

# Inuit youth and environmental research: exploring engagement barriers, strategies, and impacts

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## Abstract

Community leadership in Arctic environmental research is increasingly recognized as one of many pathways to Indigenous self-determination in Nunavut, Canada. While experienced Inuit hunters, trappers, and other recognized environmental knowledge experts are commonly included in research, similar opportunities for Inuit youth to meaningfully engage in environmental research remain limited. Finding ways to increase scientific literacy, particularly among Inuit youth, has been identified as an important step in the continuation of high-quality Arctic environmental research. This paper examines community perspectives on the roles and contributions of Inuit youth in environmental research in Nunavut, barriers that Inuit youth face in becoming meaningfully engaged in field-based environmental research, and strategies for enhancing Inuit youth engagement. Our study was conducted in Pond Inlet, Nunavut, and used interviews, workshops, and observation to gather stories and knowledge from community members about field- and land-based experiential learning pathways. This study found that a complex set of barriers, including a lack of credentials and support systems, among others, may inhibit meaningful Inuit youth engagement in environmental research. Key findings from the study support the view that collaborative land-based research activities can be an effective and meaningful method of enhancing scientific literacy among Inuit youth.

**Key words:** Environmental research, Nunavut, Arctic, science literacy, Inuit youth, youth engagement, natural science

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## Introduction

Environmental research<sup>1</sup> in Arctic Canada is increasingly characterized by local and regional control over the scientific process (see [Brunet et al. 2014](#)). This phenomenon is the result of complex forces influencing Arctic research priorities and practices including an increase in local science capacity and experience, land claims processes, as well as permit granting agency and funding program requirements. Southern-based researchers often seek to partner with Indigenous and local knowledge holders, organizations, and other stakeholders to access land, knowledge, and skills critical to

<sup>1</sup>We define the term environmental research as the study of natural systems and processes using both social and natural science approaches including field experiments and observations.

advancing their research programs (Pedersen et al. 2020). Effective partnership development and participatory approaches in this context emphasize the role of early and ongoing communication in building trust and promoting shared benefits accrued from research (Brunet et al. 2016; Henri et al. 2020a; Pedersen et al. 2020; Wong et al. 2020). However, little attention has been paid to researcher engagement and communication with Inuit youth within and beyond formal research settings, although work in this field indicates that this can be highly beneficial (Salmon et al. 2011; Provencher et al. 2013).

Recent studies have also shown that the knowledge and expertise of highly trained researchers conducting fieldwork in the Canadian Arctic rarely reaches Inuit youth (Brunet et al. 2014; Henri et al. 2020a). Typically, older and more experienced hunters and trappers are engaged in environmental research processes and projects, and therefore accrue most of the benefits associated with research partnerships (Brunet et al. 2014, 2016). Additionally, there is evidence that land-based skills are not being fully acquired by many Inuit youth today (Aporta 2004; Takano 2005; Pearce et al. 2011; Doering and Henrickson 2014). Traditionally, Inuit youth learned and developed their land-based knowledge and skills through observing and listening to family members (Bonesteel 2006; Pearce et al. 2011; Karetak et al. 2017). Land-based learning included the passing on of subsistence and safety-related knowledge, and what is known as Inuit Qaujimajatuqangit (IQ), encompassing Inuit Traditional Knowledge, values, and worldviews (Karetak et al. 2017; Pedersen et al. 2020). Today, multiple factors influence Inuit's changing lifestyle and opportunities to spend time on the land participating in traditional activities, including an increasing dependence on wage-based employment and an increasing emphasis on formal education (Impact Economics 2012; Doering and Henrickson 2014; Wilson et al. 2020). Therefore, environmental research has the potential to play a role in supporting land-based knowledge and skills acquisition as well as enhancing scientific literacy among Inuit youth (Wong et al. 2020).

Although there have been recent improvements related to local and regional engagement in Arctic research, the importance of which is similarly underscored in the National Inuit Strategy on Research and Canada's Arctic and Northern Policy Framework (Inuit Tapiriit Kanatami 2018; Government of Canada 2019), many Arctic residents still feel disengaged from environmental research programs (Wong et al. 2020), and opportunities for Inuit youth involvement in environmental research remain limited in scope. In the Nunavut territory, given that 59% of the population is under age 30 years (Statistics Canada 2017a), this suggests a gap in community engagement among over half of the population. A potential result is that newer generations of hunters, conservation officers, and resource managers are not being encouraged and trained within current environmental research efforts.

This study provides further insights into the complex relationships that have emerged and can be developed between southern-based researchers and Inuit to support meaningful youth engagement and work toward enhancing scientific literacy among Inuit youth. In the context of our study, "scientific literacy" was described as teaching and learning about Western sciences, including scientific concepts and the scientific process, particularly in relation to field-based environmental research conducted in or around the community. Scientific literacy was further viewed as knowledge and skills that could complement Inuit processes of personal development and contribute to leadership in environmental research.

