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Shaping the eco-citizens of tomorrow: Factors influencing pro-environmental behaviour of children

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ABSTRACT
The aim of this qualitative exploratory research is to investigate the underlying determinants that shape children's pro-environmental behavior in Tunisia, an emerging nation currently experiencing an active ecological transition. While academic focus on sustainability has intensified globally, the mechanisms driving young children's green practices remain poorly understood within emerging-market contexts. To address this gap, four semi-directed focus groups were conducted with 22 children aged 7 to 12 in Hammamet, Tunisia. The collected data were processed using thematic content analysis. The empirical analysis successfully identified six major determinants influencing youth eco-citizenship: family orientation, school education effectiveness, awareness of biospheric consequences, affective attitudes, environmental advertisements, and direct travel experiences. Quantitatively, the results highlight family orientation and affective attitudes as the dual dominant pillars, each representing 29% of thematic occurrences, thereby underscoring the critical power of primary socialization and internal emotional connection to nature. Interestingly, tourist experiences emerged as a novel external contextual catalyst for behavioral imitation. These interconnected factors demonstrate that childern's green framework relies heavily on holistic social, psychological, and experiential interactions. Ultimately, this research provides vital theoretical contributions to the literature on childhood environmental stewardship in North Africa. Practically, the study offers key insights and concrete recommendations for policymakers, academic institutions, and environmental educators aiming to design targeted, culturally grounded interventions that cultivate sustainable development and shape the responsible eco-citizens of tomorrow.

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Introduction

Increasing environmental degradation and intensifying climate change have become major challenges for humanity. Faced with these critical issues, transforming consumption behaviours towards more sustainable practices has become an imperative necessity to ensure a viable future for current and future generations. This growing concern for environmental issues has led to increased interest in the study of pro-environmental behaviour, especially among younger generations who will inherit the consequences of our present actions. Liu and Green (2024) highlight the crucial importance of understanding children's experiences, attitudes, and behaviours towards the environment to ensure a sustainable future.

The concept of pro-environmental behaviour is essentially linked to the notion of environmental citizenship, which refers to citizens' responsible actions as the main agents of change in responding to ecological challenges. Recent research indicatesthat children should not be considered merely as passive beneficiaries of environmental education but as active citizens capable of contributing to sustainable transformation (Vasconcelos et al., 2024). These authors consider that eco-citizenship in children requires not only awareness but also the development of skills and values necessary to actively participate in environmental protection. Meta-analyses confirm that interventions focused on pro-environmental behaviour in children produce a positive effect overall particularly in younger children (Świątkowski et al., 2024).

However, significant gaps exist in understanding the determinants that shape pro-environmental behaviours in children, particularly in emerging countries where research remains limited (Liu & Green, 2024). The scientific literature (see for example, Nisbet et al., 2009; Soares et al. 2021; Liu and Green 2024) on pro-environmental behaviour has grown considerably since the 1980s, highlighting the complexity and multidimensional nature of this phenomenon. Ajzen (1991) explained this phenomenon in the theory of planned behaviour (TPB). This theory suggests that pro-environmental behaviours result from the interaction between attitudes, subjective norms and perceived behavioural control. It is important to understand the psychological factors that determine these behaviours, because beliefs, attitudes and different motivations play a key role in the formation of pro-environmental behavioural intentions, particularly in educational settings (Juma-Michilena et al., 2023; Markovic et al., 2022).

This theory is complemented by the theory of attachment to nature (Nisbet et al., 2009), which emphasises the importance of emotional connection with the natural environment in the development of ecological behaviours. Hence, it was adopted for understanding pro-environmental behavior (Elshaer et al., 2021; Aliedan et al., 2023). In an emerging country context, this issue presents a particularly relevant field of study, particularly for Tunisia, which has resolutely committed to an ecological transition process. At the beginning of 2023, the country adopted a National Strategy for Ecological Transition (SNTE), demonstrating a strong political will to align the country with international sustainable development goals. This ambitious initiative aims to raiseawareness of environmental issues at the institutional level, although the concrete results on the ground still fall short of the objectives set. As the effectiveness of interventions tends to decrease with age (Świątkowski et al., 2024), it is all the more important to understand what influences pro-environmental behaviours in young Tunisian children to implement appropriate educational strategies at the right time and in accordance with their cultural context.

The originality of our research lies in its focus on children, considered the key factors of future environmental change. As Soares et al. (2021) point out, the current generation of children will face the most severe consequences of climate change. Therefore It is crucial to understand the factors that can influence and encourage the adoption of pro-environmental behaviours at an early age. This understanding is more important since attitudes and behaviours developed during childhood tend to persist in adulthood, shaping future citizens and decision-makers. Moreover, most existing research relies on quantitative measures based on self-report, while there is a lack of qualitative studies that explore children's own perceptions, particularly in emerging countries (Liu & Green, 2024;

Świątkowski et al., 2024). Our study is distinguished by its in-depth qualitative approach in the specific context of an emerging country, Tunisia, where environmental issues are becoming increasingly important. Through semi-directed group interviews with children, we seek to identify and understand the factors that influence their pro-environmental behaviours. This methodological approach makes it possible to grasp the complexity of the factors at play and to capture the nuances specific to the Tunisian cultural context. This research aims to answer the following question: What are the factors that can affect the adoption of pro-environmental behaviours in children in the Tunisian context? The identification of these determinants will not only enrich the existing literature on children's pro-environmental behaviour but also formulate practical recommendations for educators, policy makers and civil society actors involved in promoting sustainable development.

