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The Impact of Nature Walks on Young Children Nature Connectedness: A Biophilia Hypothesis Analysis

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Abstract

Early childhood offers a critical window for cultivating children's connection to nature, laying the foundation for environmental awareness and stewardship. While the Biophilia Hypothesis suggests an innate affinity for nature, this study expands the theory by proposing that biophilia can be intentionally nurtured through developmentally appropriate, guided experiences. Involving 31 preschoolers from two Malaysian suburban preschools, this qualitative study examined how repeated nature walks in a local park elicited affective, cognitive, and sensory biophilic responses in the participants. Data were gathered through video recordings and direct observation during multiple 60- to 90-minute sessions. Thematic analysis revealed seven interrelated response categories, including affinity for living things, curiosity-driven inquiry, and sensory awareness. Children frequently engaged with local flora and fauna, demonstrating a deepening connection to place and biodiversity. These findings underscore the value of nature walks as a low-cost, accessible pedagogical approach to foster nature connectedness, contributing to both holistic child development and national sustainability education goals.

Keywords: Nature Walks, Nature Connectedness, Biophilia Hypothesis, Nature-Based Learning, Preschool

Introduction

A sustainable future depends on young children developing a love for and care toward nature as a foundational step in its preservation and conservation. A strong connection to nature is consistently associated with improved psychological well-being in children. Studies show that children who feel more connected to nature tend to demonstrate higher levels of prosocial behaviour, empathy, and environmental responsibility (Millei et al., 2025; Speldewinde & Campbell, 2023; Sobko & Brown, 2021). Otitoju et al. (2022) further suggest that limited engagement with nature can hinder children's understanding of environmental issues, as meaningful and direct experiences with the natural world are essential for fostering

such awareness and responsibility. This early connection lays the foundation for shaping children's empathy and lifelong attitudes toward sustainable living.

Building on this foundation, direct, hands-on interaction with nature is widely regarded as an effective learning method, offering both cognitive and emotional benefits (Vella-Brodrick & Gilowska, 2022; Liu et al., 2022; Aminpour, 2021), supporting self-regulation (Ernst & Stelly, 2024), and enhancing executive functions (Jiang & Hussein, 2023). Such engagement strengthens children's connection to the environment and promotes environmental stewardship (Ekman Ladru et al., 2024; Speldewinde & Campbell, 2023; Warden, 2019). These findings are underpinned by the Biophilia Hypothesis, which identifies early childhood as a critical period for developing an innate affinity with nature (Davis & Elliott, 2023). However, some scholars argue that without locally relevant contextualisation, nature-based pedagogies may risk replicating Western-centric models that do not fully address the diverse socio-ecological realities of non-Western countries.

Emerging scholarship is beginning to challenge the idea that biophilia is solely an inborn tendency, proposing instead that it can be intentionally cultivated through guided, developmentally appropriate educational experiences. In response, this study reconceptualises the Biophilia Hypothesis by framing biophilia as an educable construct, one that can be nurtured in early childhood through carefully designed, meaningful nature-based learning activities. This theoretical shift offers a novel lens through which to understand how environmental values are formed during the early years and how they might be supported pedagogically.

In this regard, Malaysia offers a unique and ecologically rich context for exploring the intersection of early childhood education and environmental awareness. The natural environment, comprising trees, stones, sticks, insects, and natural phenomena, provides authentic learning opportunities that foster observation, curiosity, and environmental understanding (Moll et al., 2022; Park et al., 2010; Kuo, 2020). While the National Standard Preschool Curriculum (NSPC, revised 2017) recognises the importance of nature and sustainability education, its practical implementation faces challenges. These include a strong emphasis on indoor academic learning, limited access to safe outdoor spaces, rapid urbanisation (Shaari & Nazri, 2023; Affendi & Masnan, 2022; Saleh et al., 2018), and minimal time allocated for outdoor play (20 minutes per day, thrice a week). Despite Malaysia's ecological richness, systemic and structural limitations continue to hinder the effective integration of nature-based learning in early childhood settings.

