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Unpacking Determinants of Middle-School Children's Direct Nature Experiences (DNEs): An Island Perspective

Faruhana Abdullah
Universiti Sains Malaysia, Malaysia
Maldives National University, Republic of Maldives

Nor Asniza Ishak*
Universiti Sains Malaysia, Malaysia

Mohammad Zohir Ahmad
Universiti Pendidikan Sultan Idris, Malaysia

Abstract. This study aimed to explore and understand the contextual factors that influence nature experiences amongst 11–12–year–old children in their local island environments of the Maldives. The study adopted a qualitative phenomenological approach using semi-structured focus group interviews, held online, with seven groups, one per island environment. A total of 34 children participated in the interviews, with 4–6 children per group, recruited purposively based on inclusion criteria. The interviews were transcribed, and a thematic analysis was carried out. The analysis demonstrated that children's nature experiences were primarily influenced by preferences, opportunities, constraints, and freedom, of which opportunities have the greatest influence. Similarly, constraints deter the use of available opportunities, regardless of where children live. Females appear to have more constraints on their nature experiences than males. Children must be facilitated with meaningful opportunities for DNEs to overcome constraints and motivate nature engagement. Schools must play a proactive role in facilitating these experiences to foster nature connections to ensure the success of their sustainability targeted curricular objectives. While the subject of DNEs has a wide place in the literature, the lack of studies in the field of education for sustainable development (ESD) increases the importance of this study. The findings can guide the promotion of ESD as a pathway to a sustainable future in the country. Future research should examine barriers to children's DNEs at the school level.

Keywords: children; contextual factors; direct nature experiences; island environments; Maldives

* Corresponding author: *Nor Asniza Ishak, asnizaishak@usm.my*

1. Introduction

A deficit of direct nature experiences (DNEs) and its consequences is the subject of current scholarly concern. DNEs, which involve direct contact or physical, multisensory engagements with natural elements (Beery & Lekies, 2021; Gaston & Soga, 2020) in childhood, are especially pivotal for establishing lasting human-nature relationships that underpin several of the United Nations' Sustainable Development Goals (SDGs). Thus, efforts towards attaining sustainability must also focus on reconnecting people with nature (Charles et al., 2018; Ives et al., 2018). In particular, Goal 4 of the SDGs stipulates the necessity of inclusive and quality education for all and the promotion of lifelong learning; Goal 4.7 targets promoting sustainable development (SD) through education for sustainable development (ESD). Thus, "this education and lifelong learning must necessarily be connected to the living earth" (Charles et al., 2018, p. 41).

ESD embraces a transformative approach to teaching and learning that strives to equip learners with the competencies necessary for lifelong sustainable behaviours. Thus, schools in many countries – including Germany, Macau, the United States (Müller et al., 2021), Sweden and Japan (Fredriksson et al., 2020) – are embracing this approach to education. Promoting ESD is especially crucial for small island states such as the Maldives, which are the most vulnerable to the accelerating climate change crisis. In the Maldives, the National Curriculum Framework (NCF) provides a comprehensive framework for promoting ESD through its key competencies, learning areas, and pedagogical approaches (Di Biase et al., 2021). Particularly relevant to this study is its key competency, *Using Sustainable Practices,* which aims "to raise awareness to engage in sustainable practices and learn conservation for the future" (National Institute of Education [NIE], 2014, p. 19). It is envisaged that through this key competency, learners will acquire the knowledge, skills, values, and attitudes necessary for taking care of their environment and will be motivated to become future stewards of the natural world. Meanwhile, scholars strongly recommend the improved application of learner-centered approaches as a basis for transitioning towards ESD in the Maldives (Di Biase et al., 2021). However, successful ESD also requires revising educational curricula with a view to increasing nature experiences to redress waning human-nature relationships (Ives et al., 2018; Selby, 2017). Yet, environmental education in the Maldives lacks experiential learning and a sense of place related to children's local natural environment (N. Mohamed & Mohamed, 2021).

Historically, rich everyday experiences with abundant natural surroundings have enabled Maldivian children to learn and connect with nature in a myriad of ways. This contextualized, experiential learning laid the groundwork for sustainable practices in the country. In contrast, disturbing trends towards a reduction in DNEs among children are emerging. For example, children learn about nature and its values primarily through schoolbooks that emphasize global knowledge (M. Mohamed, 2012). Generations of children are becoming separated from their traditional island lives, subsequently reducing their nature interactions. Observed unsustainable practices, including abuses of nature by today's youth (M. Mohamed et al., 2019), suggest a progressive state of decline. Importantly, the frequency of children's DNEs has been found to differ significantly based on

where they live, with children outside the capital city tending to experience nature more frequently (Abdullah et al., 2022a). While such trends have been attributed to factors such as migration to the capital for better childhood education (M. Mohamed, 2015; M. Mohamed et al., 2019) and differences in available opportunities (Abdullah et al., 2022a), the true determinants of DNEs among Maldivian children remain uncertain. Thus, this study aimed to explore and understand the contextual factors that influence nature experiences amongst 11–12–year-old Maldivian children in their local island environments.

2. Literature Review

2.1 Worrying Trends in DNEs among Children

Regular DNEs, particularly with children's daily environments, can establish baselines of nature conceptions. A lack of positive DNEs or continuous exposure to nature destruction can cause negative shifts in the baselines of accepted nature norms, such as increased tolerance to environmental degradation that can worsen over time or with each generation (Papworth et al., 2009; Soga & Gaston, 2018). Thus, the progressive decline in human-nature interactions, or an *extinction of experience* in many countries, is deeply concerning (Colléony et al., 2020; Gaston & Soga, 2020; Soga & Gaston, 2016). Evidence supporting a decline in DNEs among children includes a reduction in time spent outdoors (Larson et al., 2018; Skar et al., 2016; Soga & Gaston, 2016), less free play in and use of nearby nature places (Gundersen et al., 2016) and reduced frequency of DNEs (Soga et al., 2018; Zhang et al., 2014). While this change is not always evident (Muslim et al., 2017), trends in nature experiences often depend on where children live. For instance, children in less urban areas tend to engage in more frequent DNEs than those in urban areas (Abdullah et al., 2022a; Muslim et al., 2019; Soga et al., 2018; Zhang et al., 2014). Furthermore, perceived negative trends may be related to the types of experiences rather than their frequency (Larson et al., 2018; Novotný et al., 2021). Concurrent with these debates are calls to increase childhood DNEs as a means to tackle the widening disconnect between people and nature and to ameliorate the ensuing negative effects (Charles et al., 2018). In order to do so meaningfully, it is first necessary to understand what factors influence children's DNEs.

2.2 Determinants of DNEs among Children

The main determinants of children's DNEs are sometimes broadly categorized as *opportunities* or *orientations* (Soga et al., 2018; Soga & Gaston, 2016). Opportunities constitute possibilities for interactions with nature in terms of time and space (Soga et al., 2018) that tend to decline with urbanization (Imai et al., 2018; Muslim et al., 2019; Mustapa et al., 2018; Soga et al., 2018; Zhang et al., 2014). Urbanization-imposed barriers to DNEs include a loss of access to nature due to a depletion of wildlife (Kai et al., 2014), increased distance to nature spaces (Colléony et al., 2020; Soga & Gaston, 2016), logistics of city design and spatial barriers (Kellert et al., 2017). Although cities can typically present more barriers to DNEs (Freeman et al., 2018), some may nevertheless offer ample opportunities for DNEs (Almeida et al., 2018; Charles et al., 2018; Freeman et al., 2018). Such findings demand serious consideration, given the long-term impacts of DNEs on learning and future global conservation (Kellert et al., 2017). In fact, the latter may increasingly depend on city dwellers' connections with nature through interactions with urban species

found within city limits, a concept coined as the "*Pigeon Paradox*" (Dunn et al., 2006 p. 1814).

Opportunities for children to experience nature are often hindered by the restrictions of everyday life, regardless of their natural surroundings. In this regard, parental involvement poses a primary deterrent to children's DNEs by restricting children's autonomy of movement ranges, destinations, time spent outdoors, and personal lifestyle (Freeman et al., 2018; Hand et al., 2018) as well as close supervision (Larson et al., 2011). These constraints may be related to traffic and safety concerns (Skar et al., 2016), socio-cultural values (Evans et al., 2018; Freeman et al., 2018, 2021; Soga et al., 2018) or both. Contrasting findings suggest contextual differences in restraints. For instance, time pressure due to organized activities and increased homework presents major barriers for Norwegian children's DNEs (Skar et al., 2016), but not for Japanese children (Soga et al., 2018).

Orientations involve feelings or emotions (Soga & Gaston, 2016) that can dictate how opportunities are utilized (Hand et al., 2018; Larson et al., 2018; Soga et al., 2018; Soga & Gaston, 2016). A decline in DNEs among children is sometimes driven by a *loss of orientation* towards engaging with nature, rather than a loss of opportunities. A *loss of orientation* reflects a disconnect with nature that decreases motivation (Soga et al., 2018; Soga & Gaston, 2016) or biophilia that discourages engagement with biodiverse spaces (Hand et al., 2017). Notably, the latter view has been contested (Fattorini et al., 2017).