Literature Review

Pro-Environmental Behaviour among Children

The concept of pro-environmental behaviour, basically defined as a deliberate action aimed at reducing negative impacts on the environment (Stern, 2000; Kollmuss and Agyeman, 2002; Wu et al., 2025), is part of a broader framework of environmental concern that has emerged as a crucial field of study since the 1970s. This environmental concern, conceptualised by Takala (1991) as an evaluation of attitudes toward facts and behaviours that have effects on the environment, is particularly evident in children across different developmental phases. Developing such environmental concern in children is essential to ingrain environmental citizenship in them. Thus, children are positioned as active agents capable of contributing to environmental protection through their everyday choices and behaviours (Vasconcelos et al., 2024). This approach no longer only considers children as future citizens responsible for the environment but also recognises their capacity to act and participate in actions in favour of the environment.

While the preschool period (0–6 years) represents a peak in instinctive, sensory curiosity, this phase serves as the foundation for more structured environmental behaviour seen in adolescence (Özdemir, 2006), allowing children to build their understanding of the environment through three main channels: play, personal experience, and interactions with adults (Gülay, 2011). This early learning period is characterised by a particular recognition, defined as the acquisition of new behaviours and skills through environmental interaction, combining these new acquisitions with existing behaviours to form a lasting behavioural base.

Empirical research consistently demonstrates that direct contact with nature during childhood significantly influences pro-environmental behaviours, not only during the childhood period itself (Cheng & Monroe, 2012) but also in adulthood (Hinds & Sparks, 2008; Thompson et al., 2008). This early influence is so significant that researchers and educators now consider direct contact with nature as an inexpensive and easily accessible tool to reinforce pro-environmentalism (Collado et al., 2013). The importance of this developmental period is reinforced by Witt and Kimple (2008), who demonstrated that environmental knowledge, behaviours, and attitudes acquired during the preschool period produce both short- and long-term effects.

The developmental trajectory of pro-environmental behaviour; however, shows significant age-related variation. Some studies (e.g. Bogner & Wilhelm, 1996) have assumed that pupils in grades five and six are more environmentally aware than their older counterparts when their families stimulates this behaviour. There is a trend declining in pro-environmental behaviour during adolescence, as noted by, Metzger et al. (2016), who identified a substantial decline from grades 4 to 12. This decline is corroborated by Negev et al.'s (2008) research, where there was a decline in pro-environmental practices such as recycling, conservation of water and energy, and minimisation of waste between grades 6 and 12.

The developmental dynamics presented herein highlight the fundamental necessity of establishing pro-environmental habits from a young age. Childhood presents unique opportunities

but also specific vulnerabilities in relation to climate change, as noted by Hahn (2021). Children learn to comprehend the environment as a moral issue at a young age, and early experiences have the potential to form a foundation for environmental responsibility in the long term across their lifespan. Otto and Kaiser (2014) argue that the rise in pro-environmental behaviour found in adulthood is more a result of learning about environmental issues than of direct maturation. This assertion underlines the necessity for early and ongoing environmental education.

The Determinants Influence Their Pro-Environmental Behaviors

The literature review reveals that children's pro-environmental behaviour is influenced by constellation of factors of different natures. Previous research, notably that of Zhang and Dong (2020), has identified three broad categories of determinants: sociodemographic factors, psychological factors, and socialisation agents. This categorisation is augmented by the work of Blankenberg and Alhusen (2019), who propose a broader classification also including habits and contextual factors (individual, social, and institutional) as major determinants of pro-environmental behaviour.

Sociodemographic factors include fundamental variables that shape the context in which the child evolves. Gender appears to be a significant factor, with studies showing gender differences in the adoption of pro-environmental behaviours (Hunter et al., 2004). Age also plays a crucial role, particularly during the pivotal period between 9 and 13 years, which is identified as particularly favourable for the development of ecological values (Pol and Castrechini, 2013). Place of residence and cultural context are also determining variables, influencing access and exposure to natural spaces (Duron-Ramos et al., 2020).

Psychological factors constitute the second major category of determinants. Social and moral norms play a central role in shaping pro-environmental behaviours (Collado et al., 2017, Zhang & Cao, 2025). Affective attitude, including eco-affinity and environmental empathy, appears to be a significant predictor of the willingness to act in a pro-environmental manner (Šorytė, 2021, Chen et al.,, 2024). Altruistic values and biospheric awareness of environmental consequences also constitute determining psychological factors (Stern et al., 1999).

Socialisation agents represent the third major category of influence. The family, and particularly parents, play a key role in transmitting pro-environmental behaviours (Grønhøj and Thøgersen, 2017). The school, through education for sustainable development (ESD), constitutes another crucial socialisation agent (Davis, 2007, Takshe et al., 2023, Wu et al., 2025). Media, both traditional and social, also exerts a significant influence on the formation of children's pro-environmental behaviours (Han et al., 2020). A summary of the key determinants of pro-environmental behaviour among children is presented in Table 1.

