

Article

Promoting Sustainability Together with Parents in Early Childhood Education

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Abstract: This multimethod study investigated an environmental recycling project in a Finnish kindergarten group, tailored for children aged 4 to 6, as part of early childhood environmental education for sustainable development. We aimed to identify the main drivers of sustainable lifestyles in the families of kindergarten children and evaluate the project's effective practices. We utilized a qualitative approach using interviews with parents and feedback from teachers and employed the Following a Thread approach alongside inductive thematic analysis. The results highlight the crucial role of Finland's socio-cultural context, including the emphasis on free play in natural settings and the encouragement of exploration under gentle guidance, in fostering sustainable behaviors among children. Additionally, the parents' strong environmental sensitivity was manifested in their will to engage with their surrounding community to promote sustainability. The results underscore the importance of collaboration between parents and educators in promoting environmental awareness from an early age. The study advocates for policy changes to ensure that children and teachers have access to natural environments during day care, suggesting that integrating free play in nature with hands-on recycling activities can significantly contribute to sustainable education. Moreover, this topic should be further investigated in different living environments.

Keywords: early childhood education; environmental education; sustainable development; environmental sensitivity; thematic analysis; Following a Thread approach; qualitative research; hands-on activities; nature connection

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1. Introduction

Research shows that we have not fully reached our goals on the path to a sustainable future [1]. Rising inequality, climate change, biodiversity loss, and increasing amounts of waste from human activity continue to be pressing issues. We need to accelerate our actions and successfully convey the message of sustainability to achieve these critical goals [2].

It is increasingly recognized globally that education for sustainable development plays a critical role in creating a more just, peaceful, and sustainable world. To achieve this, individuals and societies need to be equipped with knowledge, skills, and values while developing heightened awareness [3].

Moreover, the significance of early childhood education for sustainable development in promoting sustainability from a young age has been highlighted in numerous studies [4–10]. The 2007 international workshop on The Role of Early Childhood Education for a Sustainable Society emphasized the importance of early childhood for forming lasting

values, attitudes, and behaviors towards sustainability [4]. It was noted that families, along with other significant adults close to children, play an important role as primary sustainability educators in shaping children's attitudes and behaviors. Additionally, sustainability programs in both formal and informal educational settings offer families opportunities to engage in sustainability discussions and adopt new practices and ideas.

To enhance sustainable development, we brought together researchers and kindergarten professionals to collaboratively develop an environmental recycling project, including activities, such as decomposition experiments, tailored for children aged 4 to 6 years (see Appendix A). Our project was grounded in the early childhood education curriculum.

We chose recycling as the project topic due to its global significance and suitability for teaching young children. Moreover, the kindergarten professionals were already familiar with the topic and its instructional aspects. The alarming fact that households produce around 20 to 29 percent of annual solid waste is concerning, with developed countries responsible for half of this waste [5]. Although waste is decreasing in wealthier nations, it is rising in less affluent ones [6], with projections indicating further increases [7]. Waste management is crucial for addressing global challenges such as health, poverty, resource security, and sustainable practices, also impacting greenhouse gas emissions [6].

Our project the Masters of Trash aimed to nurture a natural curiosity and care for the environment among children by enhancing their understanding of recycling and its significance for both the planet and themselves. We also aimed to foster dialogue and engagement on these topics among kindergarten professionals, children, and their parents. By acknowledging the interconnectedness of our environment and broader sustainable development goals, our project aimed to underscore the important role of environmental protection in achieving a sustainable future. Hence, we consider our project as embodying the principles of environmental education for sustainable development, aiming to contribute to sustainability through education.

Our study, through our project the Masters of Trash, aims to enhance environmental education for sustainable development in kindergartens by identifying main drivers of sustainable lifestyles in the families of kindergarten children and evaluating the project's effective practices. Moreover, we aim to make suggestions of how to integrate these drivers into early childhood educational practices. Our focus is particularly on the perspectives of both parents and kindergarten professionals participating in this study. We include environmental sensitivity in our research as its significant influence on sustainable attitudes and behaviors is recognized in many studies [8–13].

The specific research questions are:

1. What are the main drivers inspiring families involved in our kindergarten recycling project to take action in protecting the environment and contributing to a more sustainable future?
2. How did the kindergarten environmental project succeed in raising children's environmental awareness and enhancing dialogue between parents and kindergarten professionals?
3. How can the drivers and successful practices identified in the project be integrated into kindergarten educational practices to enhance sustainable development education?

Moreover, by extending our focus to encompass both parents and children's home environments, our study addresses a significant gap highlighted in early childhood education for sustainable development research [14,15].

2. Environmental Education for Sustainable Development

The 1972 United Nations Conference on the Human Environment in Stockholm underscored the urgency of environmental preservation and laid the groundwork for global environmental awareness and politics [16,17]. The importance of environmental

education was later emphasized at the 1977 UNESCO conference [18], highlighting its role in promoting a harmonious relationship with nature and equipping individuals with the essential knowledge, values, and skills to improve living conditions and overall welfare.

The concept of sustainable development gained prominence with the publication of *Our Common Future* in 1987 [19], which advocated for development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Further elaboration on sustainable development was provided by the UK Department for Education and Skills in 2006, defining it as “a way of thinking about how we organize our lives and work—including our education system—so that we don’t destroy our most precious resource, the planet. It is about thinking and working in a profoundly different way” [20] (p. 42).

Purvis et al. [21] describe sustainability as a triad of economic, social, and environmental pillars, each crucial for a holistic understanding of sustainability. Hume and Barry [22] complement this by emphasizing the interconnectedness of physical, biological, and cultural elements within the environment. Each thing influences or depends on the other. Hume and Barry [22] address that environmental education should aim to sensitize people to understand how important the environment is as a source of healthy life. To sustainably preserve earth, people should understand human beings are a part of nature, and we should value and take care of it.

As well as the subject of environmental education, sustainable development has inspired researchers from across the globe over the decades [21], which certainly reflects the evolving and multifaceted nature of both concepts. We consider our project and study under the realm of environmental education for sustainable development because we aim to grow a self-driven interest in nature among children and teach them sustainability through hands-on activities. Moreover, we emphasize the interconnectedness of the environment and the significant impact human actions have on its condition.

3. The Crucial Role of Early Childhood Sustainable Education

The importance of early childhood education in fostering sustainability, especially through environmental education, is well-documented in numerous studies [5–10]. This form of education lays a foundational groundwork for developing environmental sensitivity, interest, and behaviors in later life [14]. Additionally, it plays an important role in shaping a more sustainable future for our planet [23–28].

Early childhood is a critical time for developing environmental literacy [14]. Environmental literacy refers to understanding key environmental ideas and challenges, combined with the necessary attitudes, motivation, cognitive capabilities, and skills [29]. The components of environmental literacy such as ecological awareness, environmental attitudes and consciousness, and nature relatedness are the roots of environmental behavior and they begin to take shape during early childhood [14].

Connection with nature, often rooted in childhood experiences, influences adults’ environmental concerns and is essential for sustainable development [14,23,27]. It is observed that children naturally bond with the environment [27], and nature connection has a positive impact on human well-being, promoting pro-environmental attitudes and ecological behaviors [23]. However, the decline in outdoor time for children due to modern lifestyles and limited availability of suitable outdoor spaces, especially in urban areas where half of the world’s population lives, is concerning [23]. Lumber et al. [30] underscore that reconnecting children with nature can be advocated through integrated environmental and outdoor education approaches. They highlight the importance of experiencing nature’s beauty, evoking emotions, and spending time outdoors.

Many studies underscore that children understand that humans are active parts of the environment and whose actions have consequences for the future [24–26,28]. This understanding develops through personal experiences within their own living environments. Thus, children are not just passive recipients of knowledge; they are active contributors capable of meaningfully influencing a sustainable future. Nonetheless, there is a

tendency among some educators to perceive children as innocent beings in need of protection, viewing nature as dangerous place for them [25]. This perspective needs to shift towards recognizing children's competencies, treating them as agents of change. Furthermore, engaging in critical discussions about the interplay between the environment and society, and exploring alternative actions for change, tailored to a child's developmental level, empowers children to think independently and make well-considered decisions [24–26,28].

Moreover, in addressing the challenges of educating children for an uncertain future, a holistic approach to sustainability education is recommended [24,25]. This involves incorporating real-life activities related to nature, society, economy, and governance into early childhood education programs, while emphasizing the importance of maintaining children's hope and joy [24].

Play-based and nature-rich pedagogical practices that incorporate movement and social interaction are significant contributors to positive outcomes in early childhood environmental education programs [14,26]. The study of Ardoin and Bowers [14] demonstrated that activities such as visiting natural areas, gardening, playing with natural materials, and engaging in free and imaginative play are especially effective practices in environmental education for kindergarteners. The authors highlight that nature-rich experiences in early childhood contribute to basic appreciation for the natural world, increase activity, improve health, and offer cognitive and social–emotional benefits. In light of this, practices that connect with local nature and encourage exploration and curiosity are important among young learners, as emphasized by Heggen et al. [26]. Despite these benefits, the reality remains that not all children have access to safe, clean, and nature-rich areas. This gap underscores the critical need for embedding natural elements into educational frameworks, even within indoor settings [14].

