



Exploring the Program Impact of NatureKids BC on Children and Families

Prepared by: Amy H. Bu, UBC Sustainability Scholar, 2023

Prepared for: Rebecca Law, Executive Director, NatureKids BC

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Disclaimer

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Contents

DISCLAIMER	2
ACKNOWLEDGEMENTS	2
CONTENTS	3
INTRODUCTION	4
METHODOLOGY	5
Purpose and Questions	5
Data Collection Tools	5
Data Collection Procedures	8
RESULTS	9
Quantitative Results	9
Qualitative Analysis and Results	10
DISCUSSION	14
CONCLUSION	14
REFERENCES	15

Introduction

Biodiversity loss and climate change are urgent and devastating issues that will continue to affect future generations. Children are drawn to and curious about the natural world, and yet enjoy fewer opportunities to interact with it than before due to urbanization and the allure of digital media. To address this urgent and important issue, NatureKids BC (NKBC) offers family-based youth nature access activities that give children a hands-on learning experience about their local natural environment.

NKBC is a non-profit organization that operates as a provincial network across British Columbia, Canada. It was first founded in 2000 as a program within the Vancouver Natural History Society, then incorporated as an independent society in 2006 with the purpose of encouraging and assisting young people in developing a love of nature and a feeling of respect and responsibility for the ecosystems, flora, and fauna of British Columbia¹. This goal continues to be reflected in NKBC's current mission statement: to offer accessible, educational, and engaging experiences for children and their families to get outside, explore, play, learn about, and take action for nature.

To accomplish this mission, NKBC offers different programs and resources for children and their families. It publishes a quarterly full-color nature magazine for children, *NatureWILD*, which is accessible to its members and available for schools to purchase. NKBC's website has a Stewardship and Citizen Science section, where it offers child- and family-friendly ideas, information, and resources about how to conduct citizen science projects about nature and wildlife. NKBC's most important offering, however, is a program of nature-based activities, called "Explorer Days", for families with children 5-12 years old. These are offered across NKBC's province-wide network of clubs, which are each led and managed locally by volunteer club leader(s). Last year, NKBC delivered 185 Explorer Days across 30 clubs in British Columbia, and engaged about 2500 children and family members. Explorer Days typically last between 1 to 5 hours, and provide hands-on and interactive experiences in local natural environments. Some club leaders invite a Nature Mentor, typically experts who can offer insights or lead a specific activity, to assist with the Explorer Day. Examples of past Explorer Day activities include exploring tidepools, going on a hike, bird-banding, removing invasive species at a park, and building birdhouses. Examples of Nature Mentors may be a marine biologist at a tidepool activity, a conservationist at a park cleanup, or an ornithologist at a bird-banding station.

NKBC takes an evidence-based approach to its Explorer Day program design and execution. Research suggests that children within NKBC's target age group of 5-12 years old experience the greatest increase in connection to nature through outdoor and nature programs (Ernst and Theimer, 2011; Liefländer et al., 2013). In that light, researchers have emphasized the importance of early nature experiences, such as before the age of 11 (Wells & Lekies, 2006; Liefländer et al., 2013), or between the ages of 10-12 (Westervelt & Llewellyn, 1985, as cited in Ernst & Theimer, 2011). While NKBC is not an education organization, research indicates that inquiry-based and hands-on learning experiences, such as those offered through Explorer Days, are more effective than traditional didactic instruction (Helgeson, 1992, as cited in Ernst, 2005). Powerful emotional

¹ <https://naturekidsbc.ca/wp-content/uploads/2020/06/Young-Naturalists-2019-FINAL-FS.pdf>

experiences in nature such as awe and wonder, which NKBC hopes to evoke through its programs, have also shown to be catalysts for learning (Coleman, 2014). As NKBC's most active and only in-person program, Explorer Days have the greatest potential to make the impact the organization hopes to see.

As NKBC approaches two decades of independent programming, the executive team would like to understand how its activities, especially Explorer Days, have impacted the NKBC member community. Such an understanding can help support decisions regarding NKBC's program continuation or expansion, to justify and obtain further funding, and to identify areas for improvement.