The loss of orientation is often associated with manifestations of modernization, particularly increasingly sedentary lifestyles (Kellert et al., 2017) and substitution of DNEs with digitally-mediated engagements (Ballouard et al., 2011; Kellert et al., 2017). Sometimes, children prefer to engage in screen-based activities (Larson et al., 2018) or sports (Mustapa et al., 2018) rather than DNEs, even while outdoors. Nonetheless, children's use of screen-based media is not always negatively associated with the extent of their DNEs (Soga et al., 2018). Other studies not only support a greater inclination towards indirect and vicarious nature experiences but also show that such experiences contribute more to children's connectedness to nature (CTN) than DNEs (Mustapa et al., 2019). Additionally, family members' attitudes, gender differences (Soga et al., 2018), and fear for personal safety, danger, and crime (Adams & Savahl, 2015) can influence children's orientations towards nature.

Undoubtedly, several contextual factors either impede or promote children's DNEs. Identifying barriers is important as they often have deep-seated origins in children's daily lives that marginalize DNEs and may be difficult to break down once they are established (Moss, 2012). However, to mitigate the reduction of nature experiences, it is also imperative to identify drivers that motivate children to engage with nature (Soga et al., 2018). In particular, culturally-rooted transformations must be identified in order to optimize nature connections (Novotný et al., 2021).

Unpacking the determinants of DNEs is particularly crucial in the Maldives for several reasons. Limited studies suggest emerging negative trends in DNEs and

relationships with nature among Maldivians, entwined with transitioning from rural to urban areas and modern lifestyles that conflict with the intrinsic culture of the Maldives (M. Mohamed, 2012, 2015; M. Mohamed et al., 2019). Subsequently, the perceived value of nature is changing from sustainable resources to extractive uses or recreation (M. Mohamed, 2015). Unlike in the past, current nature interactions take a more formal route based on the NCF, aimed at inculcating robust pro-conservation competencies from childhood as a step towards attaining SD (NIE, 2014). However, engaging children in stimulating DNEs in formal, non-formal, or informal contexts can be particularly challenging considering the ever-increasing congestion, societal issues, and human-altered environments prevalent on most islands. As already noted, environmental studies in the Maldives lack direct, contextual experiential learning from local nature, which is critical for building children's nature connections, knowledge, and values associated with local environments (M. Mohamed, 2012; N. Mohamed & Mohamed, 2021). Indeed, children's DNEs have significant direct effects on their biodiversity knowledge and attitudes, which influence their willingness to conserve biodiversity. These effects can have implications for future biodiversity conservation (Abdullah et al., 2022b). Therefore, identifying the determinants of DNEs among Maldivian children is urgently needed to facilitate impactful DNEs, to bring about effective changes to current practices in an educational context, as well as to harness other benefits of these experiences. This study adds new knowledge to the understudied area of children's DNEs in the context of small islands, especially the Maldives, which face multiple challenges to SD. In particular, while the subject of DNEs has a wide place in the literature and is an essential requisite for SD and ESD (Charles et al., 2018; Ives et al., 2018; Selby, 2017), the lack of literature from the perspective of children following a curriculum structured around ESD, as in the Maldives, increases the importance of this study. This study identified contextual determinants of DNEs among Maldivian children that are not well documented in literature. This information can contribute to enabling DNEs in nature spaces within everyday use areas through pedagogical shifts and informal means to foster strong connections with nature to achieve the sustainability-targeted goals of the Maldivian NCF as well as long-term SD.

2.3 Theoretical Framework

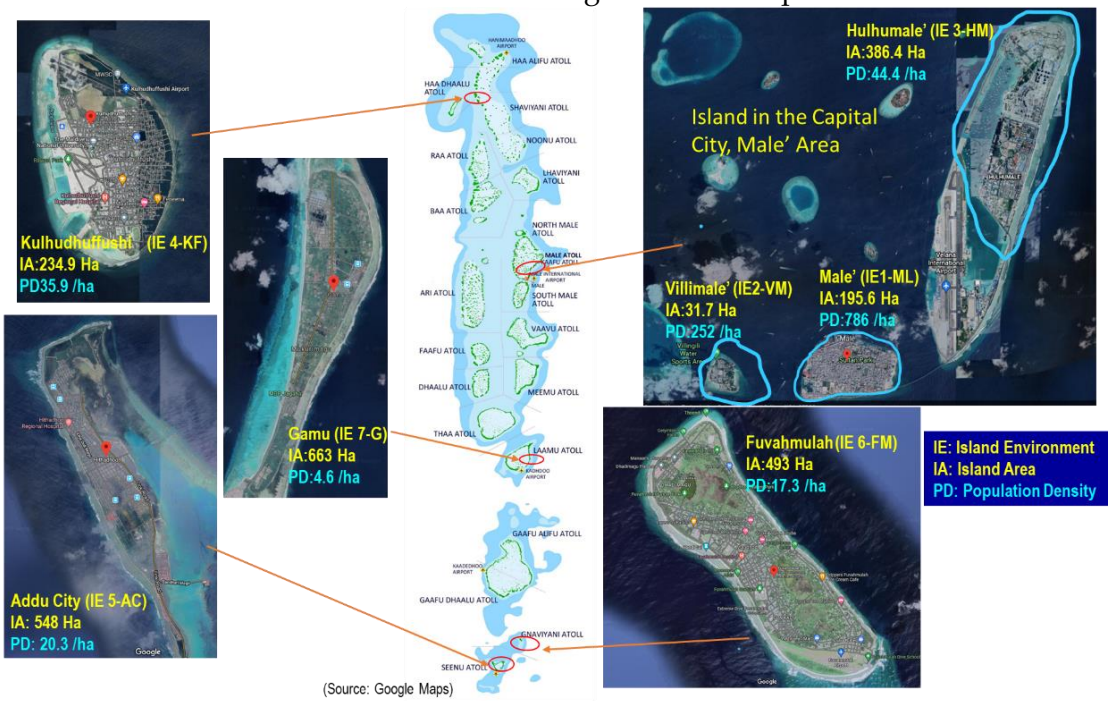
This study, being part of an in-depth study of children's DNEs in the Maldives, is primarily supported by the modified Experiential Learning Theory (Morris, 2019) and the model of modes of nature experiences and learning in childhood development (Kellert, 2005), both of which emphasize the importance of contexts of experiences in learning and outcomes. In this framework, the island environments where children reside provide the contexts of experiences and are expected to determine how children experience nature. The emphasis on contextually rich experiences is further supported by the philosophy of place-based education. Advocates of this philosophy recommend that place-based education should form the basis of environmental education, in which children are immersed in personal, real-world experiences of the local environment to enable them to truly understand, connect, and engage with local environmental problems for a sustainable future (Di Biase et al., 2021; N. Mohamed & Mohamed, 2021; Ontong & Grange, 2014).

3. Methodology

This study employed a qualitative phenomenological approach to explore and understand the contextual factors that influence children's nature experiences among middle-school children in their local islands of the Maldives. Children's nature experiences are often influenced by their natural surroundings and personal circumstances and are subject to personal interpretation (Adams & Savahl, 2015; Freeman et al., 2018). To examine such phenomena, authors recommend using qualitative, open-ended approaches to data collection and analysis (Cohen et al., 2018; Creswell & Plano Clark, 2018). This study used focus group interviews (FGIs) to gather data. FGIs involve a series of carefully planned open-ended, face-to-face interviews with a selected group of participants, aimed at eliciting personal views and opinions on the chosen topic (Creswell & Plano Clark, 2018; Krueger & Casey, 2015) and gathering a large amount of rich data within a limited time frame (Krueger & Casey, 2015).

3.1 Study Locations

This study was conducted on seven islands in the Maldives. Each island represents a different island environment (IE) type. The Maldives was chosen for this study, considering the lack of experiential learning of nature among Maldivian schoolchildren (N. Mohamed & Mohamed, 2021) and the significance of these experiences for successful ESD and SD. The island types were based on a combination of local natural spaces, island area, population density, and developmental criteria. The codes for the islands, their names, and their locations are shown in Figure 1. The codes are in order of decreasing population density and increasing natural spaces. Each island was expected to present specific contextual factors that influence children's regular nature experiences.



Note: IE- Island Environment or Island types

Figure 1. The Study Sites in the Maldives

3.2 Participants and Sampling

The sample for this study consisted of 34 children (15 males; 19 females), aged 11–12 years, from public schools in the seven IEs. Public schools were chosen to ensure a common national curriculum and minimize the effects of pedagogical differences.