Table 1

Summary of the determinants of pro-environmental behaviour in children

Main factors	Determinants	Key authors
Socio-demographic factors	- Sex	Hunter et al. (2004), Zelezny et al. (2000)
	- Age	Pol and Castrechini (2013), Collado et al., (2015)
	- Place of residence	Duron-Ramos et al. (2020), Rosa et al. (2019)
	- Culture	Chwialkowska et al. (2020), Park et al. (2007)
Psychological factors	- Social norms	Collado et al. (2017), Oh et al. (2021), Zhang & Cao (2025).
	- Moral standards	Krettenauer and Lefebvre. (2021), Turiel (1983)
	- Affective attitude	Šorytė (2021), Dopko et al. (2019), Chen et al., (2024).
	- Altruistic values	Stern et al. (1999),
Socialization agents	- Family	Grønhøj and Thøgersen (2017), Matthies et al. (2012)
	- School	Davis (2007), Takshe et al. (2023), Wu et al. (2025).
	- Media	Han et al. (2020), Trivedi et al. (2018)

This synthesis highlights the complexity and interconnectedness of the different factors influencing children's pro-environmental behaviour. Understanding these determinants is essential to develop effective strategies to promote more environmentally friendly behaviours among younger generations.

Methodology

Research Approach

Qualitative exploratory methodology was utilised in this research to study the background determinants of pro-environmental behaviour among children in the Tunisian context. The justification of the qualitative approach based on the explorative nature of our inquiry, coupled now with the need to understand children's perceptions, motivations, and obstacles related to pro-environmental behaviour at a deeper level. For the data collection process, semi-directed group interviews were chosen as the method relevant to exploring previously unknown qualitative trends and issues (Partridge et al., 2010). This technique allows for open expression while providing guidance to the participants and fosters interaction and discussion among the children. The interview guide was structured around three major themes: the importance of environmental protection, the factors and motivations for promoting pro-environmental behaviours, and the obstacles to such behaviours (see interview guide in Appendix 1).

Sample

The sample of our study consisted of 22 primary school-age children, aged 7 to 12 (see Table 2). This sample was ensured after the data saturation was achieved, i.e., when reaching this number of participants of 22 in the four focused groups, we found repetitive patterns and we did not yield fresh insight on novel themes. The details of the sample framework are presented in Table 2. The choice of this age group is particularly relevant for several reasons. On the one hand, as John (1999) points out, this period is distinguished by a high level of autonomy and openness to the external environment. On the other hand, children of this age can engage in dialogue, communicate, defend and argue their ideas (Brée, 1993; Belk et al., 1984). In addition, Otto et al. (2019) demonstrated that environmental attitudes and behaviours experience significant progression during this period. Participants were selected from a private school located in a socio-economically stable urban area of Hammamet, Nabeul.

Table 2

Characteristics of the interview sample

The interviewees	Age (years)	Sex	Year Level of Schooling	Group
Child 1	7	Boy	2	1
Child 2	7	Girl	2	2
Child 3	7	Girl	2	2
Child 4	8	Boy	3	1
Child 5	8	Girl	2	2
Child 6	8	Boy	3	1
Child 7	9	Girl	4	2
Child 8	9	Boy	4	1
Child 9	9	Boy	4	1
Child 10	9	Boy	4	1
Child 11	10	Girl	4	2
Child 12	10	Boy	5	3
Child 13	10	Girl	5	4
Child 14	10	Girl	5	4

Child 15	11	Boy	5	3
Child 16	11	Boy	5	3
Child 17	11	Girl	5	4
Child 18	11	Girl	6	4
Child 19	12	Boy	6	3
Child 20	12	Girl	6	4
Child 21	12	Boy	6	3
Child 22	12	Girl	6	4

Ethical Considerations

Ethical considerations were at the heart of our methodological approach. We obtained informed consent from their parents and the school before starting the study. Interviews were conducted in the school, ensuring a safe environment for participants. Audio recording of the interviews was carried out with the prior permission of the parties concerned, and the anonymity of the participants was preserved throughout the research process.

The interviews happened over two weeks in early 2022. They took place in the teachers' meeting room. Each session lasted about 45 to 60 minutes. This gave enough time to discuss the themes without losing the participants' attention. The interviews were done in a way that was friendly and easy for them. We used simple words so they could understand and share their thoughts easily. The interviews adopted a semi-structured protocol with open-ended prompts, which was adopted to elicit detailed narratives, not a simple affirmative response. We also adopted probing techniques, i.e. elaborate on their perceptions and feelings regarding challenges to gain more insight from all participants. During the interviews we moved from broad introductory “icebreakers” questions about their daily routines to more targeted, theory-driven inquiries concerning their behaviour and experience.

Data Analysis

The thematic content analysis technique was used to analyse data according to Bardin (2007) and Miles and Huberman (2003). Data analysis took place in the three main phases. The first phase consisted of condensing data with extensive transcription of interviews and their division by analytical theme. The second phase is displaying data by calculating their appearances' frequencies and classifying them according to distinction and analogy. Lastly, the results interpretation phase made it possible to ascertain recurrent elements and synthesise identified determinants. To ensure the validity and reliability of our analysis, we used thematic saturation as a criterion for data sufficiency. Double coding was performed to ensure the reliability of the analysis, and we triangulated the sources of information. As interviews were conducted in French, all the voice recordings and scripts were double checked by two native bilingual French-English speakers.

