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Towards Inclusive and Sustainable Nature Education in Austria: Evaluation of Organization, Infrastructure, Risk Assessment, and Legal Frameworks of Forest and Nature Childcare Groups †

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Abstract

Early childhood forest and nature education plays a vital role in shaping values and promoting sustainability throughout life. Conceptualized in Denmark, forest and nature childcare groups have been established in Austria for over 20 years, contributing to mental well-being and supporting both Education for Sustainable Development (ESD) and Early Childhood Education and Care (ECEC). With increasing demand for childcare and a growing disconnect from nature—factors linked to physical and mental health challenges—there is a pressing need to expand these groups and integrate them into formal legal frameworks. This study examines the organization, staffing, infrastructure, risk prevention, and hygiene of 79 Austrian forest and nature kindergarten groups, identifying key areas of improvement to ensure safe access for all children, including those in public childcare. A semi-standardized online survey of 72 groups was analyzed using descriptive and statistical methods, including a Spearman correlation, Kruskal–Wallis test, Chi-square test, and ANOVA. Results revealed three main infrastructure types—house, container/trailer, and tipi—with houses offering the most comprehensive facilities. The ANOVA indicated significant effects of sponsorship type ($p < 0.01$), caregiver numbers ($p < 0.001$), and their interaction ($p < 0.05$) on half-day care costs. Currently, legal frameworks exist only in Tyrol and Salzburg. Broader access requires standardized infrastructure and risk assessment guidelines, collaboratively developed with stakeholders, to ensure safety and inclusivity in Austrian forest and nature childcare groups.

Keywords: forest; nature; kindergarten; childcare; risks; prevention; sustainability; ESD; ECEC; Austria

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1. Introduction and Background

1.1. Introduction

Global societal, ecological, economic, and geopolitical challenges raise critical questions about how to establish a sustainable and socially equitable way of life on Earth. Early

Childhood Education and Care (ECEC) is increasingly recognized as a key platform for addressing these challenges. Within ECEC, nature-based education, such as forest and nature childcare groups, has emerged as an innovative approach to fostering sustainability values and practices among young children.

These programs provide immersive experiences in natural environments, promoting ecological awareness, resilience, and social interaction, which are essential for sustainable development [1,2].

Education for Sustainable Development (ESD), promoted by UNESCO, emphasizes the integration of sustainability principles into education systems worldwide. ESD aims to empower individuals to address global challenges by fostering critical thinking, life skills, and values such as empathy, tolerance, and responsibility. Since its introduction in 2004, ESD has evolved through initiatives such as the UN Decade of ESD (2005–2014) and the Global Action Programme on ESD (2015–2019), and the "ESD for 2030" framework [3]. These efforts underscore the importance of embedding sustainability into all levels of education, with early childhood identified as a pivotal entry point for cultivating sustainable habits and mindsets [3,4].

Early childhood is a formative period in which cognitive, emotional, and social development occurs, making it an ideal stage for introducing sustainability principles. ECEC programs that integrate ESD provide a comprehensive approach to early education, addressing global challenges while fostering holistic development. For instance, forest and nature childcare groups align closely with ESD principles by offering children opportunities to engage directly with natural environments. Research highlights that investing in ESD during these formative years builds children's environmental awareness and ecological responsibility, which are critical for achieving sustainable development goals [5–8]. These programs not only enhance children's connection to nature but also promote critical thinking, resilience, and meaningful social interactions, as demonstrated in comparative studies on nature-based versus traditional preschools [2,5,6].

The intersection of ECEC and ESD can be understood through their shared focus on fostering holistic development and addressing global sustainability challenges. Table 1 provides a schematic overview of how these two domains intersect to support sustainable development goals.

Table 1. Simple schematic overview of the intersection of ECEC and ESD [2,3,5,7–17].

ECEC	Intersection	ESD
Cognitive, emotional, and social development	Integrated curriculum	Addressing global challenges
Holistic development	Inclusive and quality education	Sustainability practices
Foundation for lifelong learning	Resilience and risk reduction	Long-term impact on development

Research highlights that investing in ESD during these formative years builds children's environmental awareness and ecological responsibility, which are essential for sustainable development [6–8,17,18]. This approach aims to prepare young learners for global citizenship and foster sustainable habits from an early age. ESD in ECE involves incorporating environmental, economic, and sociocultural sustainability into early childhood curricula. This holistic approach ensures that children develop a comprehensive understanding of sustainability, recognizing the diversity in early childhood values and practices across different socio-cultural contexts [8,9,19,20].