Middle childhood (6–12) years are particularly suitable for studying DNEs because children of this age are the most responsive to nature experiences. They can interact with nature in multiple ways and levels that enhance positive outcomes (Little & Derr, 2018). Furthermore, responses increase from 7–10 years, peak at around 10 years, level off from 10–14 years and then decline (Otto et al., 2019). The age range of 11–12 years was chosen due to the assumption that children at the higher end of middle childhood would have greater independence to enjoy some unsupervised nature experiences. This is an important factor that influences positive outcomes (Freeman et al., 2018; Hand et al., 2018). Also, they may communicate more comprehensively than younger children.

According to the literature, the recommended number of participants for focus group interviews (FGIs) varies from 4 to 12, depending on the study. Authors recommend including 6 – 8 (Creswell & Plano Clark, 2018) or 5 – 8 (Krueger & Casey, 2015) participants per group. However, the purpose and nature of the study determines the sample size and type in qualitative research, rather than the numbers. Furthermore, since the aim of FGIs is to understand and gain insights regarding a situation rather than making generalizations, group composition is also often determined by the nature of the study. In this study, each focus group consisted of 4–6 children chosen purposively from one school on each island, based on inclusion criteria. The sample was homogenous in terms of age, fulfilling the most important inclusion criteria for children in FGIs (Krueger & Casey, 2015). Other inclusion criteria included knowledge, cognition, and communication levels (Gibson, 2007). These criteria were explained to the appropriate teachers in the schools, who screened and selected the participants.

3.3 Data Collection Tool

Data for this study was gathered using semi-structured focus group interviews. The interview guide (see Appendix 1) consisted of seven key questions, which were mainly open-ended, aimed collectively and primarily to elicit subjective information on the contextual factors that influence children's nature experiences on their island. One question used photographs of local nature places that children may encounter. The questions focused on what the children most commonly like to do with their time; favourite living things; favourite places to visit; surrounding nature places; what children do while in natural places; best things about natural places; and visits to specific places. Follow-up questions and probes were also used for clarification and detail.

3.4 Reliability and Validity

Validity and reliability in qualitative research center around trustworthiness, or the confidence of readers in the findings of the study. The most widely used criteria to assure trustworthiness are credibility, transferability, dependability, and confirmability, which were introduced by Lincoln and Guba in 1985. Each of

these criteria may be met using several strategies, which may overlap (Korstjens & Moser, 2018; Nowell et al., 2017). Credibility ensures the accuracy of findings (Korstjens & Moser, 2018). To this end, Leung (2015) recommends determining the suitability of the tools, processes, and data. Hence, prior to the interviews, the content validity of the interview guide was established by two independent experts who assessed the appropriateness of the questions for the targeted objectives. A pilot study was run to determine the suitability of the questions for children of this age and assess time requirements. This also gave insights into the researcher's limitations as an interviewer and helped to ensure better engagement during the data collection. The interview transcripts were read repeatedly to become immersed in the data, thereby enhancing the credibility (see Korstjens & Moser, 2018).

To ensure transferability, or its application in other contexts, rich, contextual descriptions of data and details of the study can be provided (Korstjens & Moser, 2018), as in this study. Dependability, which is closely linked to credibility, includes aspects of consistency or reliability. Dependability can be ensured through clear, logical documentation, while confirmability can be ascertained by establishing credibility, transferability, and dependability (Nowell et al., 2017). To enhance reliability, deviant cases were included (see Leung, 2015), and the data, process of data analysis, and product were rigorously verified for appropriateness and accuracy through constant comparison. To ensure trustworthiness, an audit trail of the coding process, including the derivation of themes and interpretation, was maintained along with definitions and exemplars (see Leung, 2015; Nowell et al., 2017). The quality of this process was further confirmed by two independent experts in the field. Because the data analysis was guided by Braun and Clarke's (2013) thematic analysis framework, the experts used a checklist of 15 criteria, compiled by the same authors in this external audit.

3.5 Research Procedure

This study was approved by the ethics committee of Universiti Sains Malaysia. Permissions were also obtained from the Ministry of Education, schools, participants, and parents in the Maldives. Verbal assent was obtained from the children to record video of the interviews.

Although face-to-face interviews were preferred, the interviews for this study were conducted online using Google Meet, due to the restrictions of the COVID-19 pandemic. The platform and meeting time were chosen by the responsible teacher in each school. One FGI was held per IE, with four to six children in each group. All interviews were conducted by the first author, using the interview guide prepared (see Appendix 1) and following a protocol based on the guidelines for FGIs by Krueger (2002). In summary, this protocol included introductions; explaining objectives; establishing ground rules; providing instructions; and discussions based on the interview questions as well as ensuring that all participants were engaged in the discussions. The interview guide questions helped to create a more focused pathway for exploring the topic. Questions were rephrased and repeated as required, and probes were used where necessary to maintain a continuous flow of conversation. Most children communicated well and freely expressed their thoughts, although a few showed some hesitancy,

possibly because the interviews were online and were being recorded. Children were made to feel as comfortable as possible and were assured of confidentiality being maintained. The responsible teacher was available throughout the interviews to ensure the safety of the children and to address any issues that arose. The interviews were conducted in English, as preferred by the children, although they were free to speak in their first language. Video recordings of the interviews were made, and notes were written. There were limitations to visual observations because some children were shy and preferred to keep their video switched off. Every effort was made to involve all participants in the discussion. Each interview lasted approximately 45 minutes. Interviews were stopped when no new information was being generated (i.e., saturation was reached), as recommended (Krueger & Casey, 2015).

3.6 Data Analysis

The focus group interview data was analysed based on the six-step framework of Braun and Clarke (2013). This framework is particularly suitable for thematic analysis due to its clarity and flexibility. The analytical steps included (i) transcribing, reading, and familiarizing the data; (ii) generating initial codes; (iii) identifying patterns (themes); (iv) reviewing and refining themes; (v) defining and naming themes; and (vi) writing the final analysis. The process applied is summarized in Figure 2.

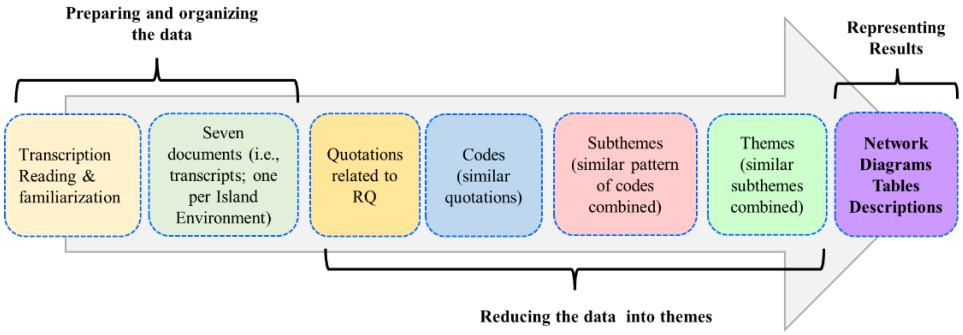


Figure 2. A Summary of the Thematic Analysis Process Used in the Study

Note: The figure is adapted from Ghasemy (2019).

For the thematic analysis, the interview recordings were first transcribed verbatim into word files by listening to the recordings and checking repeatedly against the recordings to ensure accuracy. The transcripts were imported to Atlas.ti 9 for analysis, including coding, generating themes, maintaining notes, and creating network diagrams. A network diagram created using Atlas.ti 9 is shown in Appendix 3. This visual map enhanced understanding of the relationships among all codes, subthemes, and themes.

The data set was comprised of seven transcripts, one per island. Each transcript was read repeatedly for familiarization with the data corpus as well as to identify points of interest and generate initial codes. The coding process, for the most part, was researcher derived, in that there were no pre-set codes and it focused on identifying and understanding contextual factors that drive children's nature experiences based on meanings of data. Since a few codes were also identified

from the data itself based on their explicit meaning, the analysis was also partly data-driven (see Braun & Clarke, 2013).

Following initial coding, codes that represented similar concepts were collapsed. After meticulous comparison of codes against the transcripts, revisions, and refinements, some codes were combined into broader subthemes based on the similarity of their underlying concepts. Similar subthemes were collapsed into themes. Each subtheme captured a specific aspect of the central organizing concept of a common theme. Upon confirming themes, names were finalized and defined to specify the focus and boundaries of the theme (see Braun & Clarke, 2013). To illustrate this process, the sources of the codes and the ways in which they were merged into subthemes for the theme, *opportunities,* are shown in Figure 3. This process was utilized to derive all the factors. Details of codes, definitions, and related information were maintained in a Microsoft Excel 2010 matrix for ease of sorting and cross-checking, as well as to maintain a transparent and comprehensive trail to ensure consistency in the analysis process. The theme derivation process and analysis were constantly verified through constant comparison and finally vetted by independent experts to ensure trustworthiness. A summary of the analysis with examples of quotes is presented in Appendix 2.

