encouraging participation in sustainable practices.

Develop action-oriented programs and leverage social media responsibly to promote evidence-based environmental knowledge. Universities should strengthen their environmental initiatives, including recycling infrastructure and curriculum integration. Implement targeted educational campaigns addressing specific knowledge gaps and promote peer influence to encourage pro-environmental behavior.

Further research should explore underlying motivations and psychological factors influencing environmental action through longitudinal and intervention studies. Comparative analyses across different universities or regions, alongside environmental impact studies on marine litter, would provide valuable insights for promoting sustainable engagement.

CONCLUSION

This study reveals a complex interplay of environmental awareness, attitudes, and behaviors among university students, highlighting a critical action gap. While students demonstrate considerable concern for environmental issues, particularly regarding marine litter and the Adriatic Sea, this concern doesn't consistently translate into active engagement in sustainable practices. The reliance on social media for information underscores both an opportunity and a challenge, requiring careful consideration of the information's accuracy. Crucially, the perceived lack of robust environmental responsibility within the university setting emerges as a significant barrier, further emphasized by the absence of recycling infrastructure and the prevalence of single-use plastics. However, a demonstrable interest in future

engagement, combined with qualitative insights emphasizing the effectiveness of community-based initiatives, suggests that targeted interventions promoting local opportunities, clear calls to action, and highlighting the impact of individual contributions could effectively bridge the identified awareness-action gap and foster a more sustainable future. These interventions should focus on addressing knowledge gaps, particularly concerning local environmental issues, and empowering students to advocate for and participate in environmental initiatives within their university and wider community.

REFERENCES

Balundė, A., Perlaviciute, G., & Truskauskaitė-Kunevičienė, I. (2020). Sustainability in youth: Environmental considerations in adolescence and their relationship to pro-environmental behavior. *Frontiers in psychology*, *11*, 582920.

Bandura, A. (1990). Perceived self-efficacy in the exercise of personal agency. *Journal of applied sport psychology*, *2*(2), 128-163.

Barnason, S., Li, C. J., Hall, D. M., Wilhelm Stanis, S. A., & Schulz, J. H. (2022). Environmental action programs using positive youth development may increase civic engagement. *Sustainability*, *14*(11), 6781.

Berthoû, S. K. G. (2013). The everyday challenges of pro-environmental practices. *Journal of Transdisciplinary Environmental Studies*, *12*(1).

Carson, R. (2009). Silent spring. 1962. *New York*.

Chen, P. J. (1997). Environmental educators, it is time to design a whole curriculum now. *Environmental Education Research*, *3*(2), 233-237.

Christens, B. D., & Zeldin, S. (2011). Community engagement. *Encyclopedia of adolescence. New York: Springer*.

Corpuz, A. M., San Andres, T. C., & Lagasca, J. M. (2022). Integration of environmental education (EE) in teacher education programs: Toward sustainable curriculum greening. *Problems of Education in the 21st Century*, *80*(1), 119.

Cruz, J. P., & Tantengco, N. S. (2017). Students' environmental awareness and practices: Basis for development of advocacy program. *Mimbar Pendidikan*, *2*(1).

De Weger, E., Van Vooren, N., Luijkx, K., Baan, C., & Drewes, H. (2018). Achieving successful community engagement: a rapid realist review. *BMC health services research*, *18*, 1-18.

Dittmer, L. D., Reimer-Watts, K., Dobai, J., & Riemer, M. (2023). Contributions, missed opportunities, and future directions: A critical reflection on global climate change and environmental sustainability in AJCP over five decades. *American Journal of Community Psychology*, *72*(3-4), 288-301.

Dunlap, R. E., & Mertig, A. G. (2014). *American environmentalism: The US environmental movement, 1970-1990*. Taylor & Francis.

Falanga, R. (2024). Youth participation in environmental sustainability: insights from the Lisbon participatory budget. *Journal of Public Budgeting, Accounting & Financial Management*, *36*(1), 20-39.

Halsall, T., & Forneris, T. (2019). Examining outdoor recreation as an approach to promote youth engagement in environmental activism. In *Sport, Development and Environmental Sustainability* (pp. 148-162). Routledge.

Hargreaves, T. (2011). Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of consumer culture*, *11*(1), 79-99.

Head, B. W. (2007). Community engagement: participation on whose terms? *Australian journal of political science*, *42*(3), 441-454.

Hoang, A. T., Al-Tawaha, A. R., Vu, L. A., Qaisi, A. M., & Křeček, J. (2021). Integrating environmental protection education in the curriculum: A measure to form awareness of environmental protection

for the community. In *Environmental sustainability education for a changing world* (pp. 191-207). Springer.