The role of educators is central to the success of ESD in ECEC. Their attitudes, knowledge, and prior experiences significantly influence the effectiveness of sustainability education in both eco and non-eco preschools. Training and professional development are essential to equip educators with the skills and confidence needed to integrate ESD into their teaching [2,10,15]. However, many countries lack explicit ESD content in their early childhood curricula, leading to inconsistencies in implementation. There is a pressing need for robust policies that support the integration of ESD in ECEC. Cross-national studies highlight the importance of shared understandings and common efforts to address global sustainability challenges. Policies should emphasize the relational aspects of children's learning and their connection to the multidimensional world. Local initiatives, such as the "bush kinder" approach in Australia, provide children with play-based learning experiences in natural environments, promoting sustainability through direct interaction with nature [16]. In Norway, all ECEC programs are legally required to provide at least two hours of outdoor playtime per day throughout the year, with nature-based programs offering even more time outdoors and access to natural environments for children to explore and play in. Recent comparative studies on children's behavior in nature-based versus traditional preschools in Norway further support this approach, concluding that access to natural environments significantly enhances preschool children's behavior and social interactions in meaningful ways [1]. By integrating the principles of ESD into their practices, these groups hold significant potential to contribute to sustainable development, supporting the ecological, social, and economic well-being of future generations.

This study investigates the current state of forest and nature childcare groups in Austria, focusing on their practices and potential to advance sustainability goals. By analyzing their organization, infrastructure, risk assessment, and legal frameworks, the research provides initial insights into how these childcare groups can serve as effective models for integrating sustainability into early childhood education. Furthermore, the study identifies key adaptations needed to enhance accessibility and inclusivity, thereby supporting broader public engagement and fostering a more sustainable future.

1.2. Background

Forest and nature childcare groups address the growing disconnection of children from nature, a phenomenon exacerbated by urbanization, modern lifestyles, and parental "overprotection" [5,9]. In the past, children regularly experienced nature as part of their daily lives, particularly in rural areas or urban vacant lots. Today, this lack of exposure negatively impacts child development. For example, Miklitz [19] reported that 60% of children exhibit postural defects, 40% have underdeveloped cardiovascular systems, and 30–40% show signs of muscular weakness. Motor skill deficits are also increasingly observed, heightening the risk of accidents [21].

Forest and nature childcare groups provide diverse play settings that promote sensory engagement, problem-solving, creativity, and social skills [17]. The limited availability of toys encourages children to develop situational creativity and refine their motor abilities [18]. Additionally, natural play environments promote higher levels of physical activity compared to indoor settings, reducing the risk of obesity and fostering overall well-being [22]. Time spent in nature also enhances children's understanding of environmental issues, such as pollution and deforestation, while fostering curiosity, resilience, and critical thinking [23–25]. Research shows that children in forest childcare groups often outperform their peers in creativity, participation, and social behavior, although their fine motor skills may be slightly less developed [18,26].

Despite their ecological and social benefits, forest and nature childcare groups face challenges in Austria and other countries, such as Poland and Slovenia, where legal frame-

works and trained personnel are insufficient [7,27]. In Austria, the national educational framework highlights the importance of nature experiences but lacks specific implementation guidelines, such as the minimum duration of nature exposure per age group [28]. Hygiene and safety issues, such as maintaining warm water for handwashing or managing toilet use in natural environments, remain unresolved [29].

To address these issues, comprehensive guidelines and legal frameworks are needed. These should cover organizational structures, personnel qualifications, and risk management. The TOP principle (Technical, Organizational, Personal) offers a structured approach to risk mitigation, prioritizing technical solutions, followed by organizational and personal measures [30]. Aligning with sustainability goals, this approach supports long-term, resource-efficient solutions, as outlined in standards like ÖNORM EN ISO 45001:2023-12 [31]. In Germany, precise safety guidelines aligned with applicable directives, standards, and laws exist, but are limited to the specific forest areas being used [32]. Beyond regulations concerning infrastructure design, the training and promotion of safety-conscious behavior in natural environments are particularly important to ensure the well-being of children.

Therefore, the aim of this study is to analyze the current situation of forest and nature children's groups in Austria in order to identify socially sustainable measures for existing but also new forest and nature children's groups, which will also enable pre-school children from public childcare centers to benefit from their places and nature education.

2. Materials and Methods

To achieve the objectives of this study, all 79 registered forest and nature-based childcare groups in Austria were selected as the study sample. Substantial preliminary information about these groups had already been gathered through internet research conducted in the summer of 2023 [33]. This research identified all existing forest and nature-based childcare groups in Austria. A comprehensive survey of these groups was conducted in the spring of 2024, over three months. The online questionnaire was completed by the management or deputy management.