The objectives of this study were, first, to explore community perspectives of barriers that prevent Inuit youth engagement in land-based environmental research; second, to uncover strategies that may help to increase their environmental research engagement; and third, to explore ways that Inuit youth engagement can impact the overall research process. This study was undertaken in and with members of the community of Pond Inlet (also known as Mittimatalik), Nunavut, Canada.

Methods

Approach

This study employed an inductive, participatory approach within a single case study, which included local engagement in most aspects of the research process with co-investigators in Pond Inlet, Nunavut. For the purpose of theory building, we followed an overarching inductive approach inspired by elements of grounded theory, which allowed the project to be adaptable to emerging themes and research directions while following a rigorous methodological framework (see Fig. 1; Charmaz 2006). Given the nature of the research objectives, we believed that this study would benefit from grounding findings in community perspectives and experiences.

A 10-day scoping trip to Pond Inlet in March 2018 facilitated the processes of consultation, co-design, and early engagement with community research partners. Input regarding the proposed research was solicited from individual community members and key community groups, including the Hamlet Council, the Mittimatalik Hunters and Trappers Organization (HTO), and Ikaarvik Barriers to Bridges (Ikaarvik), and was incorporated into the project design. Members of the local HTO stipulated that the research should include as many people as possible in the study, the research process should provide an opportunity for HTO members to review findings prior to publication, and results should remain as true as possible to the original meaning of information that was provided by research contributors. These stipulations were also echoed by the Hamlet Council. In response, this study was open to anyone 18 years or older (in observance of the study’s Research Ethics Board clearance). As regular HTO meetings had been postponed during our results verification phase,