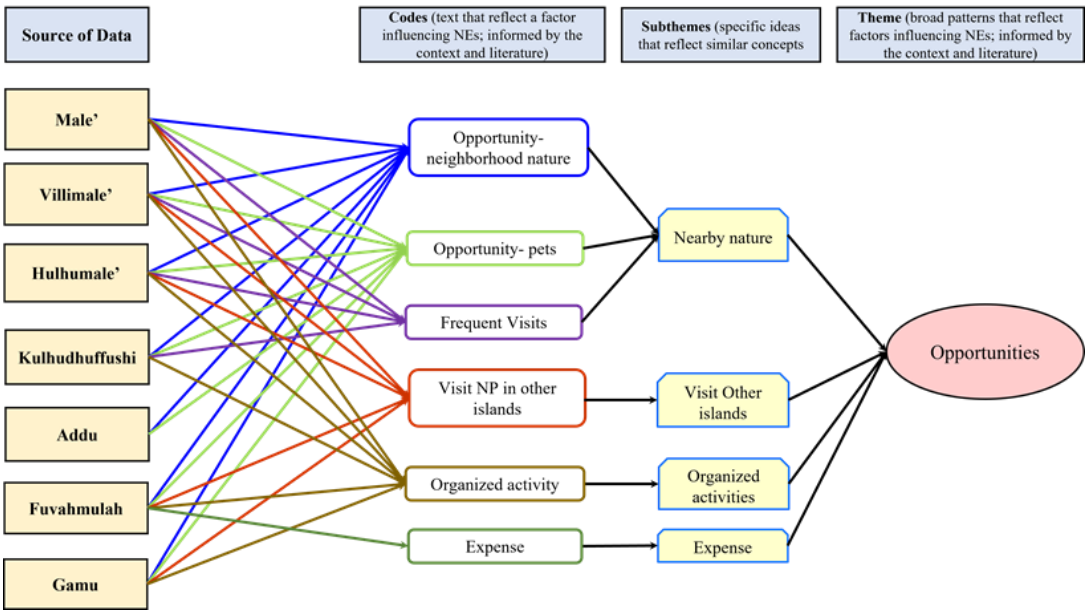


Figure 3. The Sequence of Deriving Themes

4. Findings

The demographic profile of the participants and Island Environment (IE) Codes are detailed in Table 1.

Table 1: Demographic Profile of Participants

Island Environment (IE)	Code for IE	Island Name	No in school chosen	Gender		No of children
				Boys	Girls	
IEs of Male' (Capital City)						
IE1	ML	Male'	187	3	1	4
IE2	VM	Villimale	66	3	2	5
IE3	HM	Hulhumale	147	1	4	5
IEs outside Male' (Capital City)						
IE4	KF	Kulhudhuffushi	74	1	5	6
IE5	AC	Addu City	94	2	2	4
IE6	FM	Fuvahmulah	111	3	2	5
IE7	G	Gamu	63	2	3	5
		Total	742	15	19	34

The thematic analysis identified four overarching themes, namely *preferences*, *constraints*, *opportunities*, and *freedom*. Each theme represented a broad category of contextual factors that influence children's nature experiences. Figure 4 shows a simplified illustration of all the subthemes and themes. Details are provided in Appendix 2.

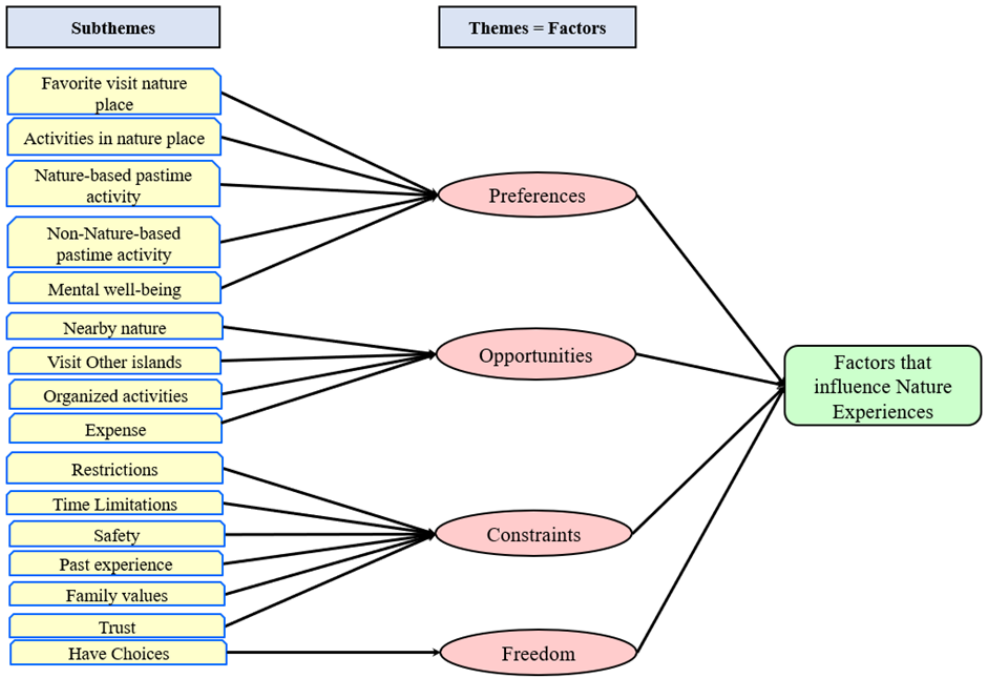


Figure 4. Main Themes and Subthemes from Thematic Analysis Depicting Factors that Influence Nature Experiences

The subthemes can be considered as dimensions of factors. The network diagram connecting all themes, subthemes, and codes, as shown in Appendix 3, was used in understanding patterns and relationships among the factors. For contextualization, clarity, and depth of discussion, pseudonyms assigned to participants (island code and number given to the participant) and gender were

sometimes used. In the discussion, *capital IEs* refer to those islands in the capital city (see Table 1 and Figure 1). Only exemplary quotes are included in the findings.

Theme 1: Preferences

Preferences captured what children liked to do during their free time while in nature places (NPs) or outdoors. Preferences included five sub-themes: *favorite visit nature places*; *activities in nature places*; *non-nature-based pastimes; nature-based pastimes*; and *mental well-being*.

Favourite visit NPs included places children liked to visit. On all islands, most children mentioned marine NPs, particularly the beach. A few children chose to visit the reef and underwater, as voiced by a child from Villimale:

> *"I like to go to the coral reefs because they are very colourful, and they are host to various sea creatures."*

Some children from outside the capital IEs mentioned mangroves or lakes [locally synonymous with mangroves] and woods as their favourite non-marine NPs. Within the capital IEs, children liked to visit gardens and parks:

> *"I like to go to the beach as well and also gardens and parks." (ML1)*

> *"They [children living in flats] can have a lot of garden space when they have a flat." (HM3)*

Activities in NPs captured what children liked to do while in NPs. Children often named *nature-based activities*, including swimming, fishing, and exploring; exploring often involved looking for animals and plants:

> *"I just usually go for swimming." (FM5)*

> *"[I] Like to find new fishing spots." (KF6)*

> *"[I] Like exploring that, the place." (AC4)*

> *"Observe all the new types of plants I haven't seen, [and] see the different insects and animals in the beach." (ML2)*

Children also liked to interact with plants, collect pebbles or rocks, play with sand, climb trees and fish:

> *"I smell some flowers… give water to plants." (ML1)*

> *"Pick flowers and small pebbles." (KF4)*

> *"Build a sandcastle bigger than Mount Everest." (HM4)*

> *"When I'm in my island near big trees I'd climb on trees." (HM2)*

> *"[I] Like to find new fishing spots." [KF6]*

Another child explained,

> *"If it was an animal, I don't touch it but if it is a flower and stuff, I touch it."*

A few children mostly enjoyed relaxing in nature, while some removed trash:

> *"I like to just sit on the bench and feel the breeze." (ML2)*

> *"I usually pick up the trash underwater." (VM)*

Pastime activities examined time-use patterns routinely, rather than on occasions when they visited nature places. Some children preferred *non-nature-based* activities while in natural paces. These revolved around enjoyment rather than an interest in nature itself. Examples include taking photographs, canoeing, walking around, playing, riding bikes, and sightseeing, often with friends or family:

> *"I'm taking some photos of the trees, and animals." (G5)*
>
> *"We rode bicycles. We go there [to the park] for breakfast in the club, like a family, so we have a lot of fun there." (HM1)*
>
> *"I was with my family venturing [in woods], you know sightseeing the place a little." (HM4)*

Many children spend their free time doing *non-nature-based pastimes*. Reading books was common on all the islands. Others enjoyed sports, hobbies, time with family or screen-based games:

> *"I do a lot of craftwork during my free time." (AF4)*
>
> *"I kind of like dabble in photography a little." (FM1)*
>
> *"I have a really extended family. Most of the time I play with my cousins." (HM3)*
>
> *"Play Minecraft." (AC1)*

Some girls in the capital IEs engaged in family responsibilities during their free time.