Of the existing 79 groups, 72 participated in the survey. Nearly three-quarters of the participating institutions identified themselves as forest childcare groups, while the remaining institutions referred to themselves as nature childcare groups. At the NUTS-1 level (NUTS: Nomenclature of Units for Territorial Statistics, a hierarchical classification of territorial units established by the European Union), Austria is divided into three macro-regions: Eastern Austria (Burgenland, Lower Austria, Vienna), Southern Austria (Carinthia, Styria), and Western Austria (Upper Austria, Salzburg, Tyrol, Vorarlberg) [34]. The three main types of infrastructure used by the participating groups were houses, tipis, and construction trailers or containers. Construction trailers and containers were grouped together due to their structural similarities.

A semi-standardized questionnaire, designed to collect both structured and unstructured information, was utilized as the primary research method to improve the quality and consistency of the data collected. Structured information includes quantifiable data, such as the number of children enrolled, while unstructured information consists of open-ended responses, such as descriptions of accidents and injuries that occurred during the kindergarten year. For example, previous studies have demonstrated that the use of electronic questionnaires in pediatric practices can significantly improve both completion rates and data quality [35]. The survey was created using the software LimeSurvey. The questionnaire consisted of five thematic sections: organization, personnel structure, infrastructure, hazard and accident prevention, and hygiene. Each section included multiple items. A combination of open-ended response options, single- and multiple-choice questions, as

well as Likert scales, was used to gather responses and assess statements. A descriptive and analytical statistical analysis was conducted, using the statistical software SPSS Version 30. It incorporated Spearman correlation, the Kruskal–Wallis test, and the Chi-square test. Additionally, an analysis of variance (ANOVA), a linear model, was performed to examine factors influencing the costs of half-day care.

Academic-AI (General ChatBot) and Scopus AI were used for literature research, text improvements and indications of connections. ChatGPT was utilized for data analysis. The generated results and content were carefully reviewed and, if necessary, revised to ensure scientific accuracy and integrity. It was carried out in compliance with the ethical guidelines for AI in science.

3. Results

3.1. Organization

More than half of the forest and nature childcare groups were in Western Austria, shown in Table 2. Vienna, Styria, and Burgenland had the fewest groups, while the highest concentration was found in Tyrol with 14 groups.

Table 2. Forest and nature childcare groups in Austria by NUTS-1: AT [1] (n = 64, 2024).

NUTS-1:AT [1]	Frequency	Percentage [%]
East Austria	14	21.9
Southern Austria	11	17.2
Western Austria	39	60.9

[1] NUTS = Nomenclature of Territorial Units for Statistics.

Most of the surveyed groups, 35 in total, were organized as associations, while 23 groups were sponsored by municipalities. A statistically significant correlation was found between sponsorship type and federal state (χ^2 = 30.893, p = 0.014, V = 0.507). Municipal sponsorship was exclusively observed in Western Austria, whereas childcare groups organized as associations were present in Southern and Eastern Austria.

Most of the surveyed institutions operated a single group, with only 29.2% (21 out of 72) having two groups. The average number of children per group was 17. The data indicate that most of the forest and nature childcare groups provided care for children aged three to six years (72.5%). Additionally, 13 of the groups were classified as mixed-age groups, offering childcare for children aged two to six years (13 out of 80; 16.3%).

Each childcare group had between one and four caregivers, averaging 2.39 caregivers per group (SD: 0.6). Based on the average number of children (17, SD: 3.62) and the average number of caregivers, we found a caregiver to child ratio of 1:7. A statistically significant difference was observed between federal states and the number of caregivers. Specifically, the average number of caregivers was higher in Carinthia, Tyrol, and Vorarlberg compared to other federal states.

Both half-day and full-day care options were offered, and their fees ranged from EUR 0 to EUR 450; 57.5% of the fees for half-day care (23 out of 40; 57.5%) fell into the low-cost category, which included contributions between EUR 0 and EUR 150. A quarter of the groups, 10 out of 40, charged fees exceeding EUR 300.

Thirteen groups reported offering full-day care. Of these, six groups charged a monthly fee of up to EUR 149, while seven required monthly contributions ranging from EUR 150 to EUR 450 for full-day care.

The results of the ANOVA revealed a significant effect of sponsorship type ($p < 0.01$), the covariate number of caregivers present ($p < 0.001$), and the interaction between sponsorship type and the number of caregivers present ($p < 0.05$) on the fees for part-time care.

The fees for part-time care were significantly higher for groups sponsored by associations compared to those sponsored by municipalities, as shown in Figure 1.