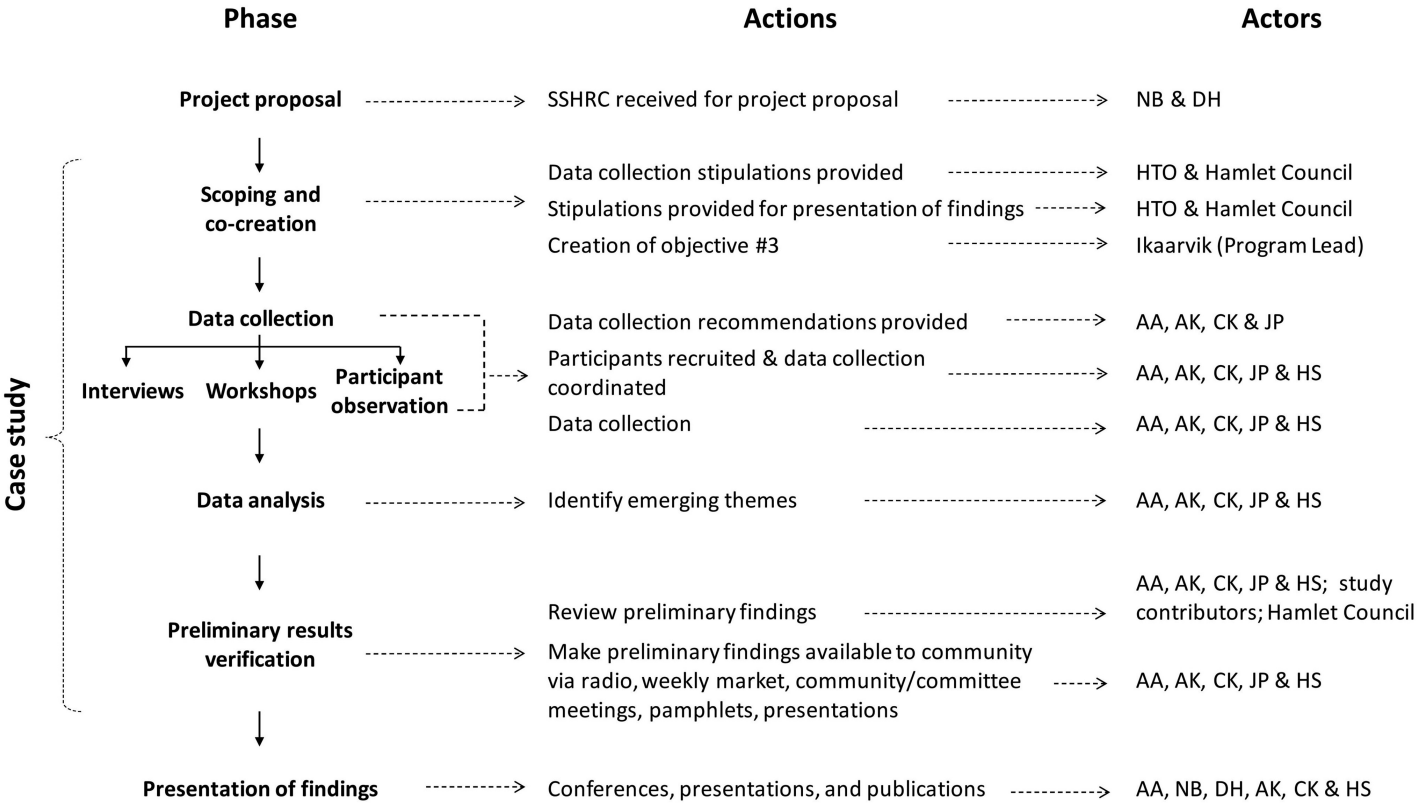


Fig. 1. Methodological framework. Author initials are used in the Actors column. HTO is Mittimatalik Hunters and Trappers Organization.

preliminary findings could not be presented to the HTO in person. Copies of the preliminary findings were provided to the HTO office for members to review along with the researchers' contact information. Preliminary findings were presented in person to the Hamlet Council during a regularly scheduled meeting. Finally, involvement of the three Mittimatalingmiut co-authors of this paper throughout the research process ensured that community perspectives were appropriately represented. Discussions with an Ikaarvik program lead resulted in the creation of one of the objectives of this study, namely, to explore ways that Inuit youth engagement can impact the overall research process (personal communication, Program Lead, Ikaarvik Barriers to Bridges, March 2018). These discussions also influenced the time of year that our field study was carried out and the duration of the community stay for data collection.

The data collection phase occurred over two months from September to November 2018. A prolonged community stay by HS was recommended by contacts in Pond Inlet for the purpose of forging relationships that were ultimately seen as beneficial to both the research and the community. This study used multiple qualitative methods, combining interviews, workshops, and participant observation. A two-week results verification trip also took place in April 2019, during which attempts were made to meet with all of the study contributors for the purpose of reviewing preliminary research findings. Throughout this paper, the word "contributors" is a preferred term to designate the individuals who took part in interviews and workshops, as this term connotes agency and a process of mutual learning and knowledge co-production. An interpreter and bilingual English–Inuktitut documents were made available during all phases of community–researcher interaction. This project was reviewed by the Research Ethics Board, REB #18-06-018, for compliance with federal guidelines for research involving human participants. This project was also reviewed by the Nunavut Research Institute for research in the areas of social sciences and Traditional Knowledge, Scientific Research License #02 066 18N-M. All contributors gave informed consent prior to participating in this study.

Importantly, four Mittimatalingmiut (people from Pond Inlet) became co-investigators for this project; the group self-selected the title of "research assistants". Three of the research assistants subsequently transitioned into the role of co-authors of publications related to this research based on their interest in continuing to work on this project following the completion of the data collection and analysis phases. All of the research assistants, AA (co-author), CK (co-author), AK (co-author), and Jonathan Pitseolak, were part of Ikaarvik Barriers to Bridges youth research group (Ikaarvik). The research assistants joined the research team prior to the commencement of data collection. The early engagement of local research assistants was deemed a crucial component of the research process by local organizations such as Ikaarvik, the Mittimatalik HTO, and the Hamlet Council to ensure cultural competence in all aspects of the research process (Collings 2009) and to ensure local community perspectives were properly represented in the research. Research assistants all had relevant experience with research conducted by southern-based researchers in and around their community and were therefore familiar with common community-level perspectives on research and common challenges faced by researchers conducting fieldwork in and around Pond Inlet. Research assistants took on various roles within the research process itself, including reviewing and giving feedback on all research questions and materials; participant recruitment; translation and simultaneous interpretation; assisting and facilitating interviews and workshops; reviewing and discussing preliminary results; and presenting findings back to research participants, the community, and at a professional research conference. Research assistants were able to advise on cross-cultural intricacies of conducting research in an Inuit community. Their involvement increased the research project's capacity on-site by facilitating connections with potential research participants and increased the depth of inquiry by contributing relevant knowledge concerning the local research context and providing feedback regarding emerging research themes.



## Positionality statement

Reflexivity in qualitative participatory research is necessary as researchers are not neutral entities, but rather are influenced by their own positionality (Banks 1998). The term “researcher positionality” refers to aspects of researchers’ identities (ethnicity, age, gender, educational background, etc.) and their own experiences that may influence how they approach research and are perceived by research participants (Brown and Stregada 2005; Sultana 2007). This positionality statement is intended to capture our positionality within the interpersonal and cross-cultural context of our research.

The authors of this paper are a diverse group, including three Inuit and three non-Indigenous persons. We are four women and two men. The three Inuit authors (AA, AK, and CK) are all from Nunavut and have been part of Ikaarvik. The three non-Indigenous authors (NB, DH, and HS) are all from southern Canada, specifically Ontario and Québec. We are experienced in research and hold a particular interest in research that aligns with community-level priorities. NB, DH, and HS are trained in Western research approaches but are familiar with Indigenous research paradigms and all have experience conducting participatory research with Inuit communities.