Results

Thematic analysis of the group interviews identified six major determinants of pro-environmental behaviour in children. These results are presented below, illustrated by representative quotes and contextualised within the framework of the existing literature. Table 3 presents a summary table of the transcription of the qualitative interviews with the verbatims.

Table 3

Transcription of qualitative interviews: verbatim by variable

Variables	Examples of comments
Awareness of	- Consuming less energy (C7)

biospheric consequences	- Breathing healthy air and have water to live (C3)
	- Preventing animals from disappearing (C15)
	- Having oxygen (C12)
	- Protecting plants (C19)
	- Not harming animals (C5)
	- Leaving nature clean for the well-being of animals and plants (C21)
	- If I throw away garbage and an animal eats , I cause its death (C8)
	- Havingless energy consumption (C2)
	- Resources can run out like water and energy (C17)
Family orientation	- My grandparents pay attention to consumption: electricity, gas, they use a bicycle instead of a car (C10)
	- My grandmother is careful when turning off the lights (C6)
	- My grandparents don't use cell phones, they have a house in the mountains, my grandmother is very concerned about reusing food waste (for example, she gives edible waste to pets) (C14)
	- My dad (C1)
	- My aunt (C18)
	- A conversation with my mum (C22)
	- When I was 8 years old, at my grandmother's house, she taught me to turn off the lights and the tap. Her insistence helped me get used to it even though I didn't really understand why (C9)
	- At home, everyone adopts pro-environmental behaviour (Mum, Dad). I don't remember the first time I learned to care about the environment, but I know that by seeing these behaviours I did the same thing, and my family always explains to me why (C11)
	- I obey my parents and grandparents first (C4)
	- My parents always tell me that (C16)
	- My mother taught me to behave in an environmentally friendly manner, and because she keeps repeating it, I feel compelled not to throw things on the ground (C20)
School education	- The school separates waste (3 bins for each category: plastic, cardboard, organic waste) (C13)
	- In my old school, I attended a lesson on the importance of environmental protection. At that time I was not concerned about the environment, and I told those around me at school. After this statement they explained to me why I should respect the environment. Since then, whenever I threw something on the ground, someone would ask me to pick up my trash, until one day it became a habit (C2)
	- In my kindergarten, I first learned to do these behaviours through the activities offered by the teachers (C7)
Environmental advertisements	- A TV show, a documentary, a series about animals explained this importance to me for the first time (C5)
	- On TV I saw how pollution and waste of resources contributed to the disappearance of animals. It made me cry; I realised that we were the ones responsible and that I had to be responsible (C19)
	- When I watched movies, I realised that I had to be like those people who protect the environment (C8)
	- Through television I learned that I should not harm the environment, the programmes encouraged me to understand the importance of environmental protection (C21)
Affective attitude	- I am really interested in the environment; I am afraid of being responsible for pollution (C4)
	- I don't want to throw my trash on the ground because someone else will have to pick it up, it's inappropriate (C11)
	- I feel responsible because if I throw away garbage and an animal eat it, I cause its death (C9)
	- I want to be an example for others to follow (C18)
	- To avoid causing problems for street cleaners (C3)
	- To influence others to do the same thing (C12)
	- I feel useful, and I want to be an example for others to follow (C10)
	- I am becoming a responsible person (C16)
	- I'm proud because not everyone does that (C22)
	- I feel efficient (C14)
	- I feel big [i.e. important] (C6)
Travel experience	- Travelling has allowed me to discover that people adopt pro-environmental behaviours (C20)
	- Travelling abroad has introduced me to environmentally friendly behaviors (C17)
	- During the trips I saw how people care about the environment. On the streets there are trash cans everywhere (C15)
	- While travelling, I observed that people protect their environment, that's how I understood that we had to do like them (C1)
	- When I travelled, I saw that everyone was trying not to harm the environment, the streets were all clean, there were always trash cans everywhere (C13)

Awareness of Biospheric Consequences

The first emerging theme concerns children's awareness of the environmental consequences of their actions. This awareness is manifested through a limited but present understanding of major environmental issues. Participants expressed their concerns about the future of ecosystems as it could be seen from the following comments:

"To protect animals so that they do not disappear, by 2050 there may be no birds left because of pollution" (C5)

"To live well, have clean air and drinking water" (C16)

This biospheric awareness translates into an intuitive understanding of the interconnections between human actions and their environmental consequences, representing 15% of the thematic occurrences identified.

Family orientation as a Determining Factor

Family influence emerged as the most significant factor (29% of occurrences), highlighting the crucial role of primary socialization in the development of pro-environmental behaviours. Participants frequently mentioned the direct influence of their family members:

"My mother taught me to behave in an environmentally friendly way, and because she says so much that we should do it, I feel obligated not to throw things on the ground." (C7)

"My grandparents who pay attention to consumption: electricity, gas, and using a bicycle instead of a car" (C12)

This family influence manifests itself through three main mechanisms. These include observational learning, repetition of instructions and imitation of model behaviours.

School Education as a Means of Awareness

Although representing a more modest proportion of occurrences (8%), school education appears to be a structuring means of environmental awareness. Participants stressed the importance of educational experiences:

"In my kindergarten, I first learned to do these behaviours through the activities offered by the teachers" (C8)

"The school separates waste" (C9)

Interviewed children were noticed to express the role of curricula and their schools' practices in shaping their eco-behaviour since they are more likely to adopt what they see and do at their schools.