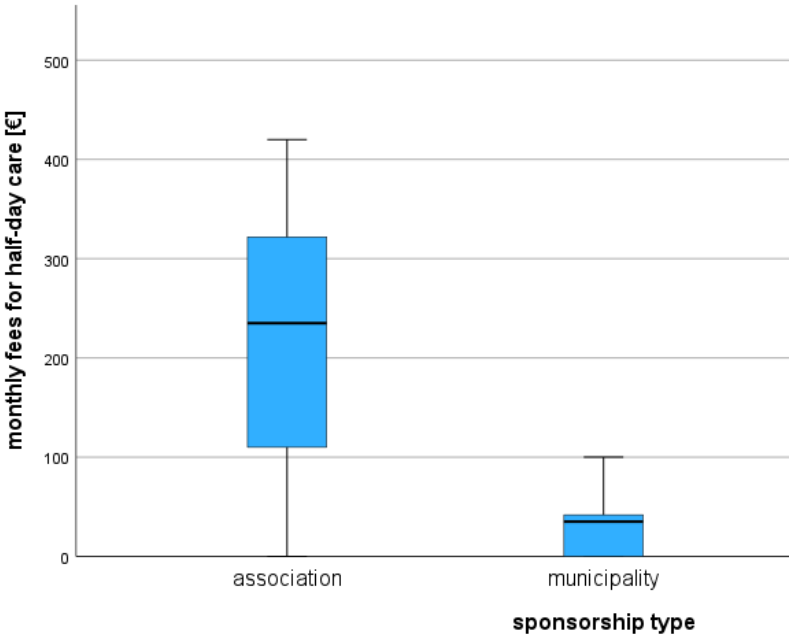

Figure 1. Monthly fees for half-day care in Austrian forest and nature-based childcare groups across sponsorship types (n = 39, 2024).

Additionally, the coefficients of the linear model indicated that in kindergartens sponsored by associations, the fees for part-time care decreased as the number of caregivers increased. In contrast, in kindergartens sponsored by municipalities, an increase in the number of caregivers was associated with higher fees. Furthermore, there was a tendency for an increase in the number of children to be associated with a decrease in the fees for part-time care.

3.2. Infrastructure

The infrastructure of the groups varied significantly, with three primary types of shelters identified: houses (23 out of 53; 43%), tipis (12 out of 53; 23%), and containers or construction trailers (18 out of 53; 34%). Houses were predominantly found in the federal states of Upper Austria (6 out of 8; 75.0%), Salzburg (6 out of 8; 75.0%), Vorarlberg (2 out of 4; 50.0%), and Tyrol (5 out of 11; 45.5%). Tipis were primarily located in Lower Austria (5 out of 10; 50.0%) and Carinthia (4 out of 7; 57.1%). Containers or construction trailers were frequently used in Tyrol (6 out of 11; 54.5%), Burgenland (3 out of 3; 100%), Styria (1 out of 1; 100%), and Lower Austria (4 out of 10; 40.0%). A statistically significant association was found between federal state and type of protective infrastructure (χ^2 = 33.624, p = 0.006, V = 0.563). Figure 2 shows the distribution of forest and nature-based childcare groups across all Austrian federal states.

A statistically significant relationship was also observed between the safety approval of the infrastructure and the type of infrastructure (χ^2 = 6.054, p = 0.048, V = 0.428). Safety approval was most common for houses (10 out of 14; 71.4%) and containers or construction trailers (7 out of 11; 63.3%). In contrast, only a small proportion of groups using tipis (1 out of 6; 16.7%) reported having their infrastructure approved by a qualified institution.

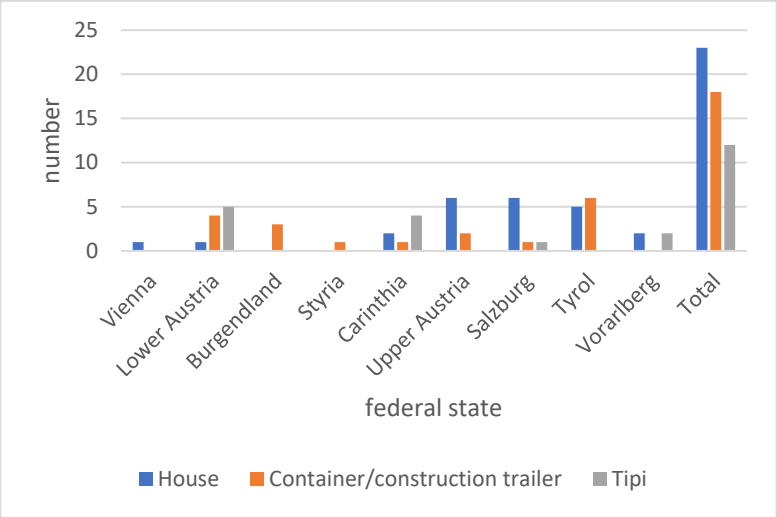

Figure 2. Distribution of Austrian forest and nature-based childcare groups by federal states and infrastructure type (n = 53, 2024).