> *"I normally like read books and in my sometimes free times I just take care of my little sister. She's just a little baby so I thought of taking care of her while my mom is working. Just like help her a lot. That's why." (HM, girl)*

Nature-based pastimes characterized children's preferred nature-engagements during their free time. Playing with pets was the most favoured activity on all islands. Others include fishing.

> *"I mostly play with my pet birds and let them explore around my house." (KF5)*
>
> *"I like to go fishing, because it is my hobby." (KF6)*

A few children in the capital IEs liked to visit islands or sandbanks; others preferred garden-related activities. Examples include,

> *"I go outside with my family to a trip; to someplace like a little island or sandbank and stuff." (HM3)*
>
> *"There are potted plants in my house, I water them." (VM5)*

Mental well-being considered children's enjoyment of nature because of an underlying feeling of freedom or well-being. A child from one of the most diverse islands said that he liked camp so much because "*we can do whatever we want*" *(FM2)*. Some children visited NPs "*To have a peaceful mind*" *(KF2)* or because "*I feel better*" *(KF1)* or "*it is so relaxing*" *(ML1).* The emotional expressions below, made by children from the capital IEs, are especially noteworthy:

> *"I like open spaces, not crowded spaces, so like... I just like to run around and stay or walk in open spaces, like open spaces and natural spaces." (HM5)*

> *"Mostly, I prefer being by myself. I live in a very crowded family, so I prefer being alone you know. Looking out the window" [because] "I can see the ocean. And the moonlight. I mostly enjoy being by myself admiring the world around me." (HM4)*

Theme 2: Opportunities

This theme encompassed elements that enabled nature experiences in various ways and contained four sub-themes: *nearby nature*, *visit other islands*, *organized activities,* and *expense*.

Nearby nature incorporated children's accounts of neighbourhood NPs, or life forms that facilitated nature experiences. The most frequently mentioned neighbourhood NP was the beach on all islands. However, children living outside capital IEs described more indigenous wild nature spaces, as illustrated by:

> *"We have two lakes." (FM4)*
>
> *"Our mangrove is the biggest mashi [clay] mangrove in Maldives." (KF4)*
>
> *"Futtaru." (Rocky inter-tidal area) (KF1)*

Nearby nature also favoured opportunities for independent explorations such as "*Going into the woods myself" (AC1)*. This setting also provided interesting experiences for children, such as, "*I also did catch a chicken and five chicks" (FM1)*. Indigenous species in children's neighbourhoods enabled valuable observations about local biodiversity, such as the white tern, [a unique bird in Addu] and snails in Gamu:

> *"[white tern] sleep on trees… eat raw fish … they are always migrating. They live at a lot of places." (AC4)*
>
> *"Snails [are found] in the roads, when it's raining" [G3]* [and] *"In the bandharu [harbour], also lot of them live near the beach." [G1]*

Another memorable experience:

> *"It's [mangrove] very muddy… but sometimes you feel like you are going down in the mud. You can't stay up. There are a few places where you can tend to get stuck. It won't drag you down, but it will just stop you from moving too much." (FM1)*

Unlike children outside the capital IEs, for children in the capital neighbourhood, NPs commonly include managed nature, such as parks or home gardens:

> *"There is a park near my house and there's a lot of like gardens, even my mum plants stuff in the balcony, and also, behind our house there is a park and a lot of trees." (HM5)*

Nearby nature may facilitate opportunities for frequent DNEs:

> *"I'm able to go as much as I like." (HM5)*
>
> *"One time a day. For fishing." (KF6)*

Although there were a few exceptions, a common form of *nearby nature* on all islands was pets.

> *"I have pigeons and budgies." (KF5)*
>
> *"Ringnecks and macaws." (G5)*

"Goldfish, carp, angelfish, fighter fish." (AC3)

"I have many fishes. Like around 1, 2, 3, 4, 5 tanks." (ML3)

"I have 12 rabbits and 2 ducks and 3 chicken." (KF3)

Visiting other islands provided exceptional and momentous opportunities to experience pristine nature outside of children's resident islands:

> *"I often go to sandbank with my family and stuff, and islands and stuff. Now I often go to there to the beach and like sandbank and islands. I actually didn't know what it.. actually exists. My aunt told me that we are going to the sandbank; I really didn't know what it was. I thought it will be a bank with sands actually (laughs). Then when I wented there, it was really beautiful. It's like a beach but there are no stuffs. It's full with sands. And when the sun goes down its really beautiful view." (HM3, boy)*

The quote above also exemplifies *organized activities*, i.e., opportunities for experiencing nature facilitated by adults. Other examples include a scout trip and a fieldtrip organized by the children's school, although the school-facilitated nature-based activities mentioned were rare.

Another subtheme of opportunity was *expense*. Although mentioned only once, regarding a visit to the neighbouring Nature Park by a child in Fuvahmulah, the quote below suggests that taking part in activities involves renting resources; hence, expense was important enough to retain as a subtheme.

> *"The person in the counter gives us a certain time to rent anything and then they give us a time for the activities."*

Theme 3: Constraints

The underlying pattern in *constraints* was barriers to children's nature experiences. The sub-themes included *restrictions*, *time limitations*, *safety*, *past experience*, *family values,* and *trust*. *Restrictions* encompassed adult-imposed limits on children's experiences. Parental influences were prominent in many explanations by some children about visiting nature places:

> *"I always ask my parents and if they give permission, I always go with them, or either one of my family members. I don't go without everyone else." (ML2)*

> *"I can go to some places alone, sometimes" but "I can't go to like faraway places without my parents." (G4)*

The extent of parental influence is well-portrayed in this interesting exchange between two children from Fuvahmulah:

> *FM1: "I never did try [to go out by myself] because I know I'll ultimately fail."*
>
> *FM2: "No. Parents are always worried."*
>
> *FM1: "Yes and that's why I'll ultimately fail. My parents will get worried."*

One child mentioned "*My mother doesn't like me touching animals*." *(FM4)*

Time limitations included instances where children occupied their time in activities over which they had no choice. These constraints were sometimes linked to everyday life events, such as studying, having busy working parents or family responsibilities, for instance:

> *"I use it [my time] to study." (VM2)*

> *"I can't go most of the times because as sometime my mother and my family's really busy doing their jobs." (HM3)*

> *"As for me, I normally babysit and when I'm free I do a lot of many things, like cooking, eating, cleaning and stuff. I go very rarely because I have a lot of small siblings and it takes a lot of time to make them ready to go somewhere and when once my mom gets my little sister ready and goes to make my little brother ready, my sister's gonna make a big mess and it's gonna take a long time to do all that." (HM2, girl)*

Remarkably, none of the boys on any island mentioned family responsibilities.

Another constraint to children's nature experiences was *safety*, which embodied elements of risk of injury or harm, fear, danger, or avoidance. Most safety-related constraints were levied by adults. For instance, children were not allowed to go alone to NPs "*for our safety reasons*" *(ML2)*, because "*it's dangerous*" *(AC2)* or "*we might get hurt*" *(ML3)*.

Personal fears, worries or negative perceptions also added to constraints:

> *"I'm personally scared to go to picture 3 (woods) cause of the insects." (AC3)*

> *"Some of them [insects] are poisonous, also dangerous." (AC4)*

> *"I don't like to touch, you know, like random animals and things because they might bite me." (ML2)*

> *"It's scary being alone." (VM2)*

Another contributor to constraints was *past experience.* For example, a child was afraid of spiders because "*A spider bit me.*" Another child explained her fear of street cats:

> *"I think they are dirty or might scratch me…It happened to my stepsister once and I do not want it happening to me."*

An interesting finding that is not common in literature was acrophobia, which also prevented nature experiences, specifically climbing trees:

> *"I would really love to climb trees but I'm really afraid of heights, so I'm really scared to." (HM1)*

Family values and *trust*, with just one code each, represented important constraints on children's autonomy of experiences. Illustrating that parents' *trust* influences children's independent nature-engagements, a child simply stated that he can go far by himself because "*They* [parents] *trust me*." Family values can also impose such limits:

> *"I mostly go out [to nature places] with my dad because if I did go out with my mom, she'd probably take us to the store to go thrift shopping.*

> *So, I mostly go out with my dad. He and my brother always decide together and if we bring someone like let's say my stepsisters or my cousins then we would all decide someplace fun where we can all be together." (HM4)*

Theme 4: Freedom

Freedom captured patterns where children intimated having some free choice in their experiences. There were only a few examples of this factor; usually it was in the form of a simple response of "*yes*" to the question asked. The quote below illustrates a typical scenario of the extent of freedom:

> *"Mostly my uncle and aunts tell everyone to go somewhere, and they decided as a family when there is a meeting. They come to my house, everyone comes to my house and decided… and decide where and when we are going. And that's how we decided. We decide like a family." (HM3)*

5. Discussion

The present study aimed to explore and understand the contextual factors that influence nature experiences amongst children in local island environments (IEs). Based on the findings, children's nature experiences are determined by four broad contextual factors: *preferences*, *opportunities*, *constraints*, and *freedom*. Earlier studies have identified opportunities and orientations (Soga et al., 2018) as broad determinants of children's nature experiences. The contextual basis for these factors is supported by many past studies (e.g., Almeida et al., 2018; Larson et al., 2018; Mustapa et al., 2018; Soga & Gaston, 2016).