Methodology

Purpose and Questions

The present study draws on Patton's (1997) utilization-focused approach to program evaluation. Stakeholders from NKBC were consulted in the development of the research question. They were interested in understanding the ways in which NKBC is achieving its program goals, identified as: 1) fostering emotional connections such as love, respect, and wonder towards nature; 2) nurturing curiosity about nature; 3) developing knowledge and skills related to nature; 4) increasing time spent outside in nature, especially as a family; and 5) ultimately cultivating a feeling of responsibility for nature and a stewardship ethic. NKBC stakeholders were additionally interested in Hence, the questions for this study were:

Key Question: How, if at all, is NKBC achieving its stated program goals? Specifically,

- a. How does NKBC affect members' emotional connection to nature?
- b. How does NKBC affect members' curiosity and learning about nature?
- c. How does NKBC affect how families spend time together?
- d. How does NKBC affect the amount of time children and their families spend outdoors?
- e. How does NKBC affect members' daily behavior, such as taking action for nature?

Data Collection Tools

Several data collection tools were needed to address the research questions. The tools were chosen or developed in partnership with NKBC stakeholders according to the aims of this study, the resources available, stakeholder preferences, and the desire to minimize burden on study participants.

- *Nature Connection Index (NCI)*: Connection to nature, sometimes described as emotional affinity towards nature (Müller et al., 2009), generally refers to an individual's perceived connection to the non-human natural world (Capaldi et al., 2014). It has become a construct of increased interest and research attention over the past two decades; frequently used instruments in nature-based education or outdoor youth program literature include the children's Connection to Nature Index (CNI) (Cheng & Monroe, 2012), the Connectedness to Nature Scale (CNS) (Mayer & Frantz, 2004), the Emotional Affinity toward Nature scale (EAN)

adapted for teenagers (Müller et al., 2019), and the Nature Connection Index (NCI) (Richardson et al., 2019). The emotions NKBC aims to foster in children about nature, such as love, wonder, and respect, are well aligned with those included in instruments measuring connection to nature.

The NCI, developed by Richardson et al. (2019) for use by both adults and children, was chosen for this evaluation for its succinctness, suitability across age groups, sensitivity to change, and validity and reliability. Further, the items pertain closely to NKBC's intended program outcomes, such as feelings of respect and amazement. The scale consists of six questions scored on a 7-point Likert scale (from "completely disagree" to "completely agree"). The answers to each question are weighted and summed for a composite Nature Connection score. A higher composite score indicates a greater degree of connection to nature.

1. I always find beauty in nature.
 2. I always treat nature with respect.
 3. Being in nature makes me very happy.
 4. Spending time in nature is very important to me.
 5. I find being in nature really amazing.
 6. I feel part of nature.
- *Participant Enthusiasm*: This survey consists of two items developed specifically for this study, designed to be analyzed at the item level. Items were developed based on the program goals. They respectively address feelings of curiosity and inclination to spend time in nature. The questions are measured using a 7-point Likert scale (from "completely disagree" to "completely agree").
 1. In the future, I am going to visit natural or outdoor places more often.
 2. I would like to learn more about nature.
 - *Member interviews*. A question guide for current members was developed specifically to address the research questions in this study. The questions are directed at adult NKBC members, as it was anticipated to be logistically and ethically challenging to obtain a child's consent, or interview them without a guardian. However, members were invited and encouraged to share about their children's experiences. The following 15 questions were created to initiate and guide the conversation; they explore whether and how NKBC may be achieving its intended program goals of increasing members' connection to nature, time spent in nature (especially as a family), curiosity about nature, and pro-environmental action.
 1. How long have you been a member of NatureKids BC?
 2. Can you tell me about your experience with NatureKids BC?
 3. Why did you choose to become a member?
 4. How often do you participate in Explorer Days? What are the factors that influence your decision?
 5. What aspects of the program do you enjoy, or not enjoy?