As shown in Table 3, houses had larger average areas and were the most well-equipped, offering amenities such as cloakrooms, rest areas, kitchenettes, and toilets. In contrast, tipis and container or construction trailer setups often had more limited facilities, relying on outdoor adaptations to meet functional needs.

Table 3. Average size of functional areas in forest and nature childcare groups (n = 35, 2024).

Functional Areas of Infrastructure	Average Size with SD (in m^2) of Functional Areas by Infrastructure Type		
	House	**Container/Construction Trailer**	**Tipi**
Cloakroom	12.43 m^2 (SD: 6.16)	6.67 m^2 (SD: 4.16)	8.5 m^2 (SD: 2.12)
Common room	12.43 m^2 (SD: 12.74)	44.5 m^2 (SD: 48.4)	-
Common room with a rest area	16 m^2 (SD: 16.1)	-	12 m^2 (SD: -)
Rest area	1 m^2 (SD: -)	-	-
Kitchenette	5.38 m^2 (SD: 8.52)	-	-
Kitchen	3 m^2 (SD: 2.83)	-	-

In addition to traditional flush toilets, which were primarily found in infrastructure types classified as houses, alternative toilet systems such as composting and separation toilets were also utilized. Traditional flush toilets were most commonly used in houses, with 41 instances reported. Additionally, nine open-air toilets, five composting toilets, and one separation toilet were recorded in this type of infrastructure.

Groups operating in containers or caravans predominantly relied on composting and open-air toilets. Six groups reported using traditional flush toilets, while four used separation toilets. In tipis, open-air toilets were the most frequently used, with 17 instances, followed by five traditional flush toilets and several composting and separation toilets.

3.3. Risks and Risk Prevention

Children and caregivers in forest and nature childcare groups face different hazards compared to those in conventional kindergartens, necessitating comprehensive safety measures for hazard prevention. In total, seven accidents were recorded in 2023, of which 3 (42.9%) were classified as minor and 4 (57.1%) as moderate in severity.

Typical injuries included wounds and bruises, most commonly occurring during activities such as climbing, running, and playing on playground equipment. Additionally,

seven groups (7 out of 40; 17.5%) reported illnesses associated with natural environments. These included hay fever, rashes caused by oak processionary moths and stinging nettles, Lyme disease, tick bites, wasp stings, and skin burns from giant hogweed.

Preventative measures followed the TOP principle. In indoor areas, 42.5% (17 out of 40) of the groups reported implementing technical measures, 37.5% (15 out of 40) applied organizational measures, and 50% (20 out of 40) adopted personal protective measures. In outdoor areas, 43% (17 out of 40) of the groups implemented technical measures, 38% (15 out of 40) utilized organizational measures, and 43% (17 out of 40) adopted personal protective measures.

Technical measures included fencing off hazardous areas, both indoors and outdoors, and removing dangerous objects such as branches. Organizational strategies involved conducting regular risk assessments, ranging from daily to yearly, depending on the risk area, performed by staff or external experts such as forestry professionals. Personal measures focused on educating children and staff about risk awareness, enforcing safety rules, and recommending appropriate outdoor clothing.

3.4. Hygiene and Skin Protection

Hygiene presented unique challenges due to the predominantly outdoor setting. Groups adopted various practices to address these challenges, including the use of hand sanitizers (13 out of 16; 81.3%), soap (12 out of 15; 80%), and paper (18 out of 40; 45%) or cotton towels (21 out of 40; 52%). However, access to warm water, especially during colder months, was limited in some cases. Diaper changing and defecation also posed common challenges. Hygiene-related issues were particularly problematic when groups were away from their infrastructure, such as during hikes.

The use of sun and cold protection cream in forest and nature childcare groups is an essential part of protecting children from extreme weather conditions. Since children in these groups spend most of their time outdoors, they are exposed to both sunlight and cold temperatures. While sun cream with a high sun protection factor was used by 58% (23 out of 40) of the groups, cold protection cream was only used by 28%. Both types of cream were predominantly provided by parents. The importance of their use is underscored by the increasing intensity of UV radiation due to climate change, as well as the understanding of the causes of dermatitis and the protective effects of "Barrier" creams against irritants [30,32]. Despite these challenges, educators emphasized the importance of hygiene and protective cosmetic education, particularly during food preparation or activities involving direct contact with natural elements such as plants, animals, sunlight, water, and mud.