The Influence of Media and Environmental Communication

Environmental advertising and media content constitute a significant factor (9% of occurrences), demonstrating the importance of communication channels in shaping pro-environmental behaviours. Children particularly mentioned the impact of audiovisual content:

"On television, I watched how pollution and the waste of resources contributed to the disappearance of animals." (C3)

This digital native was more likely to be affected by social media and digital content spread digitally.

Tourist Experience as an Emerging Factor

An unexpected result concerns the influence of tourist experiences (11% of occurrences) on the formation of pro-environmental behaviours. Travel appears as a significant learning opportunity:

"Travelling has allowed me to discover that people engage in pro-environmental behaviours" (C22)

"I saw during these trips how people care about the environment" (C19)

As it could be seen from these comments, students argued about their travel experience that shaped their environmental behaviour.

An Effective Attitude as a Behavioural Driver

Affective attitude emerges as an important factor as important as family orientation (29% of occurrences), revealing the importance of emotions and the feeling of personal efficacy in the adoption of pro-environmental behaviours:

"I feel efficient" and "I set a good example for others" (C11)

Ultimately, the analysis reveals a complex interaction between these different determinants, suggesting that children's pro-environmental behaviour results from a combination of cognitive (biospheric awareness), social (family, school), experiential (tourism) and affective (emotions, sense of efficacy) factors. Table 4 below presents the quantitative distribution of occurrences for each identified determinant. These results highlight the importance of a holistic approach in promoting pro-environmental behaviours in children, considering both cognitive and affective and social aspects of their development.

Table 4

Quantitative distribution of occurrences

Determinant	Frequency of occurrence (%)	Number of occurrences
Affective attitude	29	19
Family orientation	29	19
Biospheric consciousness	15	10
Travel experience	11	7
Environmental advertisements	9	6
School education	8	5

Discussion

This study found six main things that affect how children act in ways that help the environment. These are family focus, feelings about the environment, knowing about the effects on nature, tourism experiences, environmental ads spelled out in formal writing, and school education. These results match other research that showed nine important factors that influence their environmental actions. Family focus stood out as the most important factor. This supports what Phoenix et al found in 2017, which is that family plays a key role in how children act to protect the environment. Our findings show that children learn everyday habits such as recycling and using less from their families. This aligns with Wallis and Klöckner's 2018 research, which found that children often copy their parents when it comes to saving energy.

School education plays a role in tackling environmental issues. Although it may not be the main focus of our results, it fits with what Ouariachi et al. found in 2020. Our findings show that environmental education works best when it is interactive. This backs up Monroe et al.'s ideas from

2017. Being aware of how our actions affect the environment is crucial. This matches the study by van der Werff and Steg in 2016. Children often understand how their actions impact nature, which supports what Wang et al. found in 2021 about how these values can lead to better environmental habits. Having an emotional connection to the environment seems just as important as support from family. Wang's research in 2019 suggests that emotional factors might matter more than just knowledge. This is especially true for youngsters, where believing they can make a difference is key. It is also noted by Šorytė in 2021. A particularly interesting result concerns the influence of tourist experiences. This finding is consistent with recent work by Xue et al. (2020) which shows how exposure to environmentally responsible behaviours in different contexts can promote the adoption of these behaviours in the long term. Liu et al. (2020) also confirm that positive emotions felt during a tourist experience strengthen pro-environmental behaviour intentions.

The integrative approach is consistent with the findings of Blankenberg and Alhusen (2019), who posit that it is no longer viable to study determinants individually, but that it is necessary to consider their interaction to understand the complexity of pro-environmental behaviours. They highlight the crucial role of direct experience and social learning in the development of these behaviours. Interventions aimed at promoting pro-environmental behaviours in children should rely on family influence, integrate affective components, prioritise direct and concrete experiences, and reinforce awareness of environmental consequences in a manner adapted to their level of understanding.

The results have many implications for decision makers in shape the pro-environmental behaviour of children, who are going to be the leaders of the future. First, families play the main role in shaping the pro-environmental behaviour of their children; hence, they need to be fully aware of their role. Decision-makers should raise the awareness of parents about eco-friendly practices as their children would copy them. Eco-friendly non-governmental organisations could cooperate with such campaigns by developing simple flyers and notes on how to save resources and conserve the environment. These initiatives would contribute to children's affective attitude and their environmental awareness. Decision makers should note that children are highly affected by their travel experience; hence, ensuring that the travel experience is positive by encouraging visitors to protect the environment. Paying attention to both environmental advertisement and environmental education is important as they shape the pro-environmental behaviour of children. The research provides new perspectives for the design of environmental education programmes and awareness-raising strategies tailored to young audiences. These results echo the recent findings of Takshe et al. (2023) that highlight the crucial importance of formal and informal education in the development of pro-environmental behaviours, emphasising the need for an integrated approach combining knowledge and attitudes.