Additionally, there is a lack of clear guidance, resources, and professional development to support educators in integrating nature meaningfully into their pedagogy (Ne'matullah et al., 2024; Supramaniam et al., 2021; Mohd Yusop et al., 2018). This issue is more pronounced in urban areas, where preschools often lack access to green spaces (Lee et al., 2021). Children's opportunities to form deep and meaningful connections with their environment remain constrained without adequate support. In contrast, countries such as Sweden, the United States, and Australia prioritise daily outdoor play regardless of weather, offering children frequent opportunities to engage with nature and develop essential skills (Ernst & Stelly, 2024; Ekman Ladru et al., 2024; Sia et al., 2023). These comparisons highlight

the need for policy and professional support to align Malaysian practices with international best practices in outdoor learning.

One promising approach to bridging this gap is the integration of guided nature walks into preschool settings. Nature walks are defined as guided or self-directed outdoor excursions that encourage individuals to explore natural environments such as forests, parklands, or parks (Barton et al., 2009). These walks may vary in duration, from as short as 15 minutes (Song et al., 2019) to several hours (Lesser et al., 2020), and typically involve engagement with the ecosystem, including plants, animals, and landscapes, fostering observation, reflection, and discovery. Research has shown that nature walks enhance children's cognitive skills, emotional well-being, and environmental awareness through hands-on experiences that nurture their connection to the natural world (Kotera et al., 2021; Martin et al., 2020; Chawla, 2015; Kuo, 2010). When integrated into early childhood curricula, nature walks offer a powerful form of experiential learning and promote environmental stewardship. These meaningful outdoor experiences support children's cognitive, emotional, and social development (Vella-Brodrick & Gilowska, 2022; Veitch, 2020; Louv, 2008).

Despite these benefits, the use of nature walks and other nature-based learning activities in early childhood education in Malaysia remains limited. More critically, there is a lack of empirical research examining how Malaysian preschoolers, particularly those in urban or resource-constrained settings, can meaningfully engage with nature. This study addresses that gap by exploring the potential of nature walks as a low-cost, contextually relevant approach to fostering nature connectedness among young children in Malaysia.

This study contributes to the theoretical discourse on early childhood environmental education by advancing the understanding of how nature-based activity can be effectively integrated into early years pedagogy. A central contribution lies in the reconceptualisation and extension of the Biophilia Hypothesis (Wilson, 1984), which posits that humans possess an innate affinity for nature, into the early childhood education context as an educable and intentionally cultivated construct.

By grounding the exploration within the Biophilia Hypothesis lens and focusing on children's lived experiences in local environments, this study contributes to a deeper understanding of how guided nature walk activities can serve as a practical and scalable tool for nurturing early environmental values. It also responds to the goals of the national curriculum by proposing a developmentally appropriate and ecologically grounded method to strengthen children's connection to nature and support sustainable futures. Most notably, this study is one of the first to empirically examine biophilic responses among Malaysian preschoolers in natural settings, offering new insights into how early environmental values can be fostered in diverse educational contexts.

Biophilia Hypothesis: A Theoretical Lens

The Biophilia Hypothesis, proposed by Edward O. Wilson (1984), posits that humans possess an innate predisposition to seek connections with nature and other living organisms. This study adopts the Biophilia Hypothesis as a guiding theoretical lens to examine how preschool children interact with natural elements during and after guided nature walks. While traditionally considered an inborn tendency, this study reconceptualises biophilia as a

capacity that can be intentionally cultivated through early childhood educational experiences. The hypothesis provides a foundation for interpreting children's observable behaviours and verbal expressions, particularly those that suggest emotional, sensory, or cognitive engagement with the natural world.

As a framework for understanding human–nature relationships, the Biophilia Hypothesis supports the interpretation of children's responses through both behavioural observations and verbal cues (Burgess & Mayer-Smith, 2011). Verbal expressions that reflect curiosity, empathy, or an affinity for living beings are treated as broad indicators of biophilic responses. In this study, these responses are categorised using an established model of nature connectedness comprising three dimensions: affective, cognitive, and experiential, based on previous research (Cheng & Monroe, 2012; Kellert, 2002).