4. Discussion

The findings of this study provide valuable insights into the organizational structures, infrastructure, risk prevention strategies, and hygiene practices of forest and nature-based childcare groups in Austria. Additionally, the study underscores the potential of these childcare groups to make significant contributions to sustainability, aligning with UNESCO's objectives for Education for Sustainable Development (ESD) [3]. The results also resonate with the core principles of high-quality Early Childhood Education and Care (ECEC). Furthermore, the findings are consistent with international research, which emphasizes both the unique benefits and challenges of outdoor childcare settings. These settings have already been evaluated in terms of educator–child interaction quality and their positive impact on long-term health development [10].

These international and national differences are particularly evident in terms of equipment, spatial dimensions, safety certifications, and organizational approaches.

4.1. Organization

The organizational structure of Austrian forest and nature-based childcare groups, characterized by a predominance of associations and municipal sponsorships, reflects a decentralized approach to early childhood education. This structure is comparable to Germany, where forest childcare groups are frequently organized as independent associations or supported by municipalities. However, the exclusive presence of municipal sponsorship in Western Austria highlights regional disparities within Austria, which are less pronounced in Germany due to more uniform federal regulations and funding mechanisms [36].

In Scandinavian countries, such as Denmark, Norway, and Sweden, forest preschools are often integrated into the public education system, benefiting from consistent government funding and oversight [37]. This integration ensures equitable access to outdoor education and reduces financial burdens on families. In contrast, the Austrian system shows significant variability in fees based on sponsorship type, with association-sponsored groups charging higher fees on average. This variability may create barriers for families with lower incomes, limiting access to nature-based childcare, particularly in regions where municipal sponsorship is less prevalent. For instance, the Austrian caregiver-to-child ratio of 1:7 observed in this study is consistent with international results, which emphasize smaller group sizes for better quality of care and to ensure safety and individualized attention in outdoor environments. The caregiver-to-child ratio in Austrian forest and nature-based childcare groups (1:7) aligns with international standards of high ECEC, particularly those in Scandinavian countries, where ratios typically range from 1:3 to 1:7 [11,38]. These ratios are considered optimal for fostering high-quality interactions between educators and children, as well as ensuring adequate supervision in outdoor settings. However, the regional differences in caregiver numbers observed in Austria, with lower ratios in Carinthia, Tyrol, and Vorarlberg, suggest that local funding and organizational priorities may influence staffing levels [18,26,37]. In Germany, the caregiver-to-child ratio in forest kindergartens is often between 1:8 and 1:10, more like public kindergartens, even in other countries [37,39].

4.2. Infrastructure and Safety—Comparative Perspective

The protective infrastructure in forests and nature-based kindergartens is profoundly shaped by local educational philosophies, regulatory frameworks, and safety standards. While all programs share a fundamental reliance on nature as a core resource, the design and implementation of infrastructure exhibit significant variation, reflecting national and cultural contexts.

In Austria, the range of infrastructure types—spanning permanent structures such as houses to more flexible options like tipis, containers, and construction trailers—demonstrates the adaptability of these childcare groups to diverse regional conditions. Similar structures are given in German. In contrast, permanent buildings are less frequently used in Scandinavia and Korea, as children are often cared for outdoors year-round, even under extreme weather conditions. This highlights the critical role of context-specific solutions in the planning and operation of forest and nature-based kindergartens, ensuring their alignment with local needs and conditions [6,13,19].

4.3. Safety Approval, Infrastructure Challenges, and Legal Situation

Safety approval was primarily conducted for houses and containers, or construction trailers. Furthermore, it was found that houses were predominantly located in the federal states of Tyrol, Salzburg, Upper Austria, and Vorarlberg.

Additionally, houses had the largest average area compared to other infrastructure types. In terms of spatial equipment, tipis were minimally furnished, whereas houses often included features such as coat racks, resting areas, kitchenettes, and toilets. While conventional toilets were mainly found in houses, alternative toilet systems, such as compost toilets or open-air toilets, were predominantly used in containers, construction trailers, and tipis. A survey conducted in South Korea revealed that indoor infrastructure in similar groups was rarely used. A need for more diverse infrastructure was identified, as the existing infrastructure often exhibited limitations in terms of usability and safety [6].