Hofman-Bergholm, M. (2023). Nature-Based Education for Facilitating Resilience and Well-Being among Youth—A Nordic Perspective. *Education Sciences*, *14*(1), 43.

Hua, B. (2004). Integrating environmental education into the elementary school curriculum. *Chinese Education & Society*, *37*(4), 48-52.

Jenkins, E., McGuinness, L., Haines-Saah, R., Andres, C., Ziemann, M.-J., Morris, J., & Waddell, C. (2020). Equipping youth for meaningful policy engagement: an environmental scan. *Health promotion international*, *35*(4), 852-865.

Krasny, M. E. (2020). *Advancing environmental education practice*. Cornell University Press.

Lasino, A. Y. R., Mokodenseho, S., & Aziz, A. M. Environmental Education for Sustainable Development: A Bibliometric Review of Curriculum Design and Pedagogical Approaches. *higher education*, *3*, 5.

Manning, R. E. (1998). Integration in natural resources education: designing a core curriculum.

McDonald, K. (1999). *Struggles for subjectivity: Identity, action and youth experience*. Cambridge University Press.

Mititsina, E., Parfenova, N., Bizaeva, A., Kovalevskaya, E., & Guchkova, T. (2021). Psychological factors of environmental responsibility of student youth. E3S Web of Conferences,

Mol, A. P. (2000). The environmental movement in an era of ecological modernisation. *Geoforum*, *31*(1), 45-56.

Moula, Z., Palmer, K., & Walshe, N. (2022). A systematic review of arts-based interventions delivered to children and young people in nature or outdoor spaces: Impact on nature connectedness, health and wellbeing. *Frontiers in psychology*, *13*, 858781.

Narksompong, J., & Limjirakan, S. (2015). Youth participation in climate change for sustainable engagement. *Review of European, Comparative & International Environmental Law*, *24*(2), 171-181.

Omran, M., Yarmohammadian, M. H., & Keshtiarayrancis, N. (2014). Integrated approach: A suitable approach for designing and developing an environmental literacy curriculum in higher education system. *Entrepreneurship and Innovation Management Journal*, *2*(1), 84-96.

Omran, M. S., & Yarmohammadian, M. H. (2015). Designing environmental literacy curriculum for secondary school education system in Iran: Using an integrated approach. *Int J Educ Psychol Res*, *1*(2), 113.

Pedersen Gurholt, K. (2024). Governance of nature-based health promotion: public policy and volunteer organisations' innovations of outdoor activities among urban youth. *Sport, Education and Society*, *29*(7), 862-875.

Peterson, C. (2022). Environmental Education, Awareness, and Movements: A Historical Overview.

Powell, R. B., Stern, M. J., Frensley, B. T., & Moore, D. (2019). Identifying and developing crosscutting environmental education outcomes for adolescents in the twenty-first century (EE21). *Environmental Education Research*, *25*(9), 1281-1299.

Riemer, M., Lynes, J., & Hickman, G. (2014). A model for developing and assessing youth-based environmental engagement programmes. *Environmental Education Research*, *20*(4), 552-574.

Rootes, C. (2004). Environmental movements. *The Blackwell companion to social movements*, 608-640.

Rukmana, A. Y., Mokodenseho, S., & Aziz, A. M. (2023). Environmental Education for Sustainable Development: A Bibliometric Review of Curriculum Design and Pedagogical Approaches. *The Eastasouth Journal of Learning and Educations*, *1*(02), 65-75.

Shutaleva, A., Martyushev, N., Nikonova, Z., Savchenko, I., Abramova, S., Lubimova, V., & Novgorodtseva, A. (2021). Environmental Behavior of Youth and Sustainable Development. *Sustainability*, *14*(1), 250. https://doi.org/10.3390/su14010250

Smith, G. C., Kohn, S. J., Savage-Stevens, S. E., Finch, J. J., Ingate, R., & Lim, Y.-O. (2000). The effects of interpersonal and personal agency on perceived control and psychological well-being in adulthood. *The Gerontologist*, *40*(4), 458-468.

Thomas, I., Martin, A., Wicker, A., & Benoit, L. (2022). Understanding youths' concerns about climate change: a binational qualitative study of ecological burden and resilience. *Child and Adolescent Psychiatry and Mental Health*, *16*(1). https://doi.org/10.1186/s13034-022-00551-1

Vasiliades, M. A., Hadjichambis, A. C., Paraskeva-Hadjichambi, D., Adamou, A., & Georgiou, Y. (2021). A systematic literature review on the participation aspects of environmental and nature-based citizen science initiatives. *Sustainability*, *13*(13), 7457.

Zafari, S., & Koeszegi, S. T. (2021). Attitudes toward attributed agency: Role of perceived control. *International Journal of Social Robotics*, *13*(8), 2071-2080.