Table 1
Key Dimensions of Nature Connectedness

Dimension	Definition	Examples
Affective	Emotional responses to nature, such as empathy or concern	*"Be careful, don't hurt the butterfly!"*
Cognitive	Intellectual interest or curiosity about the natural world	*"Wow, look at the different shapes of the leaves!"*
Experiential	Expressions of sensory or physical experiences in nature	*"I love feeling the grass between my toes."*

Although the Biophilia Hypothesis primarily functions as an interpretive tool for categorising biophilic responses, it also implies potential links between early connectedness to nature and broader developmental outcomes. For example, fostering responses such as empathy, curiosity, and environmental awareness may contribute to the development of pro-social behaviours and sustainability-oriented values in early childhood (Warden, 2019; Nisbet et al., 2009). While this study does not directly assess long-term developmental impacts, it acknowledges that early biophilic responses may serve as foundational building blocks in shaping children's environmental identity and moral development.

By applying this theoretical lens, the study aims to capture the emotional, cognitive, and sensory dimensions of children's interactions with nature and to explore how guided nature walks might nurture an early affinity with the natural world, as a critical step in supporting lifelong sustainability values.

Methodology

This qualitative study involved 31 children aged 5–6 (13 boys and 18 girls) from two multicultural preschools in suburban Malaysia. These preschools serve children from diverse ethnic (Malay, Chinese, and Indian), cultural, and linguistic backgrounds and were selected for their proximity to green spaces, offering opportunities for nature walk activities despite the suburban setting. These settings were chosen to observe how biophilic responses may emerge in multicultural urban contexts.

Before participation, parental consent and child assent were obtained. Child assent involved explaining the study in simple, age-appropriate language to ensure the children understood their involvement and voluntarily agreed, even with parental consent already secured. As part of the process, parents and guardians were informed that no identifying information would be collected and that they could withdraw consent at any time. Similarly, children were free to stop participating at any point without consequence.

The guided nature walk began at the preschool and followed a marked trail to a local park. The walk included exploration along the trail and within the park, lasting approximately 60–90 minutes. Each child was provided with a water bottle to stay hydrated. At the park, children explored diverse vegetation, including tropical trees, shrubs, and grassy areas, offering a rich context for discovery. Visible wildlife such as buffalo, birds, tortoises, Asian water monitors, and various insects further enriched the environment. The park's marked paths allowed children to move safely while exploring.

During the nature walk, children engaged in both guided and open-ended exploration. The guide, either a teacher or facilitator, used open-ended questions to spark curiosity and foster observation, such as: *"What do you notice about the leaves on this tree?"* or *"What do you think would happen if we plucked the flowers?"* These questions encouraged children to share their thoughts and observations. The guide also facilitated group discussions, prompting children to describe what they saw, heard, and smelled, and helping them make connections between elements of nature, for example: *"Why do you think the birds are flying together?"* The walks balanced structured guidance with independent exploration, enabling children to observe plants, animals, and natural features while deepening their connection to the environment.

For the data collection, qualitative data were gathered during the nature walk through field notes based on direct observations and video recordings. Observations were made in an open-ended manner, with the researcher noting children's verbal and non-verbal responses, interactions with nature, and overall engagement with the environment. Specific behaviours such as expressions of curiosity, empathy, or fascination with wildlife were documented. The researcher also recorded moments of group discussion and individual reflection, which in 5–6-year-olds was primarily observed through verbalised thoughts expressed during moments of quiet sharing or responses to open-ended prompts. Since young children have limited capacity for internal reflection without verbalising, instances when children spontaneously shared their feelings, ideas, or observations aloud or in small groups were noted as indicators of individual reflection, providing insight into their personal engagement and thought processes related to nature.