Parents play a significant role in shaping children's environmental awareness by giving examples and encouraging eco-friendly habits from an early age [31,32]. Simsar et al. [31] specifically highlight that mothers, alongside socio-economic status and living environments, notably affect the development of children's environmental attitudes and awareness.

An innovative recycling program, utilizing active teaching methods and engaging parents through communication and feedback, was implemented in a Spanish kindergarten [33]. According to the researchers who studied the program, it increased children's and teachers' knowledge and motivation for recycling, improved group work skills, and fostered a stronger connection with nature. This initiative also sparked increased curiosity about recycling among parents and optimism regarding its societal impact among teachers. Therefore, the program not only enhanced the sense of community belonging and parental involvement in education but also underscored the critical role of parent–teacher collaboration in promoting environmental sustainability within early childhood education. These findings are in line with other studies [4,21].

Currently, research on sustainable education in early childhood and care lacks depth in investigating day-to-day interactions between children and their parents, highlighting a significant gap in the literature [14,15]. Furthermore, there is a pronounced need for employing interventional, experimental, and action research methods in this domain [15], as well as for studies focusing on environmental learning within nature-rich settings [14].

4. Environmental Sensitivity

Environmental knowledge and understanding alone do not necessarily lead to environmentally friendly behavior [11]. Environmental sensitivity can also be an important feature of an environmentally responsible citizen [10].

The findings of Kollmuss and Agyeman [11] challenge the traditional linear progression model that posits increased environmental knowledge naturally leads to a change in attitude and, consequently, to pro-environmental behavior. Instead, their research reveals that the pathway from knowledge to behavior is influenced by multiple factors, indicating

a complex relationship between what people know and how they act regarding the environment.

Kollmuss and Agyeman [11] emphasize the significant role of direct versus indirect environmental experiences. Their study suggests that direct, concrete experiences with environmental issues, such as witnessing the consequences of pollution first-hand, have a stronger impact on fostering pro-environmental behavior than indirect, theoretical learning obtained in classroom settings. Furthermore, the influence of social and familial norms plays a crucial role, suggesting that the behaviors and norms within one's community significantly shape individual actions toward the environment. However, Kollmuss and Agyeman [11] also highlight the complexity of accurately measuring and interpreting the relationship between environmental knowledge, attitudes, and behaviors, underscoring that attitudes towards the environment evolve over time and that methodological challenges in research can lead to misunderstandings of how knowledge translates into action.

Emotions significantly influence our actions towards the environment, as highlighted by Carmi et al. [8]. What people feel and believe, rather than what they know about the environment, determine their attitudes towards it [13]. This underscores the importance of considering the creation of environmental emotions and the development of environmental sensitivity in environmental education [8].

Kollmuss and Agyeman [11] and Weber [12] advocate for addressing environmental issues in a more personalized manner to support one's development in environmental sensitivity. Teachers can stimulate learners' sensitivity by concretizing environmental issues so that the learners would feel the environmental implications as more vivid, imminent, and personal.

Chawla [9] notes that environmental sensitivity involves an individual's awareness, concern, and appreciation for the environment. Moreover, the empathetic perspective of environmental sensitivity, which means that people feel empathetic towards the environment as if the environment had feelings people could relate to, could be taken into consideration when teaching young children. In one of the studies reviewed by Chawla [9], environmental sensitivity is defined as a predisposition to take an interest in learning about the environment, feeling concern for it, and acting to conserve it, based on formative experiences. These significant life experiences can be understood as exchanges between a child's inner and outer environment. This means, for example, that a person experiences their surroundings through their emotions and needs. Chawla [9] posits that multiple experiences, rather than one, contribute to responsible environmental behavior.

5. Materials and Methods

5.1. Context of the Study

The environmental project for sustainability, the Masters of Trash, associated with this research was implemented in a public Early Childhood Education and Care Center located in a Finnish city with approximately 19,000 residents. Early Childhood Education and Care, as a part of the Finnish educational system, forms a systematic and goal-oriented foundation for lifelong learning, focusing on education, instruction, and care [34]. The project was implemented in a kindergarten group with 24 children ages 4 to 6, along with 5 adult professionals from the kindergarten. A total of 15 families and 2 teachers volunteered to participate in our study. Notably, one of the researchers of this study also worked as a teacher in the project.

The project, developed collaboratively by our researchers and kindergarten professionals, lasted for the entire school year. It was built on the existing environmental education practices in the kindergarten and was carefully aligned with the National Core Curriculum, which considers findings of the latest research and development efforts [34]. We chose recycling as the project theme due to its global significance and suitability for teaching young children. This choice also aligns with the Finnish National Core Curriculum, which underlines that early childhood and care activities must reflect a sustainable way

of living and responsibility for nature and they must be tailored to a child-centric approach.

Our approach was holistic, aiming to engage children fully as suggested by the National Core Curriculum [34]. This involved creating an environment where children could explore the world through all their senses and entire body, interact, and express themselves freely. Activities like the “recycling train” allowed children to practice waste sorting in a playful, often outdoor setting. Children usually worked in groups, enabling children to share and discuss their experiences with peers and teachers. Given Finland’s stringent recycling regulations, we anticipated that children would extend these discussions to their home environments, applying their kindergarten-learned knowledge and skills about recycling.

Decomposition experiments were designed to spark curiosity and enhance experimental skills, helping children to understand the significance of their actions on the environment. Moreover, by involving them in forest waste collection, we aimed to empower them, instill a sense of responsibility, and show the importance of their actions. For a more detailed exploration of the specific sub-areas of our project, including objectives and implementation strategies, please see Appendix A.

In addition, we aimed to actively engage guardians and foster a meaningful exchange of knowledge and experiences among families, children, and the kindergarten, a practice underscored in the curriculum [34]. Parental engagement was primarily facilitated through pedagogical documentation. The documentation serves both as a process and a tool because it assists in the planning and implementation of kindergarten activities and engages parents by making their child’s day and development visible [34]. In our project, parents were regularly updated through the digital teaching and learning platform Wilma. We also maintained a photo diary in the kindergarten lobby, documenting daily activities. The children selected photos and shared their narratives, turning the diary into an interactive feature of the project visible to all. Additionally, kindergarten teachers engaged in conversations with parents about the project, typically during child pick-up times.

Moreover, we hypothesize that the location of homes and the day care center, Finland’s strict waste management regulations, and Finns’ connection to nature and outdoor activities may impact the phenomenon under study.

The day care center features a natural outdoor area bordering a forest. All the children and families have easy access to nature and outdoor activities, as most Finns live within approximately 700 m from the nearest forest [35]. Moreover, Finland is recognized as one of the world’s safest countries [36], and its outdoor air quality has been reported as some of the cleanest globally [37].

In Finland, waste management is strictly regulated to ensure human and environmental health and to support a sustainable material cycle. This includes directives for waste collection, litter prevention, risk management, and monitoring. Producers must sort and dispose of waste properly [38].

Additionally, Finns engage in activities such as swimming in natural waters, picking berries, spending time at cottages, fishing, cycling, skiing, and observing nature about 2–3 times weekly [35], making them the most physically active and outdoor-oriented population in the European Union [39].

5.2. Case Study

We chose the case study as our research methodology due to its suitability for small-scale projects [40] and its typical linkage to naturally occurring phenomena [41] within real-life contexts [42]. This approach aligns with our study on environmental education for sustainable development in a kindergarten, focusing on the emergence of a sustainable lifestyle in real-life settings and the collaboration between parents and professionals. MacDonald and Walker [43] describe it as a study of instances of action, which resonates with our focus on specific actions within families and kindergartens to explore factors

contributing to sustainability. Our study, characterized by multiple phases analyzed with different methods, reflects the holistic nature of case studies as described by Denscombe [41]. Although case studies face criticism for limited generalizability, the insights they provide can aid in developing theoretical frameworks for the phenomenon studied, thereby improving analytical generalizability [42]. This is in line with our goal to develop practical and effective sustainable education practices for kindergartens.

5.3. Multimethods

We adopted a multimethod approach [44] because we collected data using different qualitative research methods supported by some quantitative methods within our study. The primary benefit of a multimethod study is that it combines different research methods to overcome the limitations and biases of individual methods, leading to more comprehensive, reliable, and valid findings [45]. Recognizing the challenge of integrating diverse data strands—a challenge noted by Dupin and Borglin [46]—we applied the Following a Thread approach [47] throughout our study's four distinct phases. This involved initially analyzing each dataset separately with a methodology suited to its specific nature. We identified the themes, and questions requiring further exploration, and then traced these across other datasets through iterative refinement to achieve a comprehensive understanding of environmental education in early childhood settings. For a visual representation of the iterative analysis process, please refer to Figure 1.