Similar to the situations in Poland and Slovenia, as described by Loboda [27] and Nastran [7], Austria's lack of comprehensive regulations limits the potential scalability of these groups. Care must be taken to preserve the core principles of nature pedagogy, recognizing that a certain degree of risk can have a positive impact on child development [40]. Specific regulations regarding the design of infrastructure for forest and nature-based childcare groups are currently outlined only in the Tyrolean Childcare Act [41]. However, it has been observed that most of the Austrian forest and nature-based childcare groups do not fully comply with these requirements, particularly those related to room dimensions or equipment standards. This is especially evident when alternative structures such as containers, construction trailers, tipis, or combinations thereof are used.

Furthermore, the regulations lack clear definitions for key criteria, such as the minimum required space and equipment, as well as ergonomic indicators that should guide their design and support the health of kids and educators. Considerations for the usability of these infrastructures are insufficiently addressed. Consequently, these aspects require further evaluation, especially regarding their impact on social sustainability.

In Germany, infrastructure regulations for forest childcare groups are more comprehensive, providing clear guidelines on space requirements, safety, and equipment from practitioners in some regions [19]. Similarly, Scandinavian countries have established detailed standards for outdoor childcare settings, ensuring that infrastructure supports both safety and pedagogical goals [13]. Evaluation results in detail on the infrastructure have not yet been reported in the literature. Austria could use these examples to develop more reliable rules that address the unique needs of forest and nature-based childcare groups and allow entry for groups from public care.

4.4. Risk Assessment Tools and Educator Training

It is essential to involve all relevant stakeholders in the process of creating practical guidelines for the various types of areas used by forest and nature childcare groups (e.g., different infrastructure types in- and outdoor, arable land, grassland, and forests).

To guarantee all children, including public kindergartens, regular nature experiences in the future, certain adjustments are essential. These include specific infrastructure requirements, clear guidelines for risk assessment, the development of preventive measures according to the TOP principle for each type of area, as well as infrastructure used and comprehensive training programs for educators [30].

Educators are aware of various dangers present in the natural environment encountered in the daily life of forest and nature childcare groups. These dangers arise from weather conditions, such as the risk of falling trees during wind or storms, heat, and slippery surfaces (e.g., fallen wood, stones). Additional risks stem from activities with children in the forest and natural environment, including exposure to ticks, poisonous plants and mushrooms, and handling natural materials. Through extensive communication with the preschool children, these dangers and risks are explained and made understandable using comparisons. In this context, rules of behavior are established, and boundaries are set to ensure the safety of the children [5]. Knowledge of hazards, risk assessment, and

necessary preventive measures is gained through practical experience, discussions with colleagues, internal training, and external training in areas such as first aid, agriculture, forestry, and forest and herb education. To improve safety in natural environments, the surveyed forest educators expressed a need for a more comprehensive and clearly structured risk assessment, ideally in the form of a checklist. This tool should be specifically designed to meet the unique requirements of forest and nature childcare groups, enabling educators to confidently guide children into the forest and effectively utilize shelter infrastructure. The user-centered adaptation of existing risk assessments for forests, as well as the development of new risk assessments for other natural spaces, indoor and outdoor shelters, and equipment, can only be ensured through the collaboration of an interdisciplinary team, according to the educators interviewed [42].

Adaptation measures, rules of behavior, and personal protective equipment (PPE) for identified hazards must comply with applicable legal requirements and professional standards. These measures should be communicated clearly and accessibly to the target user groups (educators, parents, and preschool children) in a pedagogically appropriate manner. This approach aims to establish socio-technical systems according to international norms and guidelines that prioritize both usability and safety for educators and preschool children, related to public minimum requirements.

The need to develop risk assessments and guidelines for deriving relevant preventive measures for educators is urgent due to the current lack of training and professional development in forest and elementary education. Guidance on conducting risk assessments and implementing preventive measures is largely missing, particularly for natural and protected spaces, as well as for garden-like, park-like, newly constructed, used, or self-built outdoor infrastructure for preschool children. These critical topics are not sufficiently integrated as practical teaching content in the initial and ongoing training of elementary educators in Austria. In some other countries, such as the UK, Scandinavia, and Germany, risk assessment tools and guidelines are widely or partly available and integrated into educator training programs [40,43].

These tools need to be user-friendly and adaptable to different natural and infrastructural environments to ensure that teachers can effectively manage risk while upholding the core principles of nature education. It is important to adapt tools in accordance with the TOP principle and integrate them into the education and training of pre- as well as extend it to primary school teachers, especially as an important component of nature education.