6. What aspects of the program does your child(ren) enjoy, or not enjoy?
 7. How have your experiences with NatureKids impacted the way your family spends time together, if at all?
 8. How has your participation in NatureKids BC influenced your relationship with your family?
 9. Do you think NatureKids made you feel differently or the same about nature, wildlife, or the environment? If different, how?
 10. How have your experiences with NatureKids BC impacted your current life, activities, behaviors, or decisions, if at all?
 11. How have your child(ren)'s experiences with NatureKids BC impacted their current life, activities, behaviors, or decisions, if at all?
 12. In your opinion, how have you seen your child(ren) change, if at all, through their participation in NatureKids BC?
 13. What do you feel is the most important thing your child has gained through participating in NatureKids BC?
 14. Do you have suggestions for how we can make Explorer Days or NatureKids BC better?
 15. Is there anything else you'd like to tell me about NatureKids BC?
- *Member survey.* The member survey comprises a shortened form of the member interview question guide; it was reduced to 12 questions for succinctness. For logistical and ethical reasons, the questions are directed at adult NKBC members; however, they were invited to share their children's experiences.
 1. How long have you been a member of NatureKids BC?
 2. Can you tell me about your experience with NatureKids BC?
 3. Why did you choose to become a member?
 4. How often do you participate in Explorer Days? What are the factors that influence your decision?
 5. What aspects of the program do you enjoy, or not enjoy?
 6. What aspects of the program does your child(ren) enjoy, or not enjoy?
 7. How have your experiences with NatureKids impacted the way your family spends time together, if at all?
 8. Do you think NatureKids made you feel differently or the same about nature, wildlife, or the environment? If different, how?
 9. How have your experiences with NatureKids BC impacted your family's current life, activities, behaviors, or decisions, if at all?
 10. In your opinion, how have you seen your child(ren) change, if at all, through their participation in NatureKids BC?
 11. What do you feel is the most important thing your child has gained through participating in NatureKids BC?
 12. Do you have suggestions for how we can make Explorer Days or NatureKids BC better? Or, is there anything else you'd like to tell me about NatureKids BC?

- *Alumni interviews.* A question guide for alumni of the program (i.e., children who eventually "aged out" of NKBC's age range) was developed specifically to address the research questions in this study. The questions are intended for adult alumni, as it was anticipated to be logistically and ethically challenging to obtain a child's consent, or interview them without a guardian. Eight questions were created to initiate and guide the conversation; they explore whether and how alumni felt NKBC may have impacted them in terms of NKBC's intended program goals. They are as follows:
 1. For how long were you involved with NatureKids BC?
 2. Can you tell me about your experience with NatureKids BC?
 3. What aspects of the program, if any, were memorable?
 4. How have your experiences with NatureKids BC influenced your current life, activities, behaviors, or decisions, if at all? (What about academic, or career choices?)
 5. Do you think NatureKids made you feel differently or the same about nature, wildlife, or the environment? If different, how?
 6. Are there any ways you consider yourself to have taken, or to currently take, action for nature? If so, what are they?
 7. Can you tell me about your relationship to nature throughout your life?
 8. Is there anything else you'd like to tell me about NatureKids BC?

Data Collection Procedures

The NCI and Participant Enthusiasm surveys were used in a one-group, pretest-posttest design: the pretest was administered before and the posttest was administered after an Explorer Day. NKBC club leaders who led Explorer Days in July or August 2023 received invitations to support the efforts of this present study. Those who were willing to do so sent an invitation email with a pretest survey link to attendees, about two to four days before the Explorer Day. Leaders were also encouraged to send a reminder email one day before the Explorer Day. The pretest survey was prefaced with a blurb that explained the purpose of the study, and provided other consent-like information. It was determined that the present study did not fall within UBC's institutional definitions of research; thus, a Behavioural Research Ethics Board (BREB) approval was not required. The pretest comprised of the NCI and Participant Enthusiasm items. The author attended one Explorer Day in person and invited attendees to fill out a physical copy of the pretest survey before the activities; the online survey and the physical survey were identical.

After an Explorer Day, NKBC club leaders sent a follow-up email with a posttest survey link to attendees. In the posttest survey, participants were reminded of the purpose of the study, and the consent-like information. Since it was possible that participants would complete the survey up to several days after the Explorer Day, their memory was jogged by asking them to briefly describe the activity they did, and how they felt doing it. The posttest survey comprised of the NCI, the Participant Enthusiasm items, and two additional questions about satisfaction with the program. The author was unable to collect any posttest surveys in person, so all attendees were invited via email. The overall participation rates were low: across five Explorer Days, 26 people filled out the pretest survey, and 10 people filled out the posttest survey. However, only three

posttests were able to be matched with a pretest. Thus, the response rate for the surveys were only three participants.