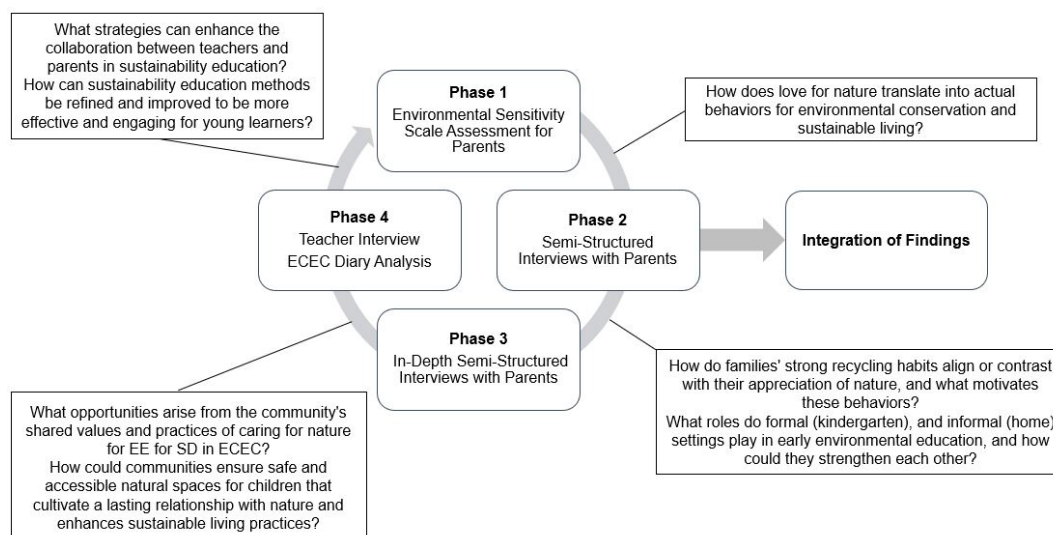


Figure 1. Integrating multiple study phases with the Following a Thread method [47]. The text boxes include thread questions of each phase.

5.3.1. Phase 1: Environmental Sensitivity Scale

In this phase of our study, we employed the Environmental Sensitivity Scale (EnSS) of Tirri and Nokelainen [48] to assess families' environmental sensitivity. The EnSS is a part of the Multiple Intelligences Profiling Questionnaire, which builds on Gardner's theory of multiple intelligences [49,50]. Tirri and Nokelainen [48] emphasize a holistic understanding of humanity's role within the ecosphere and highlight an environmental awareness and responsibility as integral to intelligence. The scale reflects the growing recognition of the importance of ecological sensitivity and sustainability in modern society.

This scale was selected based on our hypothesis that environmental sensitivity significantly influences family sustainability practices. The EnSS comprises nine items (see Table 1), each rated on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree), measuring three dimensions of environmental sensitivity. The first dimension, Love for Nature, assesses one's appreciation and enjoyment of nature, recognizing the

importance of experiencing and valuing the natural world. The second dimension, Nature Conservation, emphasizes the importance of environmental protection and engaging in activities that support environmental preservation and sustainability. The third dimension, Environment-friendly Consumer Habits, focuses on an individual's consumer behavior, particularly their choices that reflect a concern for the environmental impact.

Table 1. Distribution of responses to environmental sensitivity of the families (n=15).

Dimension Item	Agree/ Strongly Agree	Disagree/ Strongly Disagree	Neither Agree Nor Disagree
Love for nature			
1. I enjoy walking in nature.	15 (100%)	0 (0%)	0 (0%)
2. I enjoy the beauty and experiences related to nature.	15 (100%)	0 (0%)	0 (0%)
Nature conservation			
3. Animal rights are important to me.	14 (93%)	0 (0%)	1 (7%)
4. I take part in projects and events related to protection of the environment.	1 (7%)	12 (80%)	2 (13%)
5. Protecting nature is important to me.	11 (73%)	0 (0%)	4 (27%)
Environment-friendly consumer habits			
6. I pay attention to my consumption habits to protect the environment.	7 (47%)	1 (7%)	7 (47%)
7. I am ready to pay more for the products that are environmentally friendly than for normal products.	8 (53%)	3 (20%)	4 (27%)
8. I am active in recycling.	8 (53%)	1 (7%)	6 (40%)
9. I sort different trash at home appropriately.	13 (87%)	0 (0%)	2 (13%)

The scale is derived from empirical research and factor analysis ensuring its reliability and validity in assessing environmental sensitivity. Moreover, it is possibly connected to strong nature connectedness in the Finnish culture because it is tested in Finland. Therefore, we believe that EnSS is appropriate in measuring families' environmental sensitivity in our study.

5.3.2. Phase 2: Parent Interviews

In phase 2, we employed semi-structured interviews with parents to explore their perceptions of sustainable living, focusing on recycling practices and their views on the Masters of Trash kindergarten project. Semi-structured interviews provide researchers with the opportunity to gain fresh insights on a topic [51]. We prepared open-ended questions (Appendix B) for the interviews, achieving participation from 12 out of the 16 targeted families. The majority of the interviews were audio-recorded, and a few responses were received in a written form. The length of the responses varied a lot.

The interviews were analyzed through inductive thematic analysis, a flexible tool used to identify patterns and themes in qualitative data [52]. Two of the authors transcribed the interviews and written responses and reviewed them multiple times to extract initial ideas. The unit of analysis was determined as identified ideas or thoughts. We employed Atlas.ti (version 23.3.4.28863) to assign codes to specific quotes and grouped codes to form potential themes. This iterative process involved a continuous review and adjustment of themes, ultimately leading to the identification of six latent and three main themes. We incorporated quotes in our findings to support claims, illustrate ideas, and highlight experiences, following Sandelowski's [53] guidance. It is important to note that these quotes were translated from Finnish into English, so they do not align word for word with the original quotes.

The validity of the findings was ensured by involving three of the authors in the process of coding. The third author coded two of the interviews (17% of all 12 of the interviews) to be able to assess the validity of the coding. The validity was assessed by calculating the agreement between the actual coders and the intercoder. Following Campbell [54], we calculated the codes that were mentioned by either the coders or the intercoder, and divided this by the sum of codes that were mentioned by the coders or the intercoder. In total, the first interview resulted in 77% agreement and the other 71%. We conclude that this is acceptable based on the discussion by Campbell [54].

5.3.3. Phase 3: In-Depth Interviews with Parents

Due to the brief responses in phase 2 of the study and the emergence of new insights, we conducted in-depth interviews with parents to gain a better understanding. Five parents volunteered to be interviewed. The interviews lasted approximately 37 min. We noted similarities between the responses from phase 2 and the positive impacts on sustainable pedagogical practices in kindergarten identified by Ardoin and Bowers [14]. Thus, we incorporated these insights along with the understanding gained from phases 1 and 2 into the development of the interview framework. The interview guide is provided in Appendix C.

Our analysis approach for phase 3 involved thematic analysis, in which we combined both inductive and deductive methods [55]. The latent themes identified in phase 2, the value of a sustainable lifestyle, the role of recycling in daily routines, the importance of nature, engagement in outdoor activities, the value of sustainable education in kindergarten, and effective practices within the kindergarten setting, served as initial codes in our analysis. Hereby we were able to identify if the latent themes of phase 2 were strengthened. Throughout the iterative coding process, new codes were introduced as fresh insights emerged. The unit of analysis was determined as a thought or idea, allowing for a nuanced exploration of participants' perceptions and beliefs regarding factors influencing sustainability development.

The validity of the coding was calculated the same way as in phase 2. The intercoder chose two interviews to be coded so that 40% (2/5) of the interviews were coded. As a result, the other interview resulted in 77% agreement and the other 76%, which is acceptable (see Phase 2).

5.3.4. Phase 4: Kindergarten Professionals' Perspectives

Our objective of phase 4 was to understand the kindergarten professionals' perspectives on the Masters of Trash project and to identify areas needing further development. Kindergarten professionals regularly discussed the project's practices in teachers' meetings. During these meetings, a teacher-researcher documented their experiences and insights. We used this diary, along with a 30 min in-depth interview with another teacher responsible for the project, as our data sources. The diary entries were categorized into themes: observations and development ideas. For the interview data we applied inductive thematic analysis, as previously conducted in phase 2.

6. Results

Firstly, we present the outcomes of each phase of the study, highlighting the identified key threads at the end of each section. These findings are synthesized in the concluding part of the results, illustrating how the collective findings from all phases contribute to our overarching conclusions and answer to the research questions. The analysis method and the thread questions are illustrated in Figure 1.

6.1. Phase 1: Environmental Sensitivity Scale

In this phase of our study, we aimed to assess the environmental sensitivity among families by analyzing responses from 15 parents to the Environmental Sensitivity Scale [48].

The analysis (See Table 1) demonstrates families' deep connection with and value for natural environments as all 15 responses, in the Love for Nature dimension, fell into the two highest agreement categories. However, parents' participation in active conservation practices and environmentally friendly consumer habits varied considerably. While topics like animal rights and the importance of protecting nature received significant agreement (14 (93%); 11 (73%)), only one family responded that they participate actively in environmental projects and events. Approximately half of the respondents indicated that they consider their consumption habits, are ready to pay more for environmentally friendly products, and are active in recycling. Notably, 13 (87%) of the families reported proper trash sorting practices, with none falling into the lowest agreement categories.