4.5. Hygiene and Skin Protection

Occurring hygiene and skin protection problems in forest and nature childcare groups, like access to warm water or defecation during hikes, require specific measures. Schäffer [24] identified similar hygiene problems and proposed the use of canisters or thermos bottles for the provision of warm and fresh water. During hikes, disinfecting tissues, paper towels, toilet paper, plastic bags, and water bottles should be taken along to enable hand hygiene and going to the toilet in nature areas.

The use of sun and skin protection creams is another critical aspect of outdoor childcare; it highlights the need for greater awareness of its importance, particularly considering increasing climate variability. To address this, more intensive educational efforts are needed, targeting teachers, parents, and preschool children to emphasize the necessity of skin protection during time spent in natural environments [12,29,44,45]. By implementing these measures and enhancing education on hygiene and skin protection, forest and nature-based childcare groups can better address the unique challenges of their outdoor settings. These efforts not only improve immediate health and safety but also foster long-term habits that promote well-being in natural environments.

4.6. Conclusions and Outlook

The findings highlight the need for Austria to address gaps in infrastructure regulations, risk assessment practices, and educator training to ensure the safety and sustainability of forest and nature-based childcare groups. By drawing on best practices from countries such as Germany, Denmark, and the UK, Austria can develop comprehensive guidelines and tools that balance safety with the developmental benefits of nature-based education. This approach would not only enhance the quality of these childcare groups but also support their scalability and integration into the broader educational system.

Therefore, future research should prioritize the development of standardized safety guidelines and regulatory frameworks for organizational design and all infrastructure, specifically adapted to the diverse requirements of group activities. Where appropriate, these measures should be supplemented with the provision of personal protective equipment (PPE) and comprehensive safety training programs.

It is essential to involve all relevant Austrian stakeholders in this process to ensure the creation of practical requirements that preserve the fundamental principles of nature education. In addition, it is crucial to ensure that, by adhering to minimum official safety requirements to prevent hazards, preschool children in public childcare settings can spend several weeks or even months in nature from the age of one until they begin primary school as an integral part of high-quality ECEC. This practice is recognized as an integral component of high-quality ECEC, as highlighted by Nguyen et al. (2025) [1]. Similar practices should be increasingly implemented in Austrian preschool care and extended to elementary schools.

5. Limitations

This study has several limitations that should be acknowledged. First, the data were collected through a self-administered, semi-standardized online questionnaire, relying on self-reported information from caregivers and group leaders. Self-reported data are inherently susceptible to biases, particularly social desirability bias, where respondents may provide answers, they perceive as socially acceptable or aligned with normative expectations, rather than reflecting their actual behaviors or experiences. This limitation may result in systematic overreporting or underreporting of certain variables, potentially skewing the findings. Additionally, recall bias and varying interpretations of the questionnaire items may further compromise the accuracy and objectivity of the data. To mitigate these limitations and strengthen the robustness of future research, we recommend the integration of qualitative methods, such as in-depth interviews, focus groups, or ethnographic observations, to triangulate findings and validate self-reported data. Such approaches would enable researchers to capture a more comprehensive and nuanced understanding of the studied phenomena, while also addressing potential discrepancies arising from self-reporting. Furthermore, employing mixed-methods designs could enhance the reliability and validity of the results, contributing to a more holistic understanding of sustainability-related issues.

Second, the study did not utilize a randomized sampling method. Although efforts were made to survey all existing forest and nature-based childcare groups in Austria, participation was voluntary. Consequently, the final sample (n = 72) may not fully represent the characteristics of the entire population of such groups, limiting the generalizability of the findings beyond the surveyed institutions.

Third, while the study provides an initial overview of protective infrastructure and organizational aspects, it does not include qualitative interviews or direct observations. These methods could have provided deeper insights into educators lived experiences, pedagogical practices, and the practical use of infrastructure in daily routines.

Future research should consider adopting mixed-method approaches, including observational studies and qualitative interviews, to complement survey data and offer a more comprehensive understanding of forest and nature-based childcare settings. Furthermore, comparative studies across countries could help identify the best practices and support the development of international guidelines for infrastructure, risk assessment, and hygiene standards, particularly those grounded in established norms.

Overall, the findings of this study are consistent with many aspects of the international literature on forest and nature-based childcare groups, particularly regarding organizational structures, infrastructure types, risk prevention strategies, and hygiene practices. However, distinct regional differences in Austria, such as variations in sponsorship types and caregiver-to-child ratios, underscore the need for localized approaches to policy and practice. Future comparative studies could delve deeper into these regional variations and identify best practices to inform the development of international guidelines for forest and nature-based childcare settings.

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