All co-authors embarked on this learning journey because we find value in Inuit youth engagement in environmental research. Through this process, we explored the roles and impacts of Inuit youth in field- and land-based environmental research. In a Western approach, objectivity is a valued component of rigour within research (Banks 1998), though many disciplines have acknowledged that non-neutrality can also hold relevance in research, particularly as it related to relational accountability (Wilson 2008; Healey and Tagak 2014; Wong et al. 2020). In Pond Inlet, forging interpersonal relationships and imparting our connection to or interest in the research was viewed as a crucial part of situating ourselves within the research process (Wilson 2008; Healey and Tagak 2014). Based on advice from Inuit co-authors, we endeavoured to engage in “kitchen table” reflexivity as a way to offer contributors a more nuanced perspective of who we are as individuals and as researchers (Price 2007). It was our desire for contributors to feel that mutual learning and reciprocity were end goals of our project. Reflexivity and reciprocity were fundamental to our commitment to relational accountability in the research process (Wilson 2008; Reich et al. 2017). This commitment took many forms, such as: community engagement in project scoping, the described preresearch scoping and design modifications resulting from such engagement; early engagement of Inuit co-investigators; being attentive to advice from Inuit co-investigators throughout the research process; adhering to stipulations provided by community-level actors and decision-makers; and ensuring a return trip to the community for results verification and dissemination, for example.

## Case study

Pond Inlet is located at the north end of Baffin Island in Nunavut and has a population of 1,617 people (Statistics Canada 2017a), 93% of whom identify as Inuit (Statistics Canada 2017a). Approximately 63% of Pond Inlet’s population is under 30 years old (Statistics Canada 2017a). By comparison, only 35% of the population of Canada is under 30 years old (Statistics Canada 2017b). As this research is focused on youth, the sizeable cohort under the age of 30 indicates that this study may be particularly relevant to a significant portion of the population.

Pond Inlet and the adjacent waterway, Eclipse Sound, are part of the Tallurutiup Imanga National Marine Conservation Area, a region that is ecologically important for biodiversity in Canada’s High Arctic Basin (Government of Canada n.d.). Pond Inlet’s geographic position and proximity to protected areas make it an ideal location to conduct wildlife and environmental research. Pond Inlet was selected as the preferred location to conduct this study because there is high southern-based researcher traffic through the community, and because the newly built Environment and Climate Change Canada (ECCC) research facility has the potential to enhance the community’s research

capacity. Examples of the diverse types of environmental research in and around Pond Inlet include sea ice research (see [Wilson et al. 2020](#)), underwater sound monitoring, geological studies, and air quality monitoring as well as numerous wildlife research programs. Logistically, being given access to the ECCC research facility also facilitated the capacity of this project by allowing southern-based team members to stay in the community for extended periods at a lower cost.

## Knowledge gathering and analysis

This study used a purposive sampling process often referred to in the literature as snowball sampling ([Penrod et al. 2003](#)). This approach was used to reach a diverse set of individuals within the community with specific knowledge, interests, and experience in relation to the research objectives. An initial list of potential contributors was created using recommendations from the community research assistants, who were keen to identify appropriate individuals from their community. The individuals identified were all community members, except for one visitor, with experience in environmental, natural sciences, or wildlife research, or were people who had a strong interest in enhancing Inuit youth's access to environmental research and scientific literacy. Spending an extended period of time in the community also allowed for the identification and recruitment of many contributors ([Brunet et al. 2014](#)), much like the chain referral method of participant recruitment, so as not to rely on too narrow a sample group ([Penrod et al. 2003](#)). Contributors were offered an honorarium in appreciation of their time as required by the Nunavut Research Institute.

We completed semi-structured individual interviews with 28 contributors and recorded the interviews in full when possible, relying largely on storytelling by contributors ([Wilson 2008](#)). This allowed for the collection of rich data that helped to inform the larger study ([Charmaz 2006](#)). Interview contributors were both men and women, 18 years and older. [Table 1](#) provides an overview of interview themes and prompts. Interviews were predominantly conducted in English, with a small number conducted in Inuktitut with simultaneous interpretation.

In addition to interviews, we conducted two group workshops comprising 16 contributors in total (including three contributors who had been previously interviewed and 13 new participants) who were predominantly under the age of 35, allowing for focused inquiry into youth-related perspectives critical for this project (see [Fig. 2](#)). Workshops were selected as a data collection method to foster innovation in problem-solving ideas and to create opportunities for greater cohesion of ideas in a group setting ([Fisher 2004](#); [Hatzilacou et al. 2007](#)). At the recommendation of key community contacts, workshop sessions were conducted in two parts (Part One and Part Two) on two different days. This allowed contributors to reflect on what was discussed in Part One, and to further develop their ideas for Part Two (personal communication, Program Lead, Ikaarvik Barriers to Bridges, March 2018). A second workshop was also useful for reviewing previous work by the group and ensuring greater accuracy of initial findings. [Table 2](#) provides an overview of key workshop themes.