As a conclusion, a significant thread was identified: families' strong appreciation for nature but with their diverse views on active nature conservation and consumer habits. This thread guided the planning of the second phase of the study, in which we interviewed the parents to delve deeper into their motivations and barriers that influence their environmental behaviors.

6.2. Phase 2: Parent Interviews

The primary goal of this phase was to delve into parents' perspectives on sustainable living, focusing on aspects such as recycling and their views on the kindergarten project Masters of Trash.

Through an iterative coding process, six latent themes emerged: the value of a sustainable lifestyle, the role of recycling in daily routines, the importance of nature, engagement in outdoor activities, the value of sustainable education in kindergarten, and effective practices within the kindergarten setting. These themes were further integrated into the following main themes: valuing and promoting a sustainable lifestyle among parents, the importance of nature and outdoor activities for families, and parental insights on the project and its influence.

6.2.1. Valuing and Promoting a Sustainable Lifestyle among Parents

All interviewed parents expressed a strong commitment to instilling a sustainable lifestyle and mindset in their children from an early age. Parent 7 emphasized the importance, stating, "It is crucial that a sustainable lifestyle and thinking are learned at a young age". Furthermore, Parent 5 underlined the value of a sustainable lifestyle, noting, "We have clearly begun paying more attention to a sustainable lifestyle at home. Hopefully, these principles will be reflected in our children's values for the rest of their lives". Indignation towards the indifference of others also emerged, with Parent 3 expressing, "So, what goes on in the mind of a person who throws garbage from a car? He or she just opens the window and throws out the wastepaper. Trash is out, and that's fine!" On the other hand, Parent 1, professionally engaged in sustainable development, believes that it is everyone's responsibility to enhance public awareness regarding a sustainable lifestyle and the value of nature: "I've been on a mission to educate Finns on the importance of protecting water and nature while providing guidance on effective recycling". Only one parent indicated an economic perspective on recycling: "I don't want to pay waste fees if it can be avoided by recycling", said Parent 12.

Recycling emerged as an integral aspect of daily life for most of the families, with Parent 3 noting, "Recycling trash is so self-evident to us". Parent 12 stated, "Plastic trash and cardboard automatically go to recycling". Some parents expressed a sense of dissatisfaction with their family's recycling efforts. "Occasionally, when we are at a cottage, all items find their way into the same garbage bag... it feels like a terrible sin", conveyed

Parent 3. Moreover, as expressed by Parent 8, “There is room for improvement in our recycling habits”.

Many parents said that they guide their children in placing trash into the right recycle containers. Recycled materials find creative uses, such as in crafts. “It’s good to give a child a can or a jar and teach them to reuse it, for instance to build houses and towns for their plays”, said Parent 12. Families actively work to reduce the consumption of water, trash, and food waste. Parent 11 explained, “Children wear used clothes if available. We try to avoid buying such consumer goods”. Additionally, most families contribute to a cleaner environment by picking up trash in their outdoor surroundings. On a different note, Parent 1 highlighted their family’s commitment to nature: “We create conditions for birds, butterflies and other insects. Birds and squirrels are helped by winter feeding”.

6.2.2. The Importance of Nature and Outdoor Activities for Families

Most families in this study live near natural forests. Parent 1 described the surrounding of their home as follows: “Our garden is regularly visited by foxes, rabbits, and deer. Certain species have nested and inhabited the area for several generations. The house overlooks the pond where the endangered and rare bird Horned Grebe can be seen. Nesting place for swans, terns, and other water birds. Our circle of life offers nature experiences every day all year round”.

All families in our study spend a significant amount of time in nature. They engage in activities such as exercising in nearby woods, camping, boating, berry picking, and riding bicycles. Children are encouraged to go outside every day, with some spending several hours in outdoor play. Natural materials frequently become part of children’s play; for example, Parent 4 mentioned, ‘Sticks are found in the backyard; they become swords for play and tools for exploration’. Parents also mentioned zoo visits, playing in the kindergarten’s playground and nature garden, and taking trips to national parks and geocaching. Particularly, it becomes evident that the simple act of being in nature and observing its wonders holds intrinsic value.

Parents described contact with the natural environment as follows: “You can explore the trees and just touch and hug them” (Parent 4), “You can see a lot of animals in nature” (Parent 5), “My child is interested in bugs” (Parent 8), and “Child climbs trees” (Parent 12). While in nature, parents teach their children how to respect nature. As Parent 3 put it, “You can’t rip leaves off trees”. Parent 3 highlighted how nature provides us with natural products. “I hope it doesn’t get too cold that the bees can fly around. Then in the fall we’ll get some blueberry pie”.

6.2.3. Parental Insights on the Project and Its Influence

A common view amongst the parents was that the early childhood sustainable education is important, and they value skills and understanding their child has gained during the project. Parent 3 introduced a perspective that “It is good that a sustainability project reaches all families, including those who may not prioritize it as much”. Parent 5 thought that “the project brings sustainable development closer to the child. At home, it may not be so precisely explained why we act in a certain way”. A few parents felt that the project has supported them in teaching sustainability to their child. “I think that it’s important to talk about the same things. If the information comes from many sources, it gets stronger”, said Parent 6. Parent 1 expressed a concern that political and ideological tendencies will be introduced into environmental education and hoped that concerns related to the state of the world would not be included in the children’s environmental education. In contrast, Parent 2 expressed a different kind of worry: “This project scared me a little bit in the beginning. I started to think how sloppy I am”. Moreover, Parent 5 concluded that the project encouraged their family to pay more attention to sustainability at home.

Parents in general had noticed that the recycling topics learnt in a kindergarten appear in their children’s discussions and actions at home and during outdoor activities. For instance, Parent 8 shared that their child mentioned in a store: “You can’t take fruit bags

because they go into the sea”, discussing the topic learnt at the kindergarten. Moreover, parents mentioned that their children have gained skills such as the valuing of nature, reusing materials, noticing littering, and acquiring a basic understanding of recycling and decomposition. Particularly, some parents said that the decomposing test at kindergarten has had a noticeable impact, with children discussing it quite often. A few children were concerned about the consequences of littering on animals and nature or further processing of waste. However, it is important to notice that, since recycling is part of the daily routine of every interviewed family, and sustainability is important to most of the families, the parents were in some cases uncertain whether the child has learnt the activities and sustainability thinking at home or at the kindergarten.

Parents said that they have received information of the project activities, for instance, from digital parent–teacher communication platform Wilma, picture folders, and conversations with teachers. Additionally, hearing children sing along to a recycling song and bringing home recycling crafts.

As a conclusion, we identified two prominent threads: firstly, there is a notable contrast between the recycling habits reported by parents between phases 1 and 2. On the other hand, parents’ love for nature came to the fore more deeply. This observation calls for a deeper investigation into the motivations behind the families’ commitment to recycling and how their appreciation of nature influences these habits. Secondly, parents expressed uncertainty about whether certain environmental behaviors and knowledge were acquired at home or in kindergarten. Delving deeper into this area could reveal insights into the roles of formal versus informal settings in early environmental education and how they might strengthen each other. These insights guided us in creating in-depth interviews for the third phase.

6.3. Phase 3: In-Depth Interviews with Parents

The parents’ responses in this phase showed strong mutual consistency with themes identified in the second phase: the value of a sustainable lifestyle, the role of recycling in daily routines, the importance of nature, engagement in outdoor activities, the value of sustainable education in kindergarten, and effective practices within the kindergarten setting. Through our analysis, new themes emerged, including viewing care for nature as a shared community value, the depth of parents’ relationship with nature and their environmental expertise, and the significance of fostering children’s connection to nature and sustainable lifestyles.

6.3.1. Viewing Care for Nature as a Shared Community Value

In this phase, it became evident that parents perceive caring for nature as a shared communal value, contrasting with earlier phases where family-centric sustainable practices were more in focus. Two latent themes were identified: community perspectives on sustainable development and advancing environmental education in kindergarten settings.

Community perspectives on sustainable development. Parents agree that for a more sustainable future, it is essential that both parents and society ensure children grow into environmentally aware adults. Parent 11 notes, “When little children learn about the environment, they are less likely to litter when they are teens”. Parent 3 emphasizes the need for resource awareness, stating, “Our planet’s resources are finite. Future generations will need skills in recycling and reusing materials”. This parent also suggests a new approach to discussions: “Climate change is often denied. Perhaps we should focus more on the scarcity of Earth’s resources. Nobody can deny that our small planet must sustain us all”.

In the families’ community, sustainable development values like recycling are the norm, as Parent 5 noted, “Old clothes go to flea markets or are shared among friends and neighbors”. Tackling littering is also a community effort. Parent 3 recounts addressing littering with children at a playground, highlighting the need for greater environmental awareness among the youth. Additionally, trash collection has become a collective

endeavor, with Parent 5 sharing, “My child and friends collect trash, share photos of them, and celebrate their efforts”, and Parent 11 adding, “My child helps in cleanup activities organized by my spouse”.