Video recordings were conducted by other researchers using an ethnographic-inspired approach from Speldewinde and Campbell (2024), which incorporated two modes of engagement. The first involved filming from behind an "invisible wall," where the researcher remained passive and unobtrusive, allowing natural behaviours to unfold. The second involved crossing a "fluid wall," where the researcher moved closer to the participants and became more engaged in the nature walk. This dual approach provided a balance between objective observation and the depth of interaction-based data.

To minimise bias, the video recordings were not focused on specific behaviours but aimed to capture a broad range of interactions with nature, including verbal exchanges, non-verbal cues, and moments of curiosity, empathy, or engagement. These recordings supplemented field notes written during the walk to document key moments, verbal and non-verbal responses, and emerging patterns or themes. By combining both methods, the data collection aimed to present a balanced and comprehensive representation of the children's engagement during the nature walks.

To ensure consistency and reliability in the analysis, coding was conducted manually by two independent researchers. Both reviewed the children's verbal responses and categorised them based on the established framework. Next, the data analysis was guided by thematic analysis, a qualitative method for identifying patterns and themes (Braun & Clarke, 2006). Field notes and video transcripts were translated into English. Using the Biophilia Hypothesis as a theoretical lens, data were systematically coded to identify recurring themes by highlighting key phrases that reflected children's verbal responses. Responses were categorised using an established framework for nature connectedness (Cheng & Monroe, 2012; Kellert, 2002), focusing on affective, cognitive, and experiential dimensions. Within these themes, seven categories were identified: affinity for living beings, aesthetics and appreciation, empathy, curiosity, engagement with places, and engagement with objects.

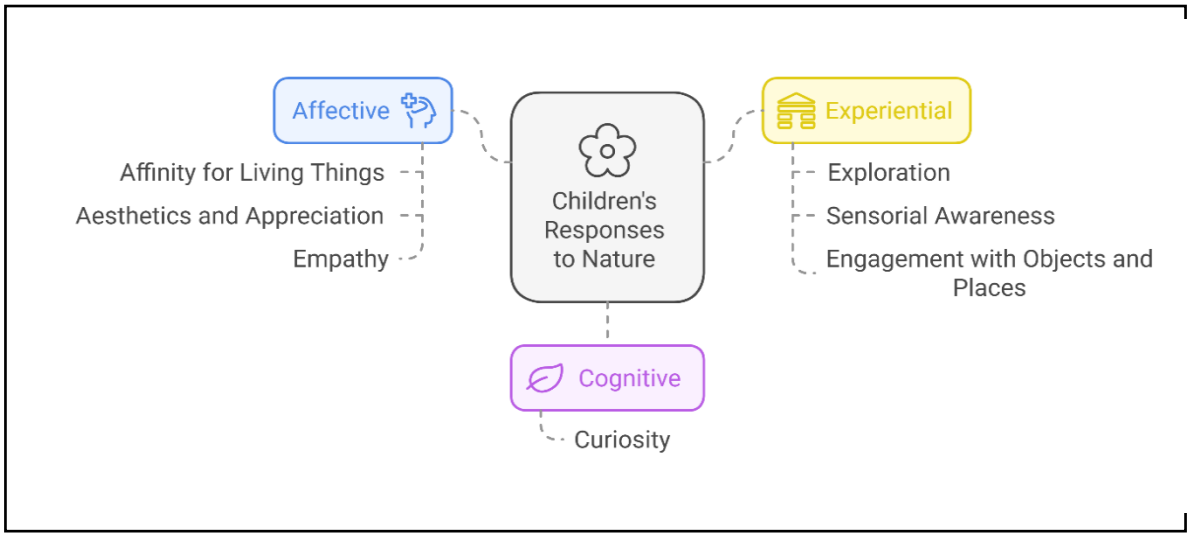

Figure 1: Children's responses during the nature walk were coded thematically using the Biophilia Hypothesis lens.