This study further employed participant observation as a third data collection method, in which our research objectives and processes were under discussion in more informal settings. Given the immersive community-based nature of the field work, informal day-to-day interactions with community members was found to foster researcher cultural competency, decreasing the possibility of misinterpreting stories and knowledge from interviews and workshops ([Collings 2009](#)). Learning through observation was also recognized as a culturally appropriate research method aligning with cultural norms and protocols in this case study context ([Collings 2009](#)). Being given access to ECCC research station in Pond Inlet—which offered both a meeting space for project activities and accommodation for southern-based project team members—also provided for a dynamic environment in which to complete this research. Being able to interact with the many researchers, professionals, and community members frequenting the research station helped to inform and contextualize aspects of this

Table 1. Interview themes and prompts.

<b>Section A—Socio-demographic information</b>
Age
Gender
Educational background
<b>Section B—Your experiences with environmental research</b>
Can you describe your experience working on environmental research projects or with researchers?
What have you been asked to do to contribute to research projects?
What new things did you learn through these experiences?
<b>Section C—Researchers and youth</b>
Have you seen or heard of researchers teaching science to youth in the community or in the field?
How have researchers engaged with Inuit youth in Pond Inlet and in the field through researcher, and have these methods been appropriate?
What do you think are some good ways to teach new science skills and knowledge to young people?
<b>Section D—Youth in research</b>
What benefits and (or) value is there in having youth participate in environmental research (for youth, the community, the research project)?
What are the barriers for young people who want to work on research projects in the field?
What can researchers do to effectively share their knowledge of science, wildlife, and the environment with youth locally?



Fig. 2. Contributor in workshop Part One.

Table 2. Workshop key themes, Part One and Part Two.

<b>Workshop Part One</b>
<b>Discussion of experiences</b>
Experiences working on environmental research
Learning outcomes from field research experiences
Satisfaction with research experiences
Contributions made by workshop participants
<b>Knowledge sharing</b>
What Inuit youth have to share with researchers
<b>Youth–researcher partnerships</b>
Researcher roles in scientific literacy and environmental education
Inuit youth contributions to environmental research
Increasing researcher effectiveness in engaging youth
<b>Workshop Part Two</b>
<b>Review of preliminary findings</b>
What researchers can do to help youth learn
How researchers can strategically engage Inuit youth in environmental research
How Inuit youth engagement impacts environmental research

research. The multiple methods used in the study allowed for a process of data source triangulation, ensuring that we accurately and meaningfully captured contributor perspectives on our research questions.

Transcribed stories and knowledge from interviews and workshops were analyzed using coding and content analysis in an iterative and ongoing basis (Charmaz 2006). The study used a combination of predetermined codes based on the interview questionnaire and workshop themes, which served as a beginning point for the inductive process, and allowed for new codes, including *in vivo* codes taken verbatim from interview and workshop transcripts, to emerge in a process of theory building. *In vivo* coding was preferred because it stayed true to the voices and words of community members (Charmaz 2006), a point that was raised by community collaborators during the design phase of this project. The initial coding scheme was based on just three main areas: barriers, strategies, and youth impacts. The process of *in vivo* coding created a large set of data nodes, which were eventually grouped into like categories thematically. Table 3 shows the final thematic grouping of the data nodes. Given the iterative nature of the analysis process, it was possible to discuss emerging themes with the research assistants as the interviews and workshops progressed in Pond Inlet to ensure accuracy.

During the results verification phase, preliminary findings were distributed to 30 contributors; feedback for verification purposes was received from 16 of them. The remaining 11 contributors declined to review preliminary findings or were unreachable. Preliminary findings were also made publicly available in Pond Inlet; pamphlets were posted on public bulletin boards, and findings were presented to community organizations, on the local radio (Fig. 3), and at the local flea market.