Preferences

Preferences primarily influenced children's nature experiences in terms of their favourite nature places (NPs) visited, activities in NPs, pastimes, and reasons for visits. The literature identifies such determinants as *orientations* towards nature (Larson et al., 2011, 2018; Mustapa et al., 2018; Soga et al., 2016). In the Maldives, "*sandy beaches are the everyday playground for young children*" (p. 39), while walking on the reef is a form of recreation (M. Mohamed, 2012). True to this culture, the most popular NPs were marine, specifically the beach and the reef, regardless of the specific island. Importantly, the natural features of reefs, such as their colours and creatures' habitats, motivated children's preferences. Outside the capital IEs, some children favoured visiting non-marine NPs such as mangroves. These preferences support an intrinsic love and connection to nature (CTN) that should be harnessed at a young age for future sustainability. However, the preference for visiting parks (built environments with green spaces and play areas) by some children in the capital suggests that available forms of nature may also influence their choices. Nevertheless, choosing less diverse greenspaces may have more influential factors (Fattorini et al., 2017; Freeman et al., 2018). In other countries, children of this age have been found to prefer urban settings (Meidenbauer et al., 2019), while city children tend to associate nature with parks and recreation more than their non-city counterparts (Collado et al., 2015). Hence, elements of fun or activity affordances could incentivize children to choose to visit parks in the capital.

Unlike some studies (Larson et al., 2018; Mustapa et al., 2018), children in this study favoured nature-based activities while in NPs. Though this discrepancy may arise from methodological differences, the results lend further support to the argument that Maldivian children are still intuitively connected with nature. Notably, some activities commonly preferred by children, such as swimming and fishing, and associated recreations, are fundamentally connected to the roots of Maldivian culture (M. Mohamed, 2012), as are children's pro-conservation behaviours such as cleaning NPs. Children's preferences for relaxing, enjoying open spaces, and spending solitary time in nature must be encouraged because restorative experiences can motivate children's pro-environmental behaviour (Collado et al., 2013).

Some children preferred non-nature-based activities such as photography, playing with friends, and riding bicycles in NPs. While these activities revolve around enjoyment and family time, they nevertheless require serious attention because such engagement by the beaches and lagoons "*imparts a different meaning and value to the reef and resources*" (M. Mohamed, 2012, p. 25). Furthermore, recreational activities have been observed to improve nature connections (Schlegel et al., 2015; Szczytko et al., 2020).

The fact that a child claimed to be happy to touch plants but not animals suggests that children could be selective in their interactions with species, possibly founded on phobias. The literature associates some phobias with biases related to prejudice or culture (Breuer et al., 2015) and a lack of DNEs (Albo et al., 2019; Ballouard et al., 2012; Soga et al., 2020). Since appropriate DNEs can reorient phobias through better understanding of species (Albo et al., 2019; Breuer et al., 2015; Soga & Gaston, 2020), nature-based, experiential education is indispensable to alleviate negative feelings towards nature.

Children's routine pastime activities also provided some insight into the way in which *preferences* can determine DNEs. Many children preferred *non-nature-based* pastime activities, such as reading, and screen-based engagements rather than nature experiences. Notably, domestic responsibilities, such as taking care of the family, were more common in the capital IEs, especially for girls, than outside of them. Although noted as a pastime activity, these may be choices enforced on girls, suggesting that some girls may be unwillingly deprived of opportunities to experience nature.

While children seemingly spend more time on non-nature-based pastimes, the findings suggest stronger inclinations towards nature-based experiences when opportunities are available. For instance, some children went fishing, a customary and common recreational activity in the Maldives (M. Mohamed, 2012, 2015) even nowadays, on all islands. Playing with pets was revealed to be a popular pastime on all islands, while spending time in gardening-related activities was common in the capital IEs. While these trends suggest differences in opportunities, they may also represent changing patterns in preferences at the island level. Encouraging such interests would be a good way to nurture positive CTN in the congested capital. However, a child's association of living in a flat with lots of garden space indicates troubling signs of shifting baselines regarding nature

concepts that scholars (e.g., Papworth et al., 2009; Soga & Gaston, 2018) warn about. Already, adults exhibit questionable concepts of development, with many aspiring to develop their islands in the manner of the capital (M. Mohamed, 2012). Such conceptual shifts are worrying as they may influence children's nature conceptions through cultural transmission. Therefore, children must be encouraged to interact more with native biodiversity to create appropriate perceptions, knowledge, and memories regarding the natural island environment. Nonetheless, "*culturally-driven transformations*" (p. 18) in nature-experience related concepts must also be given due attention for optimum outcomes (Novotný et al., 2021).

Children's nature preferences are sometimes related to their *mental well-being* as they can make children feel peaceful or improve their mood. The narratives of children from the capital IEs reflected the crowded conditions in which some of them live and revealed their yearning to immerse themselves in nature. Surprisingly, a child from one of the most diverse islands also associated nature with freedom. Both instances reveal the similar restrictive circumstances in which children live, regardless of residence. This is concerning because studies show that nature play is crucial to children's mental well-being (Skar et al., 2016), while solitary time in nature is the strongest predictor of children's CTN (Szczytko et al., 2020).

Opportunities

Opportunities influenced children's nature experiences in many ways, but may be interconnected with several other factors. Similar to some countries (e.g. ,Almeida et al., 2018), and in contrast to others (e.g., Adams & Savahl, 2015; Gundersen et al., 2016; Hand et al., 2018), *nearby nature* was key to enabling DNEs for children on islands**.** Nearby nature enables opportunities for DNEs, often through places or life forms that differ between islands. Each opportunity allows for insightful, interesting experiences that can favour learning about local biodiversity and form strong relationships with it.

On all the islands, the most common opportunity for DNEs was the beach. However, it must be noted that for many islands, beaches – especially in the capital – are human-modified. Children living outside capital IEs can experience more indigenous wild nature spaces than those in them, where built parks are more common. Nearby indigenous species can cause subtle differences in children's DNEs that are specific to each island. For instance, children in the most diverse islands encountered local species, such as mangrove plants in Gamu and the white terns in Addu, which few children in the capital IEs were able to experience first-hand. These encounters can translate into knowledge and positive predispositions towards conserving local biodiversity. In contrast, children in the capital IEs had more experience with garden plants in terraces and home gardens. Such domesticated settings can be important opportunities for nature engagement in this gridlocked city environment.

Nearby nature also promoted independent and frequent engagements with nature, such as going to the woods by oneself. The frequencies of DNE in the diverse islands are indeed greater than in less diverse ones (Abdullah et al.,

2022a). Studies confirm that independent mobility immensely impacts nature experiences and knowledge (e.g., Freeman et al., 2018). The feelings elicited during certain experiences, such as sinking in muddy mangroves, catching chickens, or watching sunsets, can lay a strong foundation for deep connections with nature that can impact future actions.

A common form of nearby nature in all islands was pets. Although most pets are non-native, they represent an important avenue for close and personal interactions with nature within safe spaces. Given the absence of terrestrial megafauna and the manifold restrictions on enjoying native nature in the Maldives, pets can be crucial to awakening children's innate curiosity and learning. Additionally, handling pets may help children reduce biophobia and enhance biophilia, as evidenced by interactions with animals (Albo et al., 2019; Soga et al., 2020). These experiences can ultimately foster positive emotions towards nature, which is crucial to reap optimal benefits from nature experiences (e.g., Ballouard et al., 2012).

Another exceptional opportunity for children to experience native nature, particularly in the capital IEs, is trips to islands and sandbanks. Such visits are a unique form of nature experience in this country. Yet, these opportunities are rapidly declining, with most uninhabited islands allocated for tourism (M. Mohamed et al., 2019) and many sandbanks reclaimed for this purpose. The social and recreational aspects of such trips may be the prime motivators for children and adults alike, but their potential for pro-conservation impacts (M. Mohamed, 2012; Schlegel et al., 2015) should be further considered.

The findings strongly indicate that schools do not play a noteworthy role in facilitating opportunities for DNEs among children, despite the emphasis in the curriculum on promoting sustainable habits in children through experiential learning (NIE 2014). Possibly, today's lifestyle, pressures to excel in school, and societal issues do not support this ambition. Nonetheless, facilitated experiences such as visits to nature places may be the only way for some children, especially those in capital IEs, to truly engage with native biodiversity and form close connections with it, following the cultural norms of the Maldives. The feelings of awe reflected in the description of a child's visit to a sandbank for the first time suggest that these experiences can have long-lasting emotional impressions. Studies show that the implementation of active lessons in the Maldives is hampered by multiple barriers, including a lack of knowledge and confidence among teachers, a lack of resources and space in and around schools, time constraints, and large classes (Abdulla et al., 2021). Such barriers may hinder children from engaging in DNEs and therefore require deeper investigation.