Conclusion

This exploratory qualitative study identified and understood the determinants of pro-environmental behaviour among Tunisian children. The results highlight six key factors: family orientation, school education, awareness of biospheric consequences, affective attitude, environmental advertisements and tourist experience. The in-depth analysis of these determinants showed some interesting findings and highlighted many implications for scholars and decision-makers, especially in educational context. Decision-makers should pay close attention to the crucial role of schools as a promoter of behavioural change and shaping the pro-environmental behaviours of children. Schools appear to be privileged actors for moralising environmental practices and sustainably anchoring pro-environmental behaviours in children. Hence, decision makers should pay close attention to developing educational pro-grammes specifically focused on the environment and experiential learning, allowing children to concretely understand environmental issues and adopt responsible behaviours. The effectiveness of these interventions requires a systemic approach involving all stakeholders. The coordinated mobilisation of families, schools, the media and public institutions

appears to be an essential condition for promoting the sustainable adoption of pro-environmental behaviours among children.

This research suggests several future directions. First, a hypothetico-deductive quantitative study could be conducted to measure the relative impact of each identified determinant and strengthen the external validity of the results. Second, it would be relevant to explore the perspectives of other key actors through interviews with parents and teachers, thus allowing a more holistic understanding of the phenomenon. Finally, longitudinal studies could be considered to assess the persistence of pro-environmental behaviours developed during childhood. The managerial implications of this research suggest the need to develop targeted and coordinated interventions, based on the different levers identified. Political and educational decision-makers could draw inspiration from these results to design more effective environmental awareness programmes, adapted to the specificities of young people.

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References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.

Takshe, A.A., Hennawi, M., Jebril, S., Alawi, S., AlZaidan, S., & Okasha, A. (2023). Investigating determinants of pro-environmental behaviors amongst UAE university students through Q-methodology. *Discover Sustainability*, 4(38).https://doi.org/10.1007/s43621-023-00156-4

Aliedan, M. M., Alyahya, M. A., Elshaer, I. A., & Sobaih, A. E. E. (2023). Who Is Going Green? Determinants of Green Investment Intention in the Saudi Food Industry. *Agriculture*, *13*(5), 1047. https://doi.org/10.3390/agriculture13051047

Bardin, L. (2007). Content analysis (1st edition). Paris: PUF.

Belk, R.W., Bahn, K.D., & Mayer, R.N. (1984). Developmental recognition of consumption symbolism. *Journal of Consumer Research*, 9(1), 4-17.

Blankenberg, A.-K., & Alhusen, H. (2019). On the Determinants of Pro-Environmental Behavior: A Literature Review and Guide for the Empirical Economist. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3473702

Bogner, F. X., & Wilhelm, M. G. (1996). Environmental perspectives of pupils: The development of an attitude and behaviour scale. *Environmentalist*, *16*(2), 95-110.

Brée, J. (1993). Children, consumption and marketing. Paris: Presses Universitaires de France.

Chen, X., Tang, J., & Liu, P. (2024). How place attachment affects pro-environmental behaviors: The role of empathy with nature and nature relatedness. *Current Psychology, 43*(23), 1-13. https://doi.org/10.1007/s12144-024-05820-0

Cheng, J. C. H., & Monroe, M. C. (2012). Connection to nature: Children's affective attitude toward nature. *Environment and Behavior*, 44(1), 31-49.

Chwialkowska, A., Bhatti, W. A., & Glowik, M. (2020). The influence of cultural values on pro-environmental behavior. *Journal of cleaner production*, *268*, 122305. https://doi.org/10.1016/j.jclepro.2020.122305.

Collado, S., Corraliza, J. A., Staats, H., & Ruiz, M. (2015). Effect of frequency and mode of contact with nature on children's self-reported ecological behaviors. *Journal of Environmental Psychology*, *41*, 65-73. https://doi.org/10.1177/001391651349241.

Collado, S., Evans, G. W., & Sorrel, M. A. (2017). The role of parents and best friends in children's pro-environmentalism: Differences according to age and gender. *Journal of Environmental Psychology*, *54*, 27-37. https://doi.org/10.1016/j.jenvp.2017.09.007.

Collado, S., Staats, H., & Corraliza, JA (2013). Experiencing nature in children's summer camps: Affective, cognitive and behavioral consequences. *Journal of Environmental Psychology*, 33, 37-44.

Davis, J. (2007). Climate change and its impact on young children. Early Childhood Australia.

Dopko, Raelyne L., Colin A. Capaldi, and John M. Zelenski. "The psychological and social benefits of a nature experience for children: A preliminary investigation." *Journal of Environmental Psychology* 63 (2019): 134-138. https://doi.org/10.1016/j.jenvp.2019.05.002.

Duron-Ramos, M.F., Collado, S., García-Vázquez, F.I., & Bello-Echeverria, M. (2020). The role of urban/rural environments on Mexican children's connection to nature and pro-environmental behavior. *Frontiers in Psychology*, 11, 514.

Elshaer, I. A., Sobaih, A. E. E., Aliedan, M., & Azazz, A. M. S. (2021). The Effect of Green Human Resource Management on Environmental Performance in Small Tourism Enterprises: Mediating Role of Pro-Environmental Behaviors. *Sustainability*, *13*(4), 1956. https://doi.org/10.3390/su13041956.

Grønhøj, A., & Thøgersen, J. (2017). Why young people do things for the environment: The role of parenting for adolescents' motivation to engage in pro-environmental behavior. *Journal of Environmental Psychology*, *54*, 11-19.

Gülay, H. (2011). A tree is bent while it is young: The importance of environmental education in the early years of life. *TÜBAV Science Journal.* 4(3) 240-245.

Hahn, E.R. (2021). The developmental origins of environmental stewardship: How young children respond to environmental threats. *Child Development*, 92(2), 668-684.