Findings And Discussion

The table below categorises children's verbal responses to nature into distinct biophilic themes observed during the nature walk activity. Seven themes were identified in this study: **affinity for living things, aesthetic appreciation, emerging empathy, curiosity-driven inquiry, exploratory behaviour, engagement with places,** and **sensory awareness**. This categorisation provides insight into how the guided nature walks foster children's expressions of connectedness to nature through affective, cognitive, and experiential dimensions, as framed by the Biophilia Hypothesis. The responses were analysed to explore how children's verbal interactions reflect various components of the Biophilia Hypothesis, which posits an innate human affinity for the natural world.

Table 2
Seven categories of biophilic response were identified

Dimension	Theme	Responses
Affective	**Affinity for Living Things**	*"I found spiders and ants! Come and see this!"* *"Look at this earthworm. I found it!"* *"What are those ants doing? Are they working?"* *"Are the ants dangerous?"* *"Are the earthworms okay?"* *"It looks like an alligator! Huge!"* *"Look at the small fish. They swim in a group."* *"I have seen the orange fish before. It is the same as that!"* *"I love the big tree! I can hug it!"*
Affective	**Aesthetic Appreciation**	*"Look at this beautiful flower!"* *"The mushrooms are so beautiful."* *"Wow, look at that buffalo! It is huge!"* *"Look, these are rare – black mushrooms!"* *"I love the big tree! I can hug it!*
Affective	**Emerging Empathy and Responsibility**	*"Do not pick the small one! Poor them. Let them grow." (referring to local fruit)* *"The trash makes it difficult for the trees to survive."* *"Be careful, don't hurt the butterfly! Poor her."*
Cognitive	**Curiosity-Driven Inquiry**	*"Why does that tree have no leaves? Is it dead?"* *"What are those ants doing? It looks like they greet each other"* *"Are the ants dangerous?"* *"Look at the birds. They are the same! But only the colours are quite different."* *"Is that a turtle or a tortoise? Aren't they the same?"* *"Wow, look at the different shapes of the leaves!"*
Experiential	**Exploratory Behavior**	*"Let us track the trails!"* *"I wanted to show you mushrooms. Come here!"* *"Let us go around and look for the rocks!"*
Experiential	**Engagement with Places and Sense of Belonging**	*"That is our school! We can see the building from here (from the park)"* *"Look at that! It is a big tractor. I saw it plowing the ground yesterday."* *"Let us go to play with that trampoline!"*
Experiential	**Sensory Awareness**	*"It's so hot today. No cloud protects the sun."* *"Let us try to walk on the tree log. It is fun."* *"This coconut tree is not tall. We can pick the coconut fruit with our hands. Look!"* *"I love feeling the grass between my toes."*

This study's findings provide captivating evidence that guided nature walks foster children's nature connectedness through multiple dimensions (ACE Dimensions) that align closely with the Biophilia Hypothesis. Seven categories of biophilic responses were identified: **affinity for living things, aesthetic and appreciation, empathy, curiosity, exploration, engagement with places and objects,** and **sensory awareness.**

Affective Dimension (A)

Children's excited voice like "*I found spiders and ants! Come and see this!"* and affectionate expressions such as *"I love the big tree! I can hug it!"* highlight an innate emotional connection to living organisms. This **affinity for life** is fundamental to biophilia, suggesting that guided nature walks nurture children's natural propensity for emotional bonding with nature. These statements reflect both fascination and a budding relational awareness. Such responses exemplify how young children's emotional connections with living organisms begin to surface through direct interaction with nature. This aligns with the Biophilia Hypothesis, which posits an innate human inclination to affiliate with the natural world. Supporting this, Speldewinde and Campbell (2023) found that early nature-based experiences foster deeper environmental awareness. These findings underscore the importance of immersive nature experiences in cultivating early environmental stewardship.