Member and alumni interviews were conducted online over Zoom in August 2023. Purposeful sampling techniques were used to identify potential candidates for interviewing, with assistance from the NKBC executive team. Members and alumni who were considered "information rich" in terms of their experience and knowledge of the program were invited to participate via email, which also briefly described the purpose of the study and included consent-like information. In total, three members and one alumnus participated in an interview.

The member survey was administered in July and August 2023. All current members of NKBC were invited to participate through a link in the NKBC monthly newsletter. An incentive was provided in the form of a lottery draw for a \$50 gift card to a local outdoors equipment store. The survey was prefaced with a brief description of the study purpose and consent-like information. All questions were open-ended, with no limit to response length. Forty-one members responded to the member survey.

Results

Quantitative Results

- *Emotional connection to nature.* Participants were asked about various aspects of emotional connection towards nature. Given that only three pretests and posttests could be matched, descriptive statistics are provided for the 26 pretest responses and 10 posttest responses. The participants who completed the pretest felt a slightly higher sense of connection to nature on average (NCI M = 86.7, SD = 20.45) than the participants who completed a posttest (NCI M= 83.8, SD= 22.56). The three participants whose pre- and posttests could be matched gave identical, maximum answers on both tests (NCI M = 100, SD = 0). Considering the small sample size, and that the pretest and posttest surveys were completed by different groups, conclusions about Explorer Day effects on nature connectedness cannot be drawn at this time.
- *Intention to spend more time in nature.* Participants were asked the extent to which they wanted to spend more time in natural or outdoor spaces. Given that only three pretests and posttests could be matched, descriptive statistics are provided for the 26 pretest responses and 10 posttest responses. Participants who completed the pretest (M= 6.5, SD= .90) felt more inclined to spend more time in nature than those participants who completed the posttest (M= 5.8, SD= 2.09). Of the three participants whose pre- and posttests could be matched, intention to spend more time in nature increased from the pretest (M= 6.3, SD= 1.15) to the posttest (M= 7, SD= 0). Considering the small sample size and pretest-posttest group differences, conclusions about Explorer Day impact on intention to spend more time in nature cannot be drawn at this time.
- *Curiosity about nature.* Participants were asked the extent to which they wanted to learn more about nature. Given that only three pretests and posttests could be matched, descriptive

statistics are provided for the 26 pretest responses and 10 posttest responses. Participants who completed the pretest (M=6.4, SD= .99) felt slightly less curious about nature than participants who completed the posttest (M=6.7, SD= .95). Of the three participants whose pre- and posttests could be matched, curiosity about nature increased from the pretest (M= 6.3, SD= 1.15) to the posttest (M= 7, SD= 0). Considering the small sample size and pretest-posttest group differences, however, conclusions about Explorer Day impact on curiosity about nature cannot be drawn at this time.

Qualitative Analysis and Results

Qualitative data was collected through three member interviews, one alumnus interview, and an open-ended member survey. Forty-one members contributed open-ended responses to the survey. Thematic analysis, informed by research practices recommended by Braun and Clarke (2012, 2020), was conducted on both interview and qualitative survey data concurrently. Analysis of both data sources was performed concurrently. Interviews were transcribed verbatim, and the author reviewed both the recordings and the transcriptions for familiarization and annotation. Similarly, the member survey responses were familiarized and annotated to obtain a general sense of potential codes or themes. Initial codes were given to any piece of interview or survey data that appeared interesting or meaningful. After initial codes were given to all relevant pieces of data, the codes were grouped and organized into themes. The themes were then examined to identify emergent sub-themes. The raw data, themes, and sub-themes continued to be reviewed and revised in an iterative process, where theme accuracy and data placement was improved and verified (Braun & Clarke, 2020).