The parents highlighted that kindergarten provides every child with the chance to develop into an environmentally aware individual. Especially, as Parent 3 highlighted, its necessity due to diverse family backgrounds: “If children learn about environmental care in kindergarten, they might encourage their parents to stop littering”.

Advancing environmental education in kindergarten settings. Parents generally viewed the environmental education provided in kindergarten as appropriate. However, Parent 1 highlighted the importance of addressing children’s unique concerns and tailoring environmental education to their age. The positive impact of environmental education in kindergarten became even more evident in this study through the observations of parents. For instance, Parent 3 noted, “The decomposition activity really helped my child grasp the concept of non-biodegradable waste”. Similarly, Parent 11 said, “You can tell the children are learning about environmental issues. They discuss how littering affects nature and wildlife”. Nevertheless, parents had diverse ideas about the development of environmental education in kindergarten.

The communication tools used, such as the picture diary and weekly updates on the Wilma platform, were generally regarded as comprehensive and informative. However, some parents offered suggestions for enhancement. Parent 5 recommended: “The weekly letter could explain the purpose behind each activity then they could be reinforced at home”. Additionally, Parent 1 highlighted that “the weekly reports don’t facilitate an active dialogue”. To improve interaction, Parent 5 suggested: “A digital platform where teachers can post pictures and texts would be great. Then we could engage at our convenience”.

Time constraints were a recurring theme among parents. Parent 11 mentioned, “It’s hard to keep up with the picture diary as often as would be ideal”. In addition, Parent 5 shares, “The teachers willingly share updates about the day if I have time for that”. The joint events were valued but also posed challenges for the same reason: “They’re engaging, with various activities and new perspectives to consider. But there’s a sense of guilt when you can’t make it”, expressed Parent 3, and as Parent 5 shares, “It’s nice to have parents involved, but I’d prefer not to have too many of these activities. They can be quite time-consuming”. On the contrary, Parent 2 suggested, “Maybe we could have joint yard events”, and Parent 1 proposes, “We could collaborate on an environmental project. This would give us a chance to discuss about practices and parents’ expectations”.

Parent 3 notes that homes can contribute to environmental activities in other ways: “It’s delightful when kids are asked to bring an odd sock to make a stick horse’s head, or old product packaging for store plays”. Sustainable practices could also extend from homes to day care, as Parent 3 suggests: “Kindergarten staff have mixed views on using cloth diapers. I’d like their use to be either mandatory or at least encouraged”.

Despite ample outdoor time in kindergarten, some parents expressed a desire to increase activities in nature. “Outdoor excursions are a great learning experience and an opportunity for urban children to connect with nature. We should have more of them”, said Parent 1 and Parent 11 emphasizes, “I hope that children spend as much time as possible in nature to learn how to enjoy and not fear it”.

6.3.2. The Depth of Parents’ Relationship with Nature and Their Environmental Expertise

Many parents described their childhood experiences with nature and its lasting influence on them. For instance, Parent 5 recalled, “I grew up near a stream and a vast forest where we played for hours. We ran through the woods to swim and discovered wonders of nature”. Similarly, Parent 1 shared, “I grew up on the city outskirts, spending time in the forests without needing a guide or compass. This instilled in me a love for nature”.

Furthermore, some parents observed significant changes in the culture of sustainable development. “In our youth, waste was often burned in the fields. We didn’t recycle or

sort, so there's a bit of indifference in our generation compared to the eco-conscious upbringing of today's kids", Parent 2 reflected. Parent 3 noted personal behavior changes: "I've had to learn to curb my spending and hoarding habits".

All parents demonstrated environmental expertise. For example, Parent 5 highlighted, "A new law will require housing associations to recycle plastic starting this summer. We have also progressed in creating sustainable alternatives to plastics and pushing companies towards eco-friendly materials". Parent 1 suggested a practical approach to waste management: "Residential properties should have dedicated storage for recyclables, accumulating waste for several months before transporting it to reduce traffic and improve efficiency".

Additionally, Parent 11 shared their perspective on human–nature interaction: "I don't specifically talk to my children about conserving nature because I believe we shouldn't disturb natural processes in the first place. Today's society inevitably disrupts these processes, a trend that started thousands of years ago. The goal should be to minimize further disturbances as much as possible".

6.3.3. Emphasizing the Importance of Children's Connection with Nature and Fostering a Sustainable Lifestyle

Parents consistently emphasized the importance of children's connection with nature and fostering a sustainable lifestyle. Through analysis, the following latent themes emerged: letting children explore nature freely, a holistic understanding of nature and nurturing empathy towards it, adoption of childhood home sustainable values and behavior, the significance of the living environment in developing a bond with nature, and conversation at a level appropriate for the child's understanding.

Letting children explore nature freely. As revealed in phase 2, parents emphasize the importance of spending time with their children in nature, guiding them to observe and respect their surroundings. However, from the analysis of phase 3, it emerged that children are also encouraged to explore nature freely. Parents trust in their children's understanding and respect for nature and are aware of their activities when outdoors. For instance, Parent 5 notes: "They use their imaginations a lot, for instance creating nests for imaginary animals in the forest", and Parent 11 adds, "In the forest, my child investigates bugs, wood blocks, and streams—things you can't find in the city". Additionally, parents generally perceive the natural environment around their homes as safe. "Our children often venture on exploratory trips to the nearby forest. We're comfortable letting them go as they know their way back", said Parent 11. Parent 2 added, "We're familiar with our neighbours, which adds to our sense of security". Parent 3 mentions, "Our area has only few poisonous insects or snakes, which is reassuring".

Moreover, parents also advise their children on specific dangers, such as not touching unfamiliar garbage, eating only safe berries, staying cautious around snakes, wasps, and mushrooms, not putting a roof on snow castles, and avoiding unknown waters. Parent 3 advises, "If you can climb up a tree, you should be able to get down", highlighting the practical nature of their guidance. Parent 11 believes, "The urban environment, indoors and people present bigger threats than nature. That's one reason we chose to live close to nature".

A holistic understanding of nature and nurturing empathy towards it. Parents aim to enhance their children's comprehensive understanding of nature's protection and sustainable living. "Last Sunday, while admiring anemones in the forest, we discussed why this plant is protected and shouldn't be picked, even though it looks lovely in a vase", shared Parent 2. Parent 11 adds, "Children should understand that some objects don't just decompose on their own. They need to be properly disposed of. I tell them, 'If everyone littered, it could become impossible to walk in our surroundings'". Parent 3 illustrates their teaching approach: "I talk about, despite a toy being attractive, a lot of resources are used in its production. I try to instill a critical view of such waste. If everyone keeps buying without thought, the Earth will suffer".

Parents also aim to foster empathy for nature: “I ask my child to imagine what would happen if every passer-by plucked a leaf from a tree, leaving it leafless. How would the tree survive?” Alternatively, parents think that children naturally empathize with nature. Parent 5 recounts, “My child asks questions like, ‘Why are there so few Saimaa ringed seals?’ and ‘Why do we have power lines that harm birds?’” Parent 3 adds, “My child is concerned about deforestation, wondering where the animals will live. They firmly believe that we must not destroy forests or harm them”.

Adoption of childhood home sustainable values and behaviors. Parents hope that children will naturally adopt the sustainable values and behaviors from their childhood homes and that these will persist into adulthood. “Not littering should become as instinctive as not stealing from a store”, emphasizes Parent 11. “The way we approach things like disposable culture greatly shapes our children’s attitudes”. Parent 1 notes the importance of engaging children in practical activities for nature: “Our city’s stormwater drains into our bird pond. We’ve been following its condition by taking samples. We’re considering legal action if the pond suffers”. Parent 3 explains a different approach: “We go through too small clothes together and pass them down to cousins for further use. Socks worn out are thrown away”.

The significance of the living environment in developing a bond with nature. Parents believe that growing up in an area where nature is readily accessible greatly enriches a child’s relationship with nature. Parent 11 emphasizes this, saying, “Choosing a residence close to genuine nature and tranquillity has been a key decision for our family”. Parent 1 contrasts urban and rural settings, noting, “A young person in central Helsinki has to travel some distance to experience the countryside. This might lead to a sense of disconnection from nature. In contrast, my child can explore nature throughout the year, as it’s right on our doorstep”.

Conversation at a level appropriate for the child’s understanding. Moreover, parents adopt a careful approach when discussing environmental challenges, aiming to protect children from anxieties these issues may cause. They address conversation at a level appropriate for the child’s understanding. “In today’s world, there are numerous global challenges. As parents, it’s our responsibility to shield our children from adult worries. Children overhear adult conversations and absorb what they can comprehend, and that is enough”, explains Parent 1. However, parents also recognize the impossibility of completely hiding information from children. “Eventually, all things, even the sad and difficult ones, will come to light”, acknowledges Parent 2.