An unexpected determinant of opportunity revealed in this study was *expense*. Considering that many children live in nature-modified neighbourhoods, facilitating experiences is often necessary. Many families are not able to afford this additional expense; hence, this is also a constraint to using opportunities that children are usually not aware of. Expenditure has been found to deter DNEs and contributes to a disconnect from nature in both children and adults in the United States (Kellert et al., 2017).

Constraints

Constraints were another contextual factor that influenced children's nature experiences. Constraints on all islands were similar, in that adults set boundaries to children's personal freedom through mandatory parental approval, prohibiting unaccompanied outings, limiting the frequency of experiences or distance travelled alone, and prioritizing schoolwork. Even on the most diverse islands, this limitation can be extreme, as exemplified by the child from Fuvahmulah who claimed to have given up all attempts to take solitary outings because of inevitable failure. Yet, contextual differences at personal levels are implicated, as a child in Gamu, the most diverse island, explained that he can travel short distances by himself but not to faraway places. Contextual, cultural, and societal underpinnings observed in this boundary-setting, especially those of parental restriction on children's independent mobility and free-choice DNEs, reflect the results of other studies in many ways (Freeman et al., 2018, 2021; Skar et al., 2016; Soga et al., 2018). In addition, parental attitudes towards nature may limit the ways in which children experience nature, exemplified by the child who claimed not to touch animals because the mother does not like it.

For some children, time spent studying or family responsibilities can restrict DNEs. Excessive study time could be due to demands to excel at schoolwork, as found in some studies (Skar et al., 2016). Family responsibilities may be imposed by working parents because they cannot afford domestic help, forcing children to step in. Gender disparities at the island level are implicated since only girls from capital IEs mentioned family responsibilities. The findings resonate with earlier reports that a high percentage of Maldivian children, particularly girls, engage in domestic work for several hours every day (United Nations Children's Fund, 2013). Many children living in the capital are from families that were forced to migrate in search of better lives (M. Mohamed, 2012, 2015). Therefore, persistent and unresolved societal issues may force greater restrictions on girls.

Constraints on children's nature experiences are often rooted in concerns over *safety*. Parental concerns over danger, which cause them to forbid lone ventures, can be justified, given the problems of modern society. Personal concerns over safety, such as fear or negative perceptions of insects, may stem from biophobia (see Albo et al., 2019) or past experiences. An interesting and uncommon finding in the literature was acrophobia, which also prevented nature experiences, specifically climbing trees.

While parents' *trust* allows children to gain independent nature experiences, it may conversely limit such experiences. Likewise, family values can also limit or enhance children's nature experiences.

Freedom

Children's nature experiences were influenced by freedom. Only a few children could visit NPs as often as they liked, while others could choose their experiences while in a NP determined by adults. In hindsight, freedom may be better positioned as a dimension of constraints.

6. Conclusion

This study demonstrated that children's DNEs are shaped by preferences, opportunities, constraints, and freedom, each underpinned by multiple sub-factors. Differences exist based on each island's context. Usually, children prefer experiencing diverse nature places over less diverse ones and engaging in nature-based activities while in nature places. However, there is an inequity in opportunities for experiencing local nature in terms of its quality and quantity as well as gender. Opportunities are greater on the most biodiverse islands than in the capital, and for males compared to females. Overall, these findings suggest that the strongest determinant of nature experiences for these children is opportunities, especially those that are nearby. Regardless of the island, or opportunities potentially available, constraints and limits to freedom set boundaries for children's nature engagements. In particular, parents stand out as boundary setters, shaping how children experience nature. While differences exist in constraints at personal levels, safety issues, phobias, and gender biases that deter nature experiences must be addressed. Yet, adults also facilitated experiences, though schools did not play a noteworthy role as facilitators. Clearly, authentic nature experiences that are also sensitive to changing cultures and children's interests must be facilitated to counter the changing islandscapes, particularly in the capital.

7. Implications and Recommendations

The findings suggest that even in the presence of abundant nature spaces in the habitual environments of children, facilitating nature experiences is necessary. Given the increasing societal obstacles to DNEs, especially on the capital islands, and considering the curricular targets towards experiential learning and moulding sustainable-minded generations, schools are in the best position to enable meaningful DNEs for children. It is recommended that schools play a more proactive and creative role in empowering children to experience nature through formal, non-formal and informal means, using opportunities that are available even in the concrete jungle of Male' city. Pedagogical shifts are necessary to engage children in nature experiences they love, be it pets, gardening or exploring their surroundings. Further work is necessary to investigate barriers to children's DNEs at the school level and strategies for creating nature-based lessons to expedite this process.

8. Limitations of the Study

The main limitation of this study was related to the interviews being conducted online, which caused some children to behave shyly. Consequently, some children's facial expressions and other nonverbal behaviour were not observed as much as hoped at the start of the study. The delineation of factors was also challenging as it was felt that there were some overlapping patterns.

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Appendix 1
Focus Group Interview Question Guide

Questions	Purpose /information sought
1. If you could go to any place in the world to have, where would you go? What makes you say that?	Ice breaker /Engagement
2. What are the things you like to do most commonly with your time? (KQ1; KQ = Key Question)	General Discussion. May indicate life-style choices / inclinations /influencing factors
3. Do you have any favourite living things? What makes them special? (KQ2)	Preferences for nature interactions /influencing factors
4. What are your favourite places to visit? Who or what decides how often or how long you stay in these places? (KQ3) [Probes: Could you tell me a bit more about these visits? Like, how often do you go, who you go with? Who organizes thee visits?]	Extent / preferences for nature interactions /influencing factors/ attitudes (likes/dislikes) [may report places outside island e.g. zoo]
5. Are there any natural places near you? Do you like to go to these places? Can you go as much as like? What makes you say that? (KQ4) [Probes: Island? House? School? Can you tell me something about them? Like what lives there? Why do you go there?]	Focus on residential area: Participation in NEs /Preferences for nature interactions extent /influencing factors / constraints /
6. What kind of things do you when you are in natural places? Who or what decides the things you do there? (KQ5) [Probe: Could you please list them?]	
7. What are the best things about natural places? Are things you don't like? (KQ6) [Probe: Could you please tell me a bit more about these?]	Preferences for nature interactions /influencing factors/ attitudes (likes/dislikes)

Appendix 1
Focus Group Interview Question Guide continued

8. I would like to show you some photographs now. Could you please look at them closely and answer my questions? (KQ7)

Photo 1

Photo 2

Photo 3

Questions	Purpose /information sought
(a) Tell me if you recognize the places in the photos	Knowledge of nature spaces
(b) Have you been to a place like this? Could you describe these visits? Who or what influences your decisions about going there?	Preferences for nature interactions /influencing factors/ attitudes (likes/dislikes) towards specific places
(c) What kind of activities have you done there? Who or what influences your decisions about what you do there?	Preferences for nature interactions /influencing factors
(d) Do you think the places in the photo should be protected? What makes you say that?	Conservation willingness
(e) If you had a choice, which of these places would you like to go most? Can you put them in order with where you would most like to go as number 1 and where you would least like to go as number 3? What makes you say that?	attitudes (likes/dislikes) towards specific places