Theme 1. Emotional Connection to Nature

The primary theme of *emotional connection to nature* was identified, and used to code responses regarding the development or deepening of emotional bonds with nature or aspects of nature through NKBC programming. The sub-themes identified are *delight*, *responsibility*, *interest*, and *familiarity*.

- *Delight*. The sub-theme of *delight* describes how members experienced or deepened feelings of wonder, appreciation, or excitement towards nature, due to participation in NKBC.
 - "The kids talk about Explorer Days for weeks afterwards!"
 - "We appreciate nature's beauty and how lucky we are here in the West Coast even more than we already did."
 - "This particular farm had animals, and trees they were tapping for syrup. And it was really neat because we all got to taste things like walnut syrup, which I didn't know existed. There was maple syrup, and walnut syrup, and birch syrup, and they had everyone taste it, and we just started to think about our relationship with food and all of these plants around us in a different way. Those kind of moments where you're experiencing something in a new way, like tasting something, that's really unique."
 - "We learned about the birds' unique behaviors and bodies and, and then about the research itself. So it was pretty exciting. It just it felt very unique. I remember holding a Robin, which I had never known. They were so aggressive. But there was a special way

that I had to learn how to hold it, because they nip. The kids got to hold hummingbirds and it was pretty spectacular. Yeah, it was amazing."

- "...showing them there's like a whole community of people that care about the environment, are interested in learning about it, that aren't just like, you know, centered in themselves, but are keen on like exploring the non-human world, I think that's probably been the biggest impact. It's just reminding them, like, there's this whole other world out there that you can participate in and belong to."
 - "NatureKids creates a love for nature with you. Like, I feel like they really guide you into loving nature and being excited about seeing animals, and insects, and plants, and looking at the trees."
- *Responsibility*. The sub-theme of *responsibility* describes how participating in NKBC helped members experience or develop more curiosity or enthusiasm about nature.
 - "It causes me to think more about our impact on the environment."
 - "They are more aware of their environment and motivated to protect it."
 - "I see they have a new connection to nature and care for it in a different way than before."
 - *Interest*. The sub-theme of *interest* describes how participating in NKBC helped members experience or develop more curiosity or enthusiasm about nature.
 - "My daughter has been more interested in science and learning about nature as a result of our membership."
 - "After we did the walk and came back, we looked up information on what the difference between a marsh and a fen was, or some rabbit trail like that. And so, often, if we do a walk and there's a new topic or something they didn't know as much about, they'll come back and look up more information on it."
 - *Familiarity*. The sub-theme of *familiarity* describes how members experienced or developed feelings of comfort, safety, or confidence about being in nature, due to participating in NKBC.
 - "We are more confident in nature and love finding things to do that we have learned in NatureKids. My kids aren't scared of bees!"
 - "We have become less fearful of certain activities."
 - "It make us feel safer. The more we know, the more comfortable we are to go on our own."

Theme 2. Personal Development

The primary theme of *personal development* was used to code participant responses that described how NKBC's programs positively affected their growth as a person. The sub-themes identified are *knowledge* and *confidence*.

- *Knowledge*. The sub-theme of *knowledge* describes experiences of members having learned or retained new information about nature due to participating in NKBC.

- "I've seen them in settings outside of NatureKids events where they will repeat things they've learned at NatureKids to their peers, and it's a little bit show off-y. But it's also like, I can see they've learned something, they've retained it, they're proud of it, and they want to show others that they know it."
 - "My child will talk about the plants and animals when she sees those which have been mentioned in the program."
 - "They learned more about a variety of environments and animals."
- *Confidence*. The sub-theme of *confidence* describes how participating in NKBC helped members develop more self-assurance or assertiveness in any aspect of their life.
 - "I feel more confident about my ability to learn things as an adult - I can learn to identify new species, for example, alongside my kids. It makes us all more excited to learn!"
 - "They're becoming more comfortable sharing their knowledge of nature with other people, or educating others about nature."
 - "They're more comfortable on the whole, asking questions of people to gain the information that they want and sharing the knowledge that they have. When we started the NatureKids journey, there's a strong probability that if me or my husband was within site, they would not have answered a question asked of them, even if they knew the answer. Whereas now they will answer, and sometimes you'll get way more detail than you expected. But yeah, on the whole, they've definitely become more comfortable asking questions that people they don't know, and sharing information with whoever asks."
 - "Now, they look forward to Explorer Days instead of being scared to participate."