In concluding phase 3, our first thread addresses how valuing and caring for nature is shared and practiced within the community. Identifying opportunities to further foster these values through educational settings could be significant for sustainable development. This includes considering families’ strong relationships with nature and parents’ environmental expertise in the development of environmental education in kindergartens. The second thread leads us to examine the critical role of children’s free exploration of nature and the influence of their home and educational environments in developing sustainable habits and attitudes.

6.4. Phase 4: Kindergarten Professionals’ Perspectives

The teacher interview addressed two main themes: the kindergarten’s sustainable practices and challenges and interaction with parents.

The kindergarten’s sustainable practices and challenges. Daily routines in kindergarten include, for instance, garbage sorting, conserving water and paper, and using recycled materials for crafts. Moreover, the teachers aim to strengthen children’s connection with nature by teaching them to move in natural environments and guiding them to respect nature. For instance, “We have a regular excursion site in a forest, where there are many rotten branches and trees. We teach children that they can collect and build with these, but they should never cut down living trees”, said the teacher. The teacher, however, acknowledged that children have varying starting points for engaging in sustainable

practices, and some children lack contact with nature: “A child may be afraid of flies or mosquitoes, or worry about getting lost in our forest trips”, the teacher notes.

In the Masters of Trash project, the teacher was thrilled by the children’s enthusiasm, recalling, “It was great to see their eagerness to learn and experience new things”. Activities related to waste, such as games and creating art from garbage, along with the decomposition activity, were particularly educational and surprising for the children. Despite their young age, the children began to grasp concepts like understanding the consequences of littering and the importance of proper waste disposal. However, the decomposition activity prompted further reflection: “Children often think that everything disappears when buried underground. While they found the digging exciting and were curious about what they might find, it didn’t always lead to understanding”, the teacher explains. The teacher believes that teaching should be hands-on, match the developmental level of the children, and practices should be verbalized by speaking aloud what they are doing and why. The approach guides children’s thinking and behavior and enhances memory retention.

The teacher acknowledges the challenges of teaching sustainable development. “Often, I need to research information to effectively teach the children. Teaching is a continuous learning process”, the teacher notes. Despite the challenges, the teacher finds it meaningful to teach these topics: “The world is changing, and we play an important role in inspiring ideas and sharing them with families”. The teacher believes nurturing these ideas early is important for the future: “Teaching a sustainable lifestyle is a form of love. We appreciate it so much that we want to share and teach it”.

Interaction with parents. The teacher observed that most parents showed interest and positivity towards sustainable activities in the project; however, a concern about global challenges causing anxiety in children was brought up. To increase parents’ awareness of the kindergarten activities, teachers, for instance, display activity-related projects in the entrance hall and on the walls. In addition, the teacher pointed out that there is not enough time for an effective interaction. The teacher calls for direct conversation, which is more effective than digital communication. According to the teacher, “the most beneficial interaction occurs when a parent asks the child and initiates a conversation”.

The diary entries, maintained by kindergarten professionals, were categorized into two themes: observations and development ideas.

Observations:

- The children’s learning was notably enhanced through hands-on activities. The decomposition experiment was particularly engaging and exciting and prompted reflection at home. However, the concept of decomposition was found to be too abstract for some children;
- The recycling song effectively reinforced the concepts learned in the recycling activities;
- The children displayed significant enthusiasm in collecting trash, a practice that extended beyond the kindergarten environment;
- To avoid causing climate anxiety, the video about the Great Pacific Garbage Patch was not shown;
- The children quickly absorbed the learning material, especially with repetitive activities like sorting, which soon became self-evident;
- The importance of the collective commitment of all who work in the kindergarten to the methods and adherence to agreed practices was emphasized;
- The lack of children’s literature on the topic was noted;
- Crafts made from recycled materials were particularly enjoyed by the children;
- Challenges were identified in making the project sufficiently visible to parents and involving them more effectively.

Development suggestions:

- Activities should be better tailored to different age levels, utilizing differentiation and organizing children into small groups;
- It is important to familiarize children with concepts, like using a composter, before conducting experiments on abstract concepts like decomposition;
- There is a need to plan for better engagement of parents in the project.

The threads of phase 4 lead us back to earlier phases, enhancing our understanding of environmental education for sustainable development. The first thread is associated with the observation that sustainable development values, behaviors, and practices in kindergarten are aligned with those of the families. Additionally, we examined that the dynamics of interactions between teachers and parents and teaching sustainability were occasionally challenging. Focusing on these issues could influence positively on a sustainable lifestyle. In the second thread, we explore insights and developmental suggestions from the Masters of Trash project. The aim is to refine and improve sustainability teaching methods, ensuring they are effective and engaging for young learners.

6.5. Integration of the Results

In this final section, we provide comprehensive answers to our research questions which are based on synthesizing the findings from all four phases.

Research Question 1: What are the main drivers inspiring families involved in our kindergarten recycling project to take action in protecting the environment and contributing to a more sustainable future?

The profound bond between families and nature was identified as the most powerful theme in all phases of our study. This bond, deeply rooted in the childhood experiences of parents, is something parents are eager to share with their children. Families appreciate a possibility to live close to nature, and they aspire to instill in their children, as well as the wider community and future generations, a lifestyle that respects and protects the natural world.

The parents believe that guiding children to understand and empathize with nature naturally fosters a protective instinct towards it. This was primarily facilitated by families spending considerable time together in nature, engaging in a variety of activities. Some emphasized that nature protection does not need to be taught separately; one grows into it. Importantly, we recognized that parents emphasized the importance of free play and simply being in natural settings as significant for well-being.

The environmental sensitivity scale did not reveal a straightforward link between loving and protecting nature. Yet, the interview data presented a compelling connection. Interviewed parents demonstrated a high level of environmental awareness and actively engaged in practices to protect the environment. This discrepancy between the scale results and interview insights may reflect parents' perceptions of their recycling behaviors, suggesting that some families believe they could do even more to contribute to a more sustainable future.

According to our analysis, the following elements of the Finnish socio-cultural context significantly influence environmental behaviors in families: environmental education efforts in families and in kindergartens support each other. The law mandates recycling, and society has responded by making recycling processes as convenient as possible for all. Furthermore, environmental protection is a common practice not only among families but also within their social circles. The safe and clean living environment and proximity to nature and forests ensure that children have the freedom to explore and play in natural settings. Recycling is seen as part of the cultural identity, naturally integrated into family life. Parents are environmentally aware, possessing extensive knowledge about sustainability, recycling, and sustainable lifestyles. Additionally, it is acknowledged that sustainable practices might have an economic impact on individuals and society in the future.

Based on these findings, we propose the following main drivers for sustainable development:

1. Strong Nature Connection: An intrinsic appreciation for and connection to the natural environment motivates families to undertake actions that protect and preserve it.
2. Family Values and Practices: The transmission of sustainable values and practices within families encourages members to live in ways that are mindful of environmental impact.
3. Socio-Cultural Context: Cultural identity and societal norms influence families' perceptions of sustainability, embedding environmental responsibility into their daily lives.

In conclusion, the integration of our study's results underscores the interplay between Strong Nature Connections, Family Values and Practices, and the Socio-Cultural Context as the main drivers behind families' commitment to environmental protection and sustainability. These findings highlight the complex, multifaceted motivations that underpin families' environmental actions.

Research Question 2: How did the kindergarten environmental project succeed in raising children's environmental awareness and enhancing dialogue between parents and kindergarten professionals?

It was notable that such hand-on activities as a decomposition experiment, crafts from recycled materials, and sorting trash not only made learning enjoyable but also facilitated retention of knowledge. Additionally, taking recycling activities outdoors, and enabling children guided and free exploration in forest environments, appeared to strengthen their connection with nature and possibly further promote a sustainable lifestyle. Children were also observed applying their newfound recycling skills beyond the kindergarten setting, such as collecting trash with friends and advising parents on sustainable practices like avoiding plastic fruit bags. Systematically repeating and verbalizing key sustainability concepts and discussing recycling activities across various situations in both in kindergarten and at home ensured effective learning. Moreover, it appears that it is essential that teachers have enough professional support in teaching sustainability issues and sustainability teaching material and all teachers are committed to recycling practices and teaching recycling in kindergarten.

It appeared to be challenging to make the project visible to parents and collaborate with them, primarily due to time constraints. Engaging parents in discussions about the project's content and its appropriate level and encouraging their input on sustainable topics can enrich the learning experience. Events like collaborative yard activities on themes of sustainable development offer valuable opportunities for increasing visibility and promoting parental involvement. However, the possibilities of involving parents in such events should be considered.

Overall, the project underscored the importance of 1. hands-on learning, 2. guided and free outdoor learning, 3. commitment of kindergarten professionals, 4. support from educational resources, 5. child-level environmental education, and 6. parent-kindergarten collaboration in enhancing environmental awareness among children.

Research Question 3: How can the drivers and successful practices identified in the project be integrated into kindergarten educational practices to enhance sustainable development education?