Results and discussion

Results discussed here represent knowledge gathered through interviews and workshops from a total of 41 contributors, including 21 men (51%) and 16 women (39%), all from Pond Inlet except for one visitor to the community (*n* = 37; socio-demographic information was not collected from four

Table 3. Data nodes by theme

Category	Data nodes
Youth Impacts	<div>Perspectives and ideas<ul style="list-style-type: none"><li>Curious, think outside the box</li><li>Innovative</li><li>Energetic, fun</li><li>Experience and knowledge</li></ul></div> <div>Skills and leadership<ul style="list-style-type: none"><li>Land-based skills</li><li>Tech savvy</li><li>Bridge two worlds</li><li>Commitment to future</li></ul></div>
Barriers	<div>For Inuit youth<ul style="list-style-type: none"><li>Lack of credentials (school, licenses)</li><li>Lack of personal support (role models, personal responsibilities)</li><li>Lack of access to equipment</li><li>Seasonality of research</li><li>Realities of field camps</li><li>Language</li><li>Undervalued skills and knowledge</li></ul></div> <div>Systemic/structural<ul style="list-style-type: none"><li>Underemployment</li></ul></div>
Strategies	<div>Strategies<ul style="list-style-type: none"><li>Balance of town- and land-based experiences</li><li>Stronger research relationships</li><li>Acknowledge different learning styles</li><li>Recurrent opportunities</li><li>More time/multi-seasonal work</li><li>Access to equipment</li><li>Help find funding opportunities</li></ul></div> <div>New directions<ul style="list-style-type: none"><li>Collaborative science camps</li><li>School credit for research</li><li>Youth-only meetings</li><li>Educational trips</li></ul></div>

people). Of the contributors, 46% were between the ages of 18 and 35; the remaining 54% were over the age of 35. Socio-demographic information on gender and age distribution of research contributors can be found in Fig. 4. The majority (76%) of contributors reported having already worked with southern-based researchers on environmental, natural sciences, or wildlife research in some capacity (for example, research in water and air quality, sea ice, seismology, migratory birds, and marine mammals). The other contributors had experience in other research areas (for example, social sciences, archaeology, and demographics research) but still held an interest in seeing improved research engagement and scientific literacy for Inuit youth in Pond Inlet.





Fig. 3. Radio announcement about research in Pond Inlet.

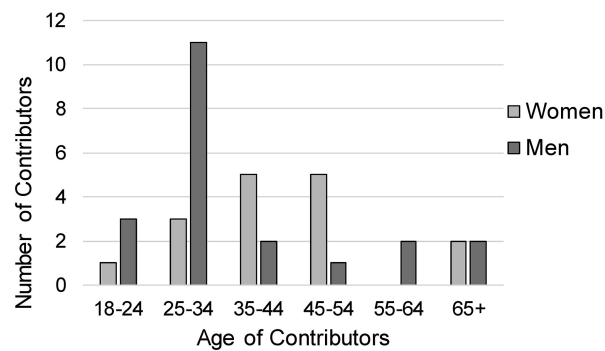


Fig. 4. Number of contributors by gender and age ( $n = 37$ ).

The results of interviews and workshops have been divided into three main areas aligning with our research objectives: (i) contributors’ thoughts on the impacts that greater Inuit youth engagement may have on research, (ii) the barriers to Inuit youth engagement in environmental research, and (iii) proposed strategies for greater Inuit youth engagement in environmental research. This section will blend our results with insight from relevant literature.

Inuit youth impact on the research process

Contributors were asked to discuss how research processes and outcomes might change by having greater Inuit youth involvement. Many specifically discussed the types of contributions they thought Inuit youth could make to environmental research.



**Fig. 5.** Impact of Inuit youth engagement on environmental research according to workshop contributors in Pond Inlet ( $n = 16$ ).

## Inuit youth perspectives and ideas

Our study contributors indicated that young people have dynamic minds that make them curious and help them think “outside the box”. Contributors saw Inuit youth’s ability to grasp new concepts, raise questions, and develop ideas as assets in conducting rigorous research. One contributor contrasted the learning styles of Inuit youth and their more senior counterparts:

“[O]lder folks are [...] used to doing things a certain way. And they don’t really—since they’ve done it for so long, a certain way—they don’t really think about the whole process, step by step. But if they start explaining it then the young person can start thinking, ‘We can change it this way, or we can do it better this way.’ Or something like that.”—Rhoda Katsak, Pond Inlet (2018)

Workshop contributors emphasized that Inuit youth have certain characteristics that they thought would make the research process more dynamic. Specifically, they said that Inuit youth are energetic, fun, and make land-based activities more interesting. One workshop contributor specifically noted that Inuit youth’s energy lends itself particularly well to greater productivity. Results also showed that Inuit youth are seen as thinkers and innovators, making them strong research partners. **Fig. 5** shows responses from workshops where contributors were asked about the impact of local Inuit youth engagement on environmental research.

Quite specifically, youth contributors believed they had a lot of land-based experience and knowledge that could serve to help southern-based researchers. In an interview, one anonymous interview contributor observed that “[southern-based] researchers have knowledge but not experience” (Pond Inlet, 2018), whereas many Inuit youth in Pond Inlet have significant experience on the land but may have limited scientific knowledge. Although their skills and knowledge may not yet be equal to those of older generations, giving recognition to Inuit youth’s capabilities and contributions may strengthen relationships between southern-based researchers and Inuit youth, incorporate aspects of IQ into the research process, and be informative to a variety of areas of study overall (Healey and Tagak 2014; Ferrazzi et al. 2018; Pedersen et al. 2020). Contributors identified both southern-based researchers and Inuit youth as having something valuable to contribute to research partnerships.