Theme 3. Family Bonding

The primary theme of *family bonding* was used to code responses that described how NKBC offered an opportunity and setting to strengthen bonds within the family.

- "It's meaningful family time, and great that it's something we can do together during the rainy season when there's not much to do."
- "It allows all our kids to participate at the same time, we really like this aspect of the program."
- "Really fun way to hang out with my grandparents and like, be doing something other than playing games at the house or something like that."
- "If my husband or I facilitate an activity, our kids would experience us differently in that. Whereas if we're out enjoying something together, and learning together, we're on an equal playing field. We're all participants. So I think that's been unique, because we're sharing an experience, instead of us parents guiding or teaching. It's fun. It brings a sense of fun to all of us. It's a binding sort of experience where we're brought together in a way in that moment, and in a way it is like celebrating together. I think it's similar to, say, going to a festival or something, because you're all participants, and experiencing something all at once together."

Theme 4. Behavioral Impacts

The primary theme of *behavioral impacts* was used to code participant responses that described how NKBC's programs have, or indicated that they may in the future, affect their choices or actions.

- *Behavioral Changes*. The sub-theme of *behavioral changes* describes how participating in NKBC affected members' typical patterns of actions or activities in daily life.
 - "If we have a choice, it's to spend our free time outside. We cancelled our Netflix and we have become closer as a family unit."
 - "NatureKids allows me to spend more time outdoors with my child."
 - "We might be more likely to try to identify a bird or plant pollinator plants in our garden."
 - "Since we're pretty urban, their peer group often spends their time indoors or in front of screens, that kind of thing. But, I've seen them sometimes separate themselves from that, and they want to be outside. Like, they want to explore, they want to play, they want to have little adventures."
 - "They've become more open to getting outside in all kinds of weather!"
 - "In my personal life, we go for, like, a lot of nature walks. I enjoy hiking and stuff. And I also want to incorporate a lot of nature in my daughter's life as well."
 - "I try to plant wildflowers instead of just like pretty flowers that you find. Like more native plants to BC, rather than just whatever ones you like. And just being more cautious, I think. In my day to day life, I'm trying to actually be like, what's recyclable? Like, let's not waste water. Just like things like that, small things you do every day."
- *Inspiration*. The sub-theme of *inspiration* describes how participating in NKBC helped spark ideas, or how it helped members discover new places or activities that may later lead to actions or change.
 - "The program gives us some really good ideas to tap into."
 - "We discovered things to do we would not have otherwise known about."
 - "I think it's inspired us, definitely. I know that when we do go to an event, we think, oh, we need to get outside more, we need to do these things more. It's easy to get into like a rut where you're doing the same things. You get to the weekend, and you're like, okay, I've got to do the laundry, and I've got to get groceries. And you know, you don't step outside of your daily life. But then you go to an event like this, and it pulls you out of that mode and reminds you, I need to be doing this to feel like I'm living. I need to go outside and more do more events like this."
 - "Seeing places and doing things I normally wouldn't have known about."

Discussion

There are several limitations of this study. Firstly, there was an insufficient number of members who participated in the quantitative portion of the study. As a result, meaningful analysis and interpretation of quantitative results was not possible. The small sample size may be explained by three practical difficulties. One, it was difficult to garner the enthusiastic support of club leaders to advocate for the study effort. Since club leaders are volunteers who do not necessarily have a background in research, advocating for and managing the participation process may feel like a daunting additional workload they are unable or unwilling to accept. Two, online survey invitations yielded low response rates, even with reminder emails. Three, recruiting participants for the posttest survey was challenging. It was not anticipated that many Explorer Days do not conclude the activity as a group; instead, families depart freely according to their needs.

Secondly, child members of NKBC were not interviewed or surveyed directly in this study due to ethical concerns and practical limitations. Feedback about any program effects children experienced was obtained secondhand from a parent or guardian. Parents may inadvertently be overly positive in reporting impact, out of a desire to view their program as efficacious.