Other than that, other children's responses reflected **aesthetic appreciation**, another key aspect of affective dimensions. Phrases such as *"Look at this beautiful flower!"* and "*Look, this is rare – black mushrooms!"* demonstrate an innate attraction to nature's beauty. According to the theory, humans are naturally drawn to the aesthetic qualities of the natural world, which fosters attachment and positive emotional responses (Bardhan et al., 2023; Burgess & Mayer-Smith, 2011). These aesthetic engagements are not merely about admiring nature; they involve cultivating meaningful connections that deepen one's relationship with the environment, consistent with the biophilia hypothesis (Wilson, 1984). This finding is strongly supported by Grant and Pollard (2022), who posited that nature walks foster an appreciation of natural beauty. However, whether such appreciation translates into lasting behavioral changes or heightened environmental stewardship remains an open question.

In addition, children's empathetic remarks in *"Do not pick the small one! Poor them.", "The trash makes it difficult for the trees to survive"*, reflects early development of **environmental empathy and responsibility**. Guided nature walks appear to foster a caring mindset, moving children from mere observation toward ethical concern and stewardship, consistent with the biophilia hypothesis that nurtured biophilic relationships promote conservation ethics. As Liu et al. (2022) and Martin et al. (2020) note, early emotional connections to nature can influence children's attitudes and actions toward environmental conservation later in life. The children's concerns for the well-being of trees and other living creatures represent foundational steps toward developing a lifelong sense of environmental stewardship, highlighting the human inclination to protect and bond with living organisms.

Cognitive Dimension (C)

Children's questions such as *"Why does that tree have no leaves? Is it dead?"* and *"What are those ants doing? It looks like they're greeting each other."* reflect early analytical thinking and a natural inclination to explore and make sense of their environment. These inquiries illustrate biophilia in action, the innate human affinity for nature and the **curiosity** it stimulates. The children's cognitive engagement, as seen through their observations and questions (Kamal et al, 2024), aligns with the Biophilia Hypothesis, which emphasises that direct interaction with nature fosters curiosity-driven learning. Guided nature walks, as demonstrated in this study, offer rich opportunities for inquiry-based learning. When children are encouraged to observe and question the world around them, they begin to engage in processes similar to scientific investigation, such as posing hypotheses, seeking explanations,

and drawing conclusions. This form of experiential learning not only enhances cognitive development but also builds a foundation for future learning in Science, Technology, Engineering, and Mathematics (STEM) disciplines (Abu Yazid, 2021; Speldewinde, 2022).

Experiential Dimension (E)

Children's expressions such as *"Let us track the trails!"* and *"I wanted to show you mushrooms!"* reflect a strong desire to **explore and engage with their natural surroundings**. According to the Biophilia theory, this instinct to explore is innate and essential for forming meaningful connections with the natural world (Wilson, 1984). Guided walks in nature provide opportunities for active participation and unstructured discovery, enabling children to strengthen their sense of belonging and environmental connectedness. These findings align with research showing that such experiences promote children's independence and problem-solving skills (Chawla, 2007; Kellert, 2002). Exploration also encouraged risky play. For example, balancing on a tree log provides opportunities for children to assess risk, build confidence, and engage deeply with their environment (Speldewinde, 2024; Cheng & Monroe, 2012).

The children also demonstrated engagement with familiar landmarks and human-made elements, *"That is our school!"* and *"Look at that tractor!"*. This statement indicates that their **sense of place** includes both natural and cultural aspects of the environment. This holistic interaction promotes place attachment and fosters a sense of belonging, which are key components of long-term nature connectedness (Grant & Pollard, 2022). This reflects the complex and dynamic environments in which many children are growing up, spaces where natural and artificial elements coexist (Amy, 2022). In modern urban settings, reduced access to natural areas may limit opportunities for children to fully connect with nature, potentially influencing their ability to appreciate and bond with the environment (Kamal et.al, 2024; Djonko-Moore et al., 2018).