### Inuit youth skills and leadership

Contributors reported that skills and competencies held by Inuit youth can come in many different forms. Examples of Inuit youth’s land-based capabilities included having survival and emergency skills, weather interpretation skills, knowledge about sea ice conditions, knowledge about wildlife, and familiarity with commonly used travel routes. As skills that are already developed, these are advantageous for researchers who are looking for competent partners. In addition, contributors observed that Inuit youth are “tech savvy”, setting them apart from older generations of Inuit. More specifically, Inuit youth in the community are computer literate and are able to understand and operate technical equipment. According to Dale and Armitage (2011, p. 5),

“Inuit youth may have a better understanding of English, of math, of science, or of computers. Having this knowledge, younger Inuit may be better able to participate in wildlife management and in governance more generally.”

Therefore, in addition to diverse environmental and wildlife knowledge that Inuit youth have acquired, they are also generally more adept users of technology than their more senior counterparts.

Importantly, some contributors remarked that it is the ability to “bridge two worlds”—North and South, old and new, traditional and modern—that makes Inuit youth strong research partners. In bridging these worlds, Inuit youth can improve community-researcher expectations, ethics, and accountability in the research process (Pedersen et al. 2020). It was observed that many Inuit youth saw themselves as being uniquely positioned to work at the interface of research and their community. Accordingly, Ikaarvik coined the term “SciQ,” which reflects the bridging of science and IQ in research to which Inuit youth are uniquely positioned to contribute (Pedersen et al. 2020). There is an increasing emphasis on the need for the coupling of IQ and research, moving beyond “mining” Inuit for information about the environment and wildlife and bringing IQ values into the research approach (Ferrazzi et al. 2019; Henri et al. 2020b; Pedersen et al. 2020; Wong et al. 2020). In essence, strategies for meaningful engagement, employing approaches such as Ikaarvik’s SciQ concept, should empower Inuit youth to confidently conduct research while upholding both scientific and Inuit values. Contributors reported that Inuit youth who develop both Western scientific and local Inuit knowledge today would make the best-informed environmental leaders in the future.

“That’s kind of knowledge that you can get from the youth ‘cause they know the land. They’ve grown up in it. They’ve seen the environment”—Joshua Idlout, Pond Inlet (2018).

Enhancing youth’s scientific literacy has the potential to develop their capacity in and ownership of research (Ballard et al. 2017; Wilson et al. 2020; Wong et al. 2020). In turn, having a sense of ownership of the research can help to motivate communities to further develop and sustain their research programs over the long term (Johnson et al. 2013). Capacity developed through participatory research models also has the potential to give rise to knowledge mobilization for decision-making in the future

(Danielsen et al. 2010; Johnson et al. 2016; Henri et al. 2020b; Wilson et al. 2020). Aaluk et al. (2019, p. 2) explained that

“... building capacity in Indigenous communities in this context should lead to, among other things, improved self-determination, access to information required to effectively respond to development and climate change pressures, and the skills, knowledge and confidence to work as true partners with the broader research community to address local research priorities.”

Contributors reported that long-term research partnerships should ideally result in Inuit youth developing skills and knowledge that can also be applied to their other endeavours in the future. Results from this study showed that scientific literacy is an important part of preparation for the future of Pond Inlet, especially in the face of a changing climate, increasing tourism, and natural resource development (Aaluk et al. 2019). Contributors believed that Inuit youth care deeply for their community and surrounding environment, and that their commitment to both will impassion them to take ownership of local research.