Thirdly, this study did not control for whether members are part of any other similar programs, or for NKBC program "dose", meaning the duration and frequency at which members attended NKBC activities. Concurrent participation with other nature access or education programs would confound NKBC's program effects, as it would be impossible to attribute long-term changes to NKBC specifically. The amount of time spent and level of activeness in NKBC would also likely shape perceptions of what was gained through participation.

Lastly, there is the potential for a non-response bias, where members who responded to survey and interview requests represent the perspectives of those who are relatively active in NKBC, and enjoy the program. Non-respondents were not asked about their non-response due to financial and time limitations.

Conclusion

The qualitative results of this study suggest that, as a result of NKBC programming, members develop positive emotional connections to nature; feel more responsible towards and curious about nature; experience family bonding; and feel motivated and inspired to spend more time outdoors. While the results are not conclusive, they are consistent with research on the impact of nature access and education on feelings of connection to nature. The findings in this study suggest that NKBC's program impacts are aligned to its organizational goals, and that members are experiencing the intended positive effects as a result of their membership.

References

- Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57–71). American Psychological Association. <https://doi.org/10.1037/13620-004>
- Braun, V., Clarke, V.: One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qual. Res. Psychol.* (2020). <https://doi.org/10.1080/14780887.2020.1769238>
- Capaldi, C.A., Dopko, R.L. and Zelenski, J.M. (2014), “The relationship between nature connectedness and happiness: a meta-analysis”, *Frontiers in Psychology*, Vol. 5 No. 976, pp. 1-15.
- Chase Coleman, T. (2014). Positive Emotion in Nature as a Precursor to Learning. *International Journal of Education in Mathematics, Science and Technology*, 2(3), 175. <http://files.eric.ed.gov/fulltext/ED548763.pdf>
- Cheng, J. C. H., & Monroe, M. C. (2012). Connection to nature: Children’s affective attitude toward nature. *Environment and Behavior*, 44(1), 31–49. <https://doi.org/10.1177/0013916510385082>
- Ernst, J. (Athman). (2005). A Formative Evaluation of the Prairie Science Class. *Journal of Interpretation Research*, 10(1), 9–29. <https://doi.org/10.1177/109258720501000102>
- Ernst, J., & Theimer, S. (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research*, 17(5), 577–598. <https://doi.org/10.1080/13504622.2011.565119>
- Helgeson, S. (1992). *Problem solving research in middle/junior high school science education*. Columbus, OH: ERIC Clearinghouse for Mathematics, Science, and Environmental Education
- Liefländer, A. K., Fröhlich, G., Bogner, F. X., & Schultz, P. W. (2013). Promoting connectedness with nature through environmental education. *Environmental Education Research*, 19(3), 370–384. <https://doi.org/10.1080/13504622.2012.697545>
- Mayer, F. S., & Frantz, C. M. P. (2004). The connectedness to nature scale: A measure of individuals’ feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515. <https://doi.org/10.1016/j.jenvp.2004.10.001>
- Müller, M. M., Kals, E., & Pansa, R. (2009). Adolescents’ emotional affinity toward nature: A cross-sectional study. *Journal of Developmental Processes*, 4(1), 59–69.
- Patton, M. Q. (1997). *Utilization-focused evaluation: The new century text* (3rd ed.). Sage Publications, Inc.
- Richardson, M., Hunt, A., Hinds, J., Bragg, R., Fido, D., Petronzi, D., Barbett, L., Clitherow, T., & White, M. (2019). A measure of nature connectedness for children and adults: Validation, performance, and insights. *Sustainability (Switzerland)*, 11(12), 1–16. <https://doi.org/10.3390/SU11123250>
- Wells, N. M., & Lekies, K. S. (2006). Nature and the life course: Pathways from childhood nature experiences to adult environmentalism. *Children, Youth and Environments*, 16(1), 1–25.
- Westervelt, M.O., and L.G. Llewellyn. 1985. *Youth and wildlife: The beliefs and behaviors of fifth and sixth grade students regarding nondomestic animals* (Report to the US Fish and Wildlife Service, Document No. 498-443-42425). Washington, DC: US Government Printing Office.