Han, R., & Xu, J. (2020). A comparative study of the role of interpersonal communication, traditional media and social media in pro-environmental behavior: A China-based study. *International Journal of Environmental Research and Public Health*, 17(6), 1883.

Hinds, J., & Sparks, P. (2008). Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology*, 28(2), 109-120.

Hunter, L. M., Hatch, A., & Johnson, A. (2004). Cross-national gender variation in environmental behaviors. *Social science quarterly*, *85*(3), 677-694. https://doi.org/10.1111/j.0038-4941.2004.00239.x.

John, D.R. (1999). Consumer socialization of children: A retrospective look at twenty-five years of research. *Journal of Consumer Research*, 26(3), 183-213.

Juma-Michilena, I.-J., Ruiz-Molina, M. E., Gil-Saura, I., & Belda-Miquel, S. (2023). An analysis of the factors influencing pro-environmental behavioural intentions on climate change in the university community. *Economic Research-Ekonomska Istraživanja*, *36*(3), 2264373. https://doi.org/10.1080/1331677X.2023.2264373

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?. *Environmental education research*, *8*(3), 239-260. https://doi.org/10.1080/13504620220145401.

Krettenauer, T., & Lefebvre, J. P. (2021). Beyond subjective and personal: Endorsing pro-environmental norms as moral norms. *Journal of Environmental Psychology*, *76*, 101644. https://doi.org/10.1016/j.jenvp.2021.101644.

Liu, J., & Green, R.J. (2024). Children's pro-environmental behavior: A systematic review of the literature. *Resources, Conservation and Recycling*, 205, 107524.https://doi.org/10.1016/j.resconrec.2024.107524

Liu, X., Zou, Y., & Wu, J. (2020). Promoting green practices at tourist attractions: Tourists' pro-environmental behavior. *Journal of Sustainable Tourism*, 28(7), 1070-1091.

Markovic, E., Vidosavljević, S., Krulj, J. R., & Lazović, N. (2022). Psychological factors influencing pro-environmental attitudes in children. *Sportlogia*, *18*(1), 60–67. https://doi.org/10.5550/sgia.221801.en.mvkl

Matthies, E., Selge, S., & Klöckner, C. A. (2012). The role of parental behaviour for the development of behaviour specific environmental norms–The example of recycling and re-use behaviour. *Journal of environmental psychology*, *32*(3), 277-284. https://doi.org/10.1016/j.jenvp.2012.04.003.

Metzger, A., Syvertsen, A. K., Oosterhoff, B., Babskie, E., & Wray-Lake, L. (2016). How children understand civic actions: A mixed methods perspective. *Journal of Adolescent Research*, *31*(5), 507-535. https://doi.org/10.1177/074355841561000.

Miles, MB, & Huberman, AM (2003). Qualitative Data Analysis (2nd ed.). De Boeck Supérieur.

Monroe, MC, Plate, RR, Oxarart, A., Bowers, A., & Chaves, WA (2017). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research*, 25(6), 791-812.

Negev, M., Sagy, G., Garb, Y., Salzberg, A., & Tal, A. (2008). Evaluating the environmental literacy of Israeli elementary and high school students. *The journal of environmental education*, *39*(2), 3-20. https://doi.org/10.3200/JOEE.39.2.3-20.

Nisbet, EK, Zelenski, JM, & Murphy, SA (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 41(5), 715-740.

Oh, R. R. Y., Fielding, K. S., Nghiem, L. T. P., Chang, C. C., Carrasco, L. R., & Fuller, R. A. (2021). Connection to nature is predicted by family values, social norms and personal experiences of nature. *Global Ecology and Conservation*, *28*, e01632. https://doi.org/10.1016/j.gecco.2021.e01632.

Otto, S., & Kaiser, F. G. (2014). Ecological behavior across the lifespan: Why environmentalism increases as people grow older. *Journal of Environmental Psychology*, *40*, 331-338. https://doi.org/10.1016/j.jenvp.2014.08.004

Otto, S., Evans, G.W., Moon, M.J., & Kaiser, F.G. (2019). The development of children's environmental attitude and behavior. *Global Environmental Change*, 58, 101947.

Ouariachi, T., Li, CY, & Elving, WJ (2020). Gamification approaches for education and engagement on pro-environmental behaviors: Searching for best practices. *Sustainability*, 12(11), 4565.

Özdemir, A. (2006). Behaviors Expected of and Observed in School Principals Regarding the Creation of School Culture and Its Promotion to the Community. *Turkish Journal of Educational Sciences.*, 4(4), 411-436.

Park, H., Russell, C., & Lee, J. (2007). National culture and environmental sustainability: A cross-national analysis. *Journal of Economics and Finance*, *31*(1), 104-121. https://doi.org/10.1007/BF02751516.

Partridge, H., Edwards, SL, & Thorpe, C. (2010). Evidence-based practice: Information professionals' experience of information literacy in the workplace. Practicing Information Literacy: Bringing Theories of Learning, Practice and Information Literacy Together, 273-298.

Phoenix, A., Boddy, J., Walker, C., & Vennam, U. (2017). Environment in the lives of children and families: Perspectives from India and the UK. Bristol: Policy Press.

Pol, E., & Castrechini, A. (2013). Disruption in education for sustainability. *Revista Latinoamericana de Psicología*, *45*(3), 333-347. https://doi.org/10.14349/rlp.v45i3.1477.