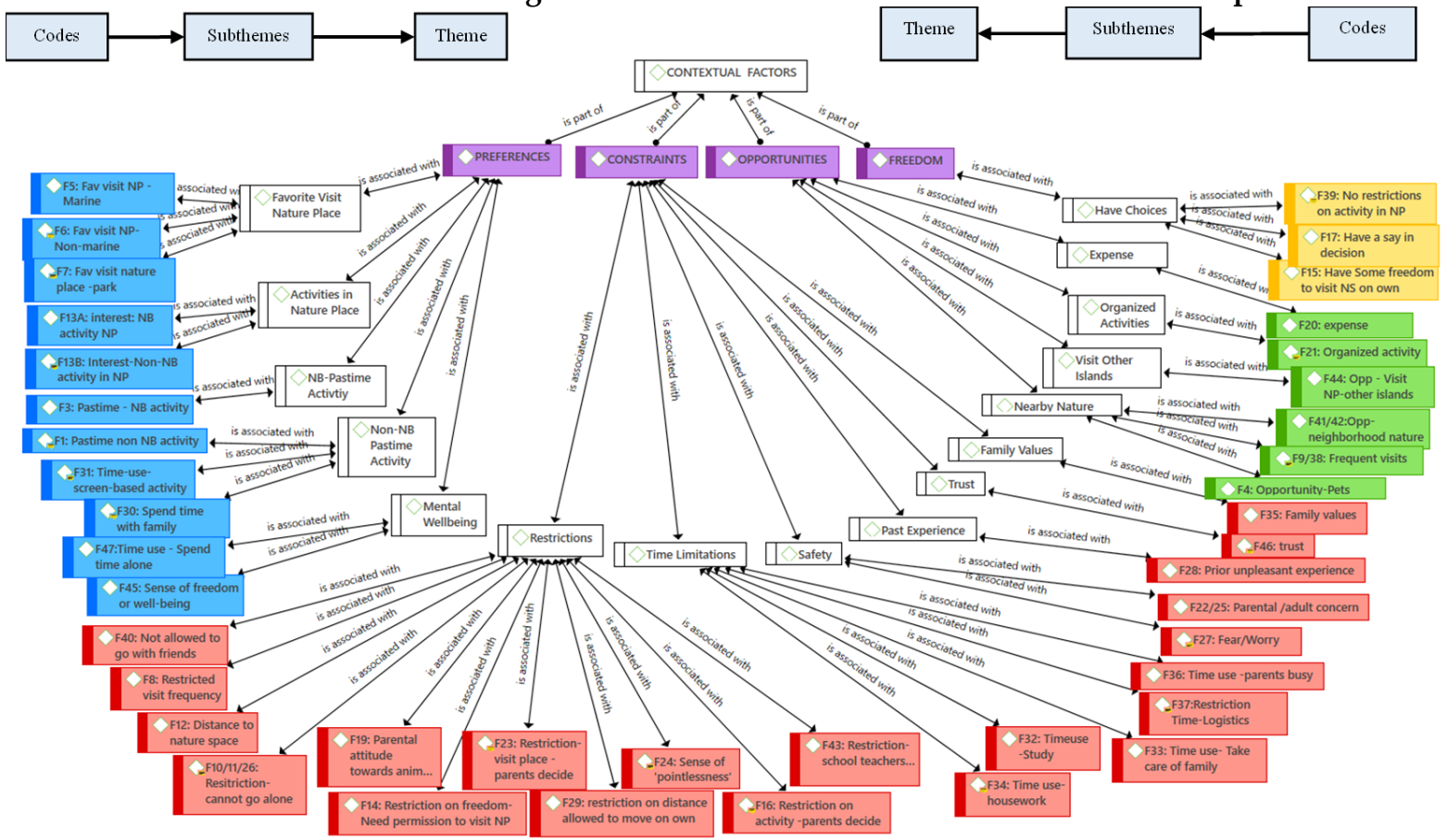
Questions	Purpose /information sought
9. Let's list some of the factors that influence your decisions to visit nature spaces. If you had to pick only one factor, what would be most important to you? You can pick something you mentioned yourself or something that was said by others.	Summary. Prioritize factors
10. Give a short summary. Is this a good summary of what was said today? Have we missed anything? Would like to add anything else to our discussion?	Exit

Appendix 2
Summary of Deriving Themes with Examples of Quotes and Observations

Major themes /factor	Sub-themes/sub-Factor	Examples of Interview Excepts	Observations /Comments
Preferences (What children prefers to do during their free time or when in NP or when they are outdoors; related to likes & dislikes)	Favorite Visit place (places children like to go)	"*Beach*". [repeated by many participants] "*There is a thing call called Bodu Fengandu.. which is my favorite part"* [G1] "*I normally go to the central park*" [HM1]	**Most preferred** = marine NP. Parks/garden: activity affordance may be motivator; More in MA
	Favorite Activities in NP (what children like to do while in NP)	"[I] *Like exploring that, the place*"[AC]. "*I like to pick roses. They are my favorite. In the garden*" [HM1] "*If it was an animal, I don't touch it but if it is a flower and stuff, I touch it*" [G3]. "*I usually go to Kudakudhinge Bageecha* (a park in Male') *with my younger cousins. I like to just sit on the bench and feel the breeze*" [ML2] "*… playing with family and friends, ..*" [VM]	**Nature based**: explore, pick flowers, play with sand **Non- nature based**: take pictures; playing with family Key drivers -recreation & family; cultural-roots.
	Nature-based pastime activity (daily /routine activities during free time involving nature)	"*I play with my pets*" [VM3] "*I like to go fishing..because it is my hobby*"[KF6] "*I go outside with my family to a trip; to someplace like a little island or sandbank and stuff*" [HM3] "There are potted plants in my house, I water them" [VM5]	**Most common**: playing with **pets**; Possibly related to opportunities afforded
	Non-Nature-based pastime activity (daily /routine activities during free time without involving nature)	"*I go to play handball and basketball*" [ML1] "*I do a lot of craftwork during my free time*" [KF4] "*Yeah, I normally like read books and in my sometimes-free times I just take care of my little sister. She's just a little baby so I thought of taking care of her while my mom is working. Just like help her a lot. That's why*". [HM1]	Screen-based; photography; read; arts and crafts; sports; spending time with family Family time
	Mental well-being (underlying feelings of freedom or well-being)	"*We can do whatever we want*" (FM2) [explaining why he liked a camp] Visit NP "*To have a peaceful mind*" (KF2)	Liked being doing things by self; being alone; Restorative effects; surprising & concerning motive.
Opportunities (Provisions that enable nature experiences)	Nearby nature (Proximity to nature e.g., Neighborhood nature-places/life forms)	"*The lakes. The Kudha kilhi"* [FM4] "*I go often because the beach is very near*"[KF6]. "*I like to go to coral reefs around the island"* [VM1] "*Goldfish, Carp, Angelfish*" [AC3] '*I like to ….take care of my pet… I have many fishes*" [ML2] "*There are potted plants in my house, I water them*" [VM5].	Opportunities vary among IEs; Most common –beach; pets; Native species /spaces only in most diverse IEs; can give unusual experiences Others: gardens; parks natural spaces; Opportunities in MA– mostly pets, gardens and other domestic sources
	Visit Other islands	"*I often go to sandbank with my family and stuff, and islands and stuff*" [HM3].	Common NE /cultural
	Organized activities (facilitated by adults)	[went to Thoondu] "*Actually on a Scout trip*" [FM2]. Also see quote above on visit other islands	Family important; Opportunities – need to be facilitated (pets; visits)
	Expense (costs of organizing outings)	"*The person in the counter gives us a certain time to rent anything and then they give us a time for the activities"* [FM1].	Unexpected pattern
Constraints (Limits to children's experiences; imposed by adults; commitment, time / personal issues)	Restrictions (parents' decisions - where to go, what to do, with whom, duration/ frequency)	"*I always ask my parents and if they give permission, I always go with them, or either one of my family members. I don't go without everyone else"* [ML2]. "*My mother doesn't like me touching animals*" [FM4]. "*I never did try* [to go out by myself] *because I know I'll ultimately fail*" [FM1] "*No. Parents are always worried*" [FM2];	Parental influence strong
	Time Limitations (No choices; constraints to free time; life-style factors e.g., study time or family affairs; social factors)	"*Uh, because on the weekdays I have to study*" [G4] "*I can't go most of the times because as sometime my mother and my family's really busy doing their jobs…*" [HM3] "As *for me, I normally babysit and when I'm free I do a lot of many things.. like cooking, eating, cleaning and stuff*" [HM2]	Family obligations; Gender & IE level differences implicated; only girls & children in MA mentioned family obligations Adults –boundary setters; safety concerns Societal issues – e.g., working parents; pressure to perform
	Safety (closely related to restrictions; elements of risks / injury / harm, danger / avoidance of NE)	"*Not allowed to go by myself*".. "because it's dangerous"[AC2]; "*For our safety reasons*" [ML2] "*But I'm mostly scared of animals …so I don't like to get near them*" [HM5] "*Some of them* [insects] *are poisonous"* and "*also dangerous*" [AC4]	Adult imposed; Parental safety concerns; Phobia; personal fears /limit experiences;
	Past experience (Prior unfavorable / knowledge of such experience)	[Afraid of street cats because] "*I think they are dirty or might scratch me"* adding that *"It happened to my step-sister once and I do not want it happening to me*" [HM4] "*A spider bit me"* [AC1]	Phobias; may be innate or originate from past experiences
	Family values	"*I mostly go out with my dad because if I did go out with my mom she'd probably take us to the store to go thrift shopping. So I mostly go out with my dad*" [HM4]	visits depend on family member; May be societal issues
	Trust	" *They* [parents] *trust me*". (can go far by myself because) [AC1]	Lack of trust may hinder freedom/ NEs
Freedom / Have choices	Freedom (children have a say in their experiences)	"*Yes*" Can visit NP as much as I like [KF6] "*Mostly my uncle and aunts tell everyone to go somewhere, and they decided as a family* ".[HM3]	Generally limited

Key: MA= Male' Area; NE= Nature Experience; NP = Nature Place; ML=Male; VM = Villimale'; HM = Hulhumale'; KF = Kulhudhuffushi; AC = Addu City; FM = Fuvahmulah; Gamu = Gamu

Appendix 3
Network Diagram of Factors That Influence Children's Nature Experiences



Note: Factor: broad variable investigated; Purple: themes, i.e., factors; White: subthemes, i.e., dimensions; Label F with numbers: Codes