Integrating the identified drivers requires a multifaceted approach that emphasizes nature connection, collaboration, hands-on learning, and community engagement. The following strategies could enhance environmental education for sustainable education in kindergartens:

1. Strengthening nature connections through outdoor and nature-based learning activities, such as forest explorations, outdoor classroom sessions, and allowing children to play and explore nature freely.
2. Promoting parent-kindergarten collaboration by:
Enhancing dialogue between parents and kindergarten professionals through regular communication channels, such as newsletters, dedicated meetings, and digital

platforms. These channels can share insights into the kindergarten's environmental activities and gather feedback from parents.

Exploring flexible engagement opportunities to accommodate time constraints.

Leveraging parents' expertise in sustainability to benefit EE planning and practices.

Organizing family sustainability events, including workshops for parents and children on environmental practices and projects that families can continue at home.

3. Involving the wider community in sustainability events, such as joint garbage collection events, flea markets, goods exchange markets, and sustainability workshops. Planning and implementing these events in collaboration with the community, including parents' teams, local expertise associations, scouts, etc., are essential, considering time constraints.
4. Expanding educational resources by equipping kindergartens with diverse resources, including books, games, and digital media focused on sustainability topics. Additionally, providing ongoing professional development opportunities for educators in environmental education can ensure teaching strategies remain innovative and effective.

In conclusion, by integrating the main drivers behind families' environmental actions and the effective practices from the kindergarten project, educational practices can be enhanced to foster a culture of sustainable development from an early age. This holistic approach not only enriches the educational experience for children but also strengthens the partnership between kindergartens, families, and the wider community in pursuit of a more sustainable future.

7. Discussion

Our study aimed to enhance environmental education for sustainable development within kindergarten settings. We sought to identify the primary factors influencing sustainable lifestyles among families and to evaluate which practices within our recycling project effectively raise children's environmental awareness. Additionally, our research aimed to improve communication between parents and early childhood professionals by examining both groups' perspectives on these practices, specifically within the context of our targeted recycling program.

The results of our study demonstrate clearly that a connection to nature serves as the foundation in promoting a sustainable lifestyle. It became evident that childhood experiences with nature shape parental attitudes and behaviors towards the environment. Additionally, parents' desire to pass on these values to their children underlines the importance of early life experiences in forming lifelong sustainable habits which aligns closely with the research of Sihadi et al. [32] and Simsar et al. [31]. Passing down these values from one generation to the next can lead to a continuous tradition of caring for the environment.

The Finnish socio-cultural context, which includes the right of every child to participate in Early Childhood Education and Care, along with mandatory environmental regulations and societal norms, also plays a crucial role in supporting families' environmental behaviors. These behaviors are deeply rooted in many families' daily routines. It is notable that being in nature and participating in outdoor activities is an essential part of Finnish culture and therefore families valued nature highly. This aligns with findings from previous research, such as Simsar et al. [31], which highlighted how factors like socio-economic status and living environment are important in shaping children's environmental attitudes and awareness.

While the results from the Environmental Sensitivity Scale [48] did not directly link a love for nature with its protection, observations from interviews revealed a strong connection among parents to nature and a commitment to sustainable living. This commitment not only influences individual and family behaviors but also extends to playing a role in community efforts towards sustainability. Makkonen et al. [56] observed a similar

strong relationship between environmental sensitivity and community engagement among Finnish high school students, suggesting that both are closely tied to personal values. They proposed that the Finnish cultural affinity for nature might significantly contribute to this relationship, a hypothesis that our findings support.

The saying, “It takes a whole village to raise a child”, has served as a powerful inspiration for community-driven projects in Finland [57,58]. Drawing on this principle, we argue that collaborative recycling projects and training programs have the potential to foster sustainable development in a constructive and motivating way. This approach, which places the community at the heart of environmental education, finds support in the research by Kollmuss and Agyemang [11]. However, one significant challenge that has emerged is the constraint of time among parents, which needs to be addressed to fully realize the potential of these initiatives.

Parents and kindergarten professionals both frequently highlighted the importance of free play, simply being in natural settings, and evoking the children’s empathy for nature in fostering a protective instinct for the environment. Ardoin and Bowers [14] and Heggen et al. [26] advocated for play-based and nature-rich educational practices as beneficial for early childhood environmental education. Moreover, Grindheim et al. [24] emphasized the importance of preserving children’s hope and joy in childhood experiences. We also observed that guided activities, such as composting activity in nature, were not only challenging but also joyful for the children.

Interestingly, our findings, along with those of Lumber et al. [30], suggest that a connection with nature can also be fostered through unstructured experiences that allow children to simply spend time in nature and enjoy the beauty of natural settings. Efforts to enhance children’s empathy for nature included discussions on how human activities impact animals and the environment, which were seen to significantly boost children’s empathy during the project.

However, the study also uncovered concerns among some parents and professionals regarding the potential for environmental education to induce anxiety in children. This apprehension underscores the importance of open dialogue between parents and educators to find a balanced approach that educates without causing undue stress. Pooley and O’Connor [13] and Carmi et al. [8] have, however, highlighted the profound impact of emotions and beliefs on environmental attitudes. Therefore, we point to the necessity of carefully considering how to foster environmental consciousness in a way that is both informative and emotionally supportive.

Our study introduces a nuanced perspective on children’s interaction with nature. We discovered that the Finnish cultural identity and practice of allowing children to freely explore nature, under gentle guidance, and naturally grow into a sustainable lifestyle are somewhat unique. This approach suggests that children naturally develop these values—an aspect not explicitly recognized in the research we came across.

Researchers such as Heggen et al. [8], Hedefalk [7], Spiteri [10], and Grindheim et al. [6] emphasize the importance of perceiving children as autonomous thinkers and active contributors to a sustainable future. They argue that adults should encourage children to form their own thoughts and roles in sustainability efforts. Our findings contribute new insights by showing how Finnish cultural practices help strengthen children’s natural desire to care for the environment. This means that in Finland, the way children are encouraged to explore and connect with nature not only reflects their own interests but is also deeply rooted in cultural traditions. These traditions support the idea that children, through their own experiences and with minimal direct instruction, naturally learn to value and protect the natural world.

However, it is important to acknowledge that Finland’s unique context, characterized by a safe, clean living environment and easy access to nature and forests, plays a significant role in facilitating these connections. As Hume and Barry [22] highlight, sensitizing people to the environment’s importance as a source of healthy living is vital. To effectively preserve our planet for future generations, it is essential to recognize that

humans are an integral part of nature, deserving of our respect and care. Our research underscores that ensuring access to a clean and safe natural environment for families should be a priority in all societies. This raises the question of how various cultural contexts approach environmental education and how such experiences can be promoted universally, beyond the constraints of geographic or socio-economic differences. By learning from different societies, we can identify effective strategies that could be adapted internationally to foster a deep-seated respect for and commitment to the environment.

In this study, parents expressed uncertainty about whether their children's recycling [9] skills were developed primarily through the project or at home. Despite this, they consistently emphasized the significance of collaborative efforts between families and kindergarten educators toward a shared goal of sustainability. Reinforcing recycling activities both at home and in the kindergarten was seen as vital for enhancing sustainable practices. This observation aligns with Chawla's [9] findings, which indicate that multiple experiences contribute to pro-environmental behavior. Given the recognized need for improved collaboration between kindergartens and parents, we recommend allocating specific times for teachers to engage with parents. This would facilitate the development of effective cooperation strategies, thereby enriching the educational experience and reinforcing sustainability efforts.

This study has its limitations, including a sample size where only 12 out of 24 families were willing to be interviewed, potentially introducing self-selection bias towards those already engaged in environmental practices. Additionally, the dual role of one of our researchers serving as a teacher in the project might introduce biases, potentially affecting the authenticity of our data and the validity of our findings. To mitigate these effects and maintain research validity, we had three coders in our analysis and the validity was assessed by calculating the agreement between the actual coders and the intercoder. Moreover, we interviewed another teacher involved in the project, and the in-depth interviews were conducted by other researchers.

The unique geographical context of the study, conducted in an area surrounded by a forest, offers exceptional access to nature but may limit the generalizability of our findings to less green environments. Future research could benefit from being carried out in urban settings to explore contrasts in environmental engagement. Additionally, the impact of socio-economic backgrounds and cultural differences on sustainability practices was not examined, which could provide a deeper understanding of these influences. A longitudinal approach could also enrich future studies, offering insights into how environmental behaviors evolve over time and across different contexts.

8. Conclusions

Our study highlights the important role of early childhood experiences in nature for fostering sustainable lifestyles, underlining the importance of cultural practices and the integration of environmental education within early childhood care settings. The findings underscore the significance of parental involvement and the need for collaboration between families and educators in promoting environmental awareness from a young age. Moreover, the unique Finnish context of our study, with its emphasis on allowing children to play free in nature and Finns' access to nature overall, suggests that ensuring such access in kindergartens globally could greatly enhance environmental education outcomes. Policymakers should consider this when developing educational policies, recognizing the value of nature access in shaping future generations' attitudes towards sustainability. Future research should explore this theme across diverse cultural and urban contexts to validate and extend our findings, ultimately contributing to a more sustainable and environmentally conscious global society.

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Appendix A

Activities of the Masters of Trash project

1. Project map

Aims: To involve parents and other staff in the project.