Rosa, C. D., & Collado, S. (2019). Experiences in nature and environmental attitudes and behaviors: Setting the ground for future research. *Frontiers in psychology*, *10*, 763. https://doi.org/10.3389/fpsyg.2019.00763.

Soares, J., Miguel, I., Venâncio, C., Lopes, I., & Oliveira, M. (2021). Public views on plastic pollution: Knowledge, perceived impacts, and pro-environmental behaviors. *Journal of Hazardous Materials*, 412, 125227.

Šorytė, D. (2021). Environmental Attitudes and Recycling Behavior in Primary School Age: The Role of School and Parents. *Psychology*, 63, 101-117.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407-424.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human ecology review*, 81-97. https://www.jstor.org/stable/24707060.

Świątkowski, W., Surret, F. L., Henry, J., Buchs, C., Visintin, E. P., & Butera, F. (2024). Interventions promoting pro-environmental behaviors in children: A meta-analysis and a research agenda. *Journal of Environmental Psychology*, *96*, 102295. https://doi.org/10.1016/j.jenvp.2024.102295

Takala, M. (1991). Environmental awareness and human activity. *International Journal of Psychology*, 26(5), 585-597.

Thompson, C.W., Aspinall, P., & Montarzino, A. (2008). The childhood factor: Adult visits to green places and the significance of childhood experience. *Environment and Behavior*, 40(1), 111-143.

Trivedi, R. H., Patel, J. D., & Acharya, N. (2018). Causality analysis of media influence on environmental attitude, intention and behaviors leading to green purchasing. *Journal of cleaner production*, *196*, 11-22. https://doi.org/10.1016/j.jclepro.2018.06.024.

Turiel, E. (1983). *The development of social knowledge: Morality and convention*. Cambridge University Press.

Van der Werff, E., & Steg, L. (2016). The psychology of participation and interest in smart energy systems: Comparing the value-belief-norm theory and the value-identity-personal norm model. *Energy research & social science*, *22*, 107-114. https://doi.org/10.1016/j.erss.2016.08.022.

Vasconcelos, R. N., de Santana, M. M., Costa, D. P., Duverger, S. G., Ferreira-Ferreira, J., Oliveira, M., ... & Franca Rocha, W. J. (2024). Machine learning model reveals land use and climate's role in Caatinga wildfires: Present and future scenarios. *Fire*, *8*(1), 8. https://doi.org/10.3390/fire8010008.

Wallis, H., & Klöckner, C. (2018). The transmission of energy-saving behaviors in the family: A multilevel approach to the assessment of aggregated and single energy-saving actions of parents and adolescents. *Environment and Behavior*, 50(2), 197-230.

Wang, X., Van der Werff, E., Bouman, T., Harder, M. K., & Steg, L. (2021). I am vs. we are: how biospheric values and environmental identity of individuals and groups can influence pro-environmental behaviour. *Frontiers in psychology*, *12*, 618956. https://doi.org/10.3389/fpsyg.2021.618956.

Wang, X. (2019). Examining the effects of sentiment and cognition on pro-environmental behavior. *Journal of Cleaner Production*, 227, 954-963.

Witt, S.D., & Kimple, K.P. (2008). How does your garden grow? Teaching preschool children about the environment. *Early Child Development and Care*, 178(1), 41-48.

Wu, X., Jia, W., & Wu, T. (2025). Mechanism by which environmental education influences pro-environmental behavior in Wuyishan National Park, China. *Sustainability*, *17*(1), 43. https://doi.org/10.3390/su17010043.

Xue, L., Chang, YR, & Shen, CC (2020). The sustainable development of organic agriculture-tourism: The role of consumer landscape and pro-environment behavior. *Sustainability*, 12(15), 6264.

Zhang, J., & Cao, A. (2025). The psychological mechanisms of education for sustainable development: Environmental attitudes, self-efficacy, and social norms as mediators of pro-environmental behavior among university students. *Sustainability*, *17*(3), 933. https://doi.org/10.3390/su17030933

Zhang, X., & Dong, F. (2020). Why do consumers make green purchase decisions? Insights from a systematic review. *International Journal of Environmental Research and Public Health*, 17(18), 6607.

Zelezny, L. C., Chua, P. P., & Aldrich, C. (2000). New ways of thinking about environmentalism: Elaborating on gender differences in environmentalism. *Journal of Social issues*, *56*(3), 443-457. https://doi.org/10.1111/0022-4537.00177.

Appendix 1

Semi-directive group interview guide

Target audience: Children aged 7 to 12

Introduction phase

Hello everyone, we are going to talk together about the environment and how we can protect it.

Theme 1: Exploring the importance of environmental protection

- Why is it important to protect the environment?
- How can we protect nature? Give me several examples.

Theme 2: Factors and motivations that influence pro-environmental behaviors

Family and social influence

- Who are the people around you who behave in ways such as throwing things in the trash, turning off the lights, or using a bicycle instead of a car?
- Why do you think they do these behaviors?

Role of education and media

- When and why was the first time you demonstrated pro-environmental behavior?
- What motivates you to behave in an environmentally friendly way? (sorting waste, using a glass of water instead of leaving the tap running, recycling)

Experience and affective attitude

- How do you feel when you demonstrate environmentally friendly behavior?