Furthermore, the children's spontaneous **sensory observations**, such as "*It's so hot today," "I love feeling the grass between my toes,"* highlight the importance of multisensory experiences in nature-based learning. Biophilia emphasises that direct sensory engagement with the environment deepens emotional and cognitive connections (Kellert, 2008). Through guided walks, children had opportunities to see, touch, feel, and move through natural spaces, supporting immersive and affective learning. Sensory awareness was another key theme in children's responses. Statements like *"Let us try to walk on the tree log. It is fun,"* and *"This coconut tree is not tall—we can pick the coconut fruit with our hands,"* demonstrate their active processing of environmental stimuli. Such multisensory interactions are crucial for building ecological literacy and emotional bonds with nature (Speldewinde & Campbell, 2023; Louv, 2008)

Therefore, this study underscores the experiential richness of guided nature walks and supports the Biophilia Hypothesis by showing how direct, hands-on experiences foster children's cognitive, affective, and sensory engagement with the natural world. The children demonstrated empathy, curiosity, and a strong appreciation for their environmental qualities that form the foundation for a lifelong connection to nature. Research affirms that direct contact with the real world is essential for children to develop a deep love and connection to their surroundings (Roberts et al., 2022; Olcoń et al., 2024). These findings highlight the

importance of experiential learning and confirm that hands-on encounters are vital in nurturing children's biophilic relationships with the environment.

Conclusion, Limitations, and Future Recommendation

This study explored how guided nature walks in a suburban Malaysian preschool setting foster young children's connection to nature through the lens of the Biophilia Hypothesis. The most significant finding was that children expressed a strong sense of nature connectedness across affective, cognitive, and experiential dimensions, particularly through curiosity, empathy, and appreciation for living beings. These expressions emerged during open-ended questioning, group discussions, and spontaneous interactions with nature, illustrating how even a single guided nature walk can evoke biophilic responses and early environmental awareness.

By expanding the Biophilia Hypothesis as an educable construct, one that can be intentionally cultivated through early experiences, this study contributes a novel perspective to the field of early childhood environmental education. It illustrates that children's innate affinity for the natural world can be nurtured through structured, developmentally appropriate experiences like nature walks. These guided engagements not only foster children's sense of place and emotional bonds with nature but also support the development of prosocial behaviour, empathy, and environmental responsibility (Liu et al.,2022).

Nature walks in biodiverse areas were shown to be especially impactful. Such experiences promote curiosity, mood enhancement, and focus while cultivating environmental stewardship (Bardhan et al., 2023; Faber & Kuo, 2019; Veitch et al., 2020). Immersing children in local ecosystems lays a foundational connection to nature that can support lifelong attitudes and behaviors aligned with sustainability (Soga & Gaston, 2024; Wong, 2019). While nature walks alone may not guarantee transformative change, they serve as accessible, low-cost starting points to foster environmental awareness, empathy, and agency in addressing ecological challenges (Van Heel et al., 2023; Chawla, 2020).

This study therefore recommends that early childhood programs intentionally embed nature-based learning, such as guided nature walk activities, into curriculum planning. In addition, educators can enrich these experiences through open-ended questioning, storytelling, reflection, and opportunities for child-led exploration. Next, professional development is essential to support teachers in identifying and strengthening biophilic tendencies in children, especially in varied ecological and cultural settings.

However, several limitations should be noted in this study. The small sample size and single-site setting limit the generalisability of findings. Additionally, the activity was conducted on a sunny day, which may have influenced the children's level of engagement and enthusiasm. Moreover, the observation of individual reflection in young children relied on verbalized expressions, which may not fully capture internalised responses.

Therefore, future research should examine the long-term effects of repeated nature walks on children's environmental identity and connectedness. Comparative studies between guided and free exploration could offer insights into the pedagogical value of each. Furthermore, strategies for adapting and scaling nature walk programs in diverse contexts,

urban vs. rural, biodiverse vs. built environments, should be explored. Future work might also investigate how nature-based learning influences children's understanding of complex environmental issues such as biodiversity loss and climate change. Such insights can inform the development of early childhood programs that not only foster nature connectedness but also empower children with a strong sense of environmental agency and resilience from a young age.

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Conflict of Interest Statement
The authors declare no conflict of interest.

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