Short description: The project map is a pedagogical documentation. It is on the kindergarten wall for all to see. The map includes, for instance, wake up information such as photos and drawings, information of the actions and questions for the parents and staff. The information increases with the project. Parents are also able to ask questions and share their ideas with the teachers especially when picking up their children from kindergarten.

2. Emotion photos of everyday living environment

Aims: To awaken parents' and children's curiosity and interest in what kinds of thoughts or emotions the observations in their own living environment stimulate and elicit. Possibly, observations also lead to changes in manners of behavior.

Short description: Parents and children are asked to observe their living environment and take photos of the views that stimulate and elicit positive or negative feelings.

Example A1. Picture of dog poop

Observations awaken emotions and possibly affect behavior.

The child observes dog poop. "This is not nice because I might step on it".

Example A2. Picture of New Year's trash

Realizing one's own behavior affects one's emotions and possibly behavior. Children walk around the neighborhood after the New Year's celebration. They observe plenty of trash from fireworks. The child says, "My family fired fireworks. These little pieces of fireworks look bad. It is so difficult to pick them up. We cannot shoot them here anymore".

3. These things do not belong to my play environment

Aims: To understand how a phenomenon called littering appears in a child's own play environment. To form an understanding of the concept "litter" at the qualitative level. To learn the first steps of classification (or categorization): belong to nature/does not belong to nature. To give children a possibility to reflect on the experience and discuss and express the feelings the littering evokes.

Short description: Children make observations in their own play and learning environments near a kindergarten center. They are asked if they notice anything that does not belong to the environment. Children and adults pick up trash. Afterwards, in the reflection session, children are free to ask questions and discuss their experience. Emotion cards are used in discussions to assist conversation. Teachers can ask leading questions such as is there something which does not belong to our play environment and where does the trash come from?

4. Trash Bingo

Aims: To develop classification skills. To learn to sort waste.

Short description: Children receive an open task where they are asked to sort the waste, which they picked up from the forest, in their own way. Their ideas of classifications are discussed, or the teacher can help with some leading questions. Next, kids play Trash Bingo. Trash Bingo is a game where different categories are described with pictures according to the common recycling system. The children are asked to set pictures of waste on the bingo plate. They are asked to take Trash Bingo home and to teach their parents to play it. Furthermore, the children and adults recycle all the trash by taking it to the appropriate recycling bins in the day care center.

In classification learning sessions, teachers can assist children, for instance, by asking questions such as: Are the objects alike or different? How are they different? (color, size, shape, texture...). What does the trash in the same category have in common?

To lead the children to the next action, teachers ask: What do you think that would have happened to the trash if you had not collected it?

5. Production from waste

Aims: To promote logical thinking skills by thinking about which trash can be reused in different products. To enlarge classifications with new categories. To wake up understanding why recycling trash benefits societies.

Short description: Large pictures of products, which are made from recycled waste, are placed on the walls: cars, carton, plant soil bags, warm home, clothes, watering can, flea markets and thrift stores, glass bottles, etc. Children are given picture cards of different types of waste. One child at a time picks up a trash card. He or she is asked to think about what products could be made from that waste. The solution is reached together. The card is placed in the correct position on the wall by the movement indicated by the exercise dice.

Teachers can assist children's thinking by asking what similarities and differences between the products and waste there are.

6. Waste reduction and reuse

Aims: To discover that everyone has an opportunity to affect the amount of waste by their own choices.

Short description: In a weekly child meeting, they are asked to think if they have any toy at home that they do not need any more. Children and teachers share their ideas of how somebody else can benefit from the toy or other product that is unnecessary for themselves. It is also discussed if the product can be reused in another way, in another context, or if it can be shaped for another use. The recycle box for evaluation forms for later use is built together from the used products. In addition, children set up a flea market for toys at the day care center.

Teachers can promote discussions by asking leading questions such as: Do you have any toys that you have not played with in a long time? What could we do with useless toys? If we do not make choices with the toys, where do they end up?

7. Decomposition experiments in the day care garden

Aims: To learn to make hypotheses, observations, and experiments. To observe that trash decomposition rates vary depending on type. To develop a sense of time by linking the findings of the experiments and hypothesis to familiar events. To promote understanding of decomposition and its importance in the ecosystem.

Short description: Waste, such as aluminum cans, ice cream wrappers, banana peels, cigarette butts, plastic bags, wool socks, etc., are placed underground in the day care garden. Children create hypotheses of how long they expect waste to decompose under the ground. Children are encouraged to discuss the arguments they have for their assumptions. The estimations are made by linking the time scale to the familiar events in their life. The time scale is presented visually. Children ask their parents to

estimate how much time it takes the buried products to decompose. The evaluation forms are visual. They are dropped into the recycle estimation box. The products are placed underground in the fall and in the spring the observations of their condition are made. The analysis and comparison with the hypothesis are made. A short movie on decomposition and its importance in the ecosystem is watched and discussed. The time scale of decomposition of different materials is perceived together with Lego bar charts. An exhibition of the decomposition and its rate is built in the day care hall. Children also visit a home where owners show how they sort, recycle, and decompose waste.

The importance of decomposition is learnt with the Earthworm Soil Factory. Children feed worms with their leftovers. Children observe that earthworms break food into tiny pieces and those pieces become part of the soil (decomposition). Therefore, those animals can be called decomposers. Children plant seeds to recognize that in addition to worms, plants also need “food” (nutrients) to live and grow.

8. **Recycling train**

Aims: To empower children. To awaken positive emotions of successful learning and actions towards a cleaner environment. To learn self-assessment.

Short description: Children are given, two at a time, responsibility for sorting and recycling the waste produced in kindergarten during their day. The trash is sorted into the recycling train and the trash is taken out to the waste containers with the train.

9. **The washing of trash, packaging, and waste into creeks, rivers, lakes and from there to the ocean.**

Aims: To understand that trash, thrown onto the ground, may enter the water systems with rainwater, causing problems for animals, plants, and humans.

Short description: Children are given photos of creeks, rivers, lakes, and oceans. These concepts are discussed, and a short movie of the oceans is watched. A scale model of the creeks, rivers, lakes, and oceans is made from recycled materials. The model is filled with water and children can drop trash and observe, with the running water, what is the path of the trash in the model.

What might happen to the trash in the water systems is discussed in the children’s meeting with the “What can I do” action cards. The cards describe problems that trash causes to animals.

10. **The Masters of Trash Diploma**

Aims: To empower children to understand and feel that they have learned and worked to maintain our varied and beautiful planet.

Short description: The Masters of Trash Diploma is made from recycled materials. The diplomas are given to the children at the end of the project.

Appendix B

Phase 2.

Questions for parents of kindergarten children:

1. Can you describe the types of nature experiences your family has had?
2. What thoughts or feelings has the sustainable development project at the kindergarten sparked in you or other family members?
3. Have any topics or activities related to the project come up in your child’s discussions or actions at home?

Appendix C

The interview guide was developed by incorporating effective practices in environmental education for kindergarteners, such as visiting natural areas, gardening, playing with natural materials, and engaging in free and imaginative play, as reported by Ardoin and Bowers. Insights from phases 1 and 2 of our study were also considered to refine the interview questions.

Table A1. Interview Guide.

Topic Question	Possible Clarification	Possible Follow-Up Question
The importance of nature		
Let's first consider the significance of nature for your family.		
(1a) Can you assess how much time your child spends in nature?		
(1b) What does your child do in nature?	What does he/she see, hear, smell...?	
(1c) Do you feel that the time your child spends outdoors affects how he/she relates to nature?		How do you think it affects him/her?
Play and activities		
Next, let's talk about play.		
(2a) Would you say that your child enjoys playing outside?		
(2b) Does your child engage in nature-themed play, both indoors and outdoors? What kind?	Indoors, outdoors?	What kind?
(2c) How does your child participate in recycling at home?	Or in other nature-protective actions?	
(2d) What nature and recycling-related activities do you do together with your child?		
(2e) What kind of experiences does the child have in protecting nature?		
Knowledge and skills		
Let's talk for a moment about your child's recycling skills, or the skills to recycle things.		
(3a) Can you describe your child's recycling skills?		
(3b) In your opinion, what significance do these skills have for the future?		
(3c) Does your child talk about recycling?		What does he/she say?
(3d) What kind of questions does your child ask about nature and its protection?		
(3e) Does your child propose his/her own recycling ideas?	Like what could be recycled? Where could it be recycled?	
(3f) Let's consider the following situation: an adult walking ahead drops an ice cream wrapper on the ground. They notice it but don't pick up the litter. Your child sees the situation. What do you think will happen as a result of this experience?	What does the child say or do, or does he/she do anything?	
Future		
Let's move forward towards the future.		
(4a) What is your opinion on the statement that children need to be protected from dangers in nature and future threats?		

Kindergarten

Let's consider your child's kindergarten.

(5a) What role should the kindergarten play in matters related to protecting nature?

(5b) How would you improve the kindergarten's activities and collaboration between families and the kindergarten in environmental matters?

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