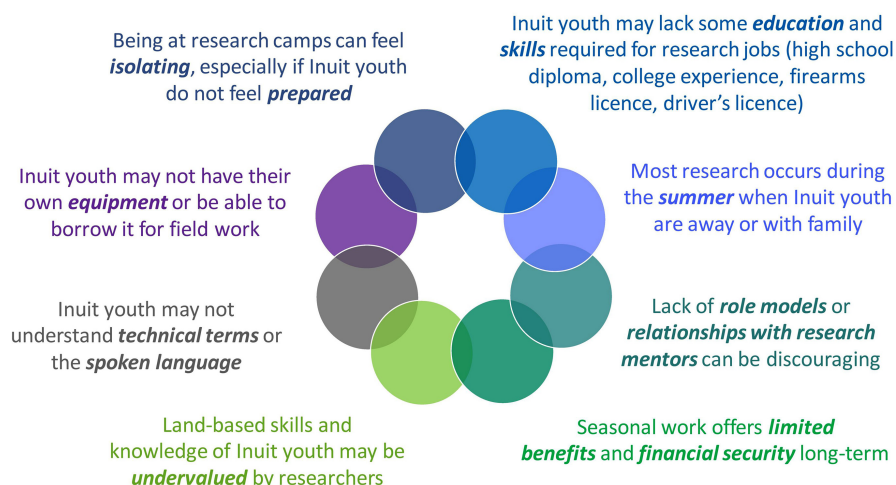
Contributors indicated that they would like more research to be conducted by Inuit youth themselves within current monitoring and research efforts. This would require substantially more mentoring from southern-based researchers to enhance the youth's research capacity, which would also align with the *National Inuit Strategy on Research* for Inuit Nunangat (Inuit Tapiriit Kanatami 2018). It was widely recognized among both interview and workshop contributors that Inuit youth's aspirations and goals in research, conservation, and environmental stewardship would benefit from engagement in research. However, Inuit youth's ability to participate in research may be affected by a variety of factors.

## Barriers

To better identify strategies to encourage Inuit youth involvement in environmental research, contributors were first asked if they knew of barriers that Inuit youth in Pond Inlet faced in becoming meaningfully engaged. Answers ranged greatly and sometimes depended on the level of involvement Inuit youth wanted to have in research activities. A variety of obstacles may impact Inuit youth's ability to participate in environmental research. A summary of these barriers is shown in Fig. 6.

Contributors indicated that two main barriers may underscore the challenges to Inuit youth engagement in environmental research: a lack of credentials and a lack of personal support systems. First, Inuit youth may not have the credentials required to work on scientific research projects. Credentials included both formal accreditations, such as a high school diploma or post-secondary experience, and other more informal capabilities, such as the ability to operate equipment like boats, snow machines, and firearms. For Inuit youth looking to be involved in research activities that can enhance their scientific literacy, participation may be discouraged due to insufficient educational attainment. Contributors observed that some Inuit youth with extensive land-based experience found school to be quite challenging but were equally motivated to work in environmental research as their more academically inclined peers. Although educational attainment is not a reliable indicator for determining how well youth will learn and perform new skills (Pearce et al. 2011), contributors reported that high school completion and (or) post-secondary experience were often listed as job requirements for environmental research positions, limiting the work that some Inuit youth could apply for.





**Fig. 6.** Summary of community perspectives on barriers to Inuit youth engagement in environmental research according to interview and workshop contributors in Pond Inlet ( $n = 41$ ).

“This is why a lot of people step back. I see a lot of people, because they don’t have the high school diploma or the training they need, they won’t apply for jobs. I tried to tell them that you don’t really need it, it’s ok if you don’t have that grade twelve diploma. You can get on-the-job training.”—Karen Nutarak, Pond Inlet (2018).

For those who prefer to support or facilitate research projects as guides, drivers, and camp managers, the credentials listed above must sometimes be accompanied by a need to supply such equipment, though many Inuit youth may not be able to afford their own equipment (especially in the absence of regular work) or borrow it from others. Contributors indicated that some employers also required security clearance prior to commencing work, which can be a time-consuming process and deter Inuit youth participation. For those wishing to engage in other levels of the research process, such as data collection, data analysis, or research design, for example, formal academic credentials and research experience may be expected.

Second, many Inuit youth may lack the personal support systems that would allow them to become more involved in research initiatives. Some contributors observed that a lack of role models or encouragement in the home and at school could easily reduce Inuit youth’s sense of their own abilities to pursue their goals. Additionally, a lack of interpersonal relationships with and mentorship from researchers was strongly linked to insufficient support systems for Inuit youth.

“How do you aspire to anything? How do you know—well, even, how do you know you could be a researcher if you’ve never encountered a researcher who takes time to tell you what it is that they do?”—Shelly Elverum, Pond Inlet (2018).

Contributors also remarked that Inuit youth often had responsibilities at home or had their own families to support, limiting the time they could comfortably spend outside of the community to work in the field. Nunavummiut already experience high rates of unemployment, including structural unemployment (a mismatching of the skills held by people and the skills that are required for the available jobs) ([Impact Economics 2012](#)). Notably, study contributors indicated that underemployment was a more common issue among Inuit youth, which can be defined as “the underutilization of the productive capacity of the employed population,” including involuntary part-time work, short-term work, work below a person’s skill level, and insufficient wages ([Sengenberger 2011](#), p.11).



Underemployment and other forms of precarious work come with certain risks, namely low wages and slow wage growth, job insecurity (increased risk of job loss and temporary work), and limited access to benefit and pension packages ([Organizations for Economic Cooperation and Development 2015](#); [Library of Parliament 2018](#)). At least three study contributors reported that they would like to work on research projects but would not be able to because the work would only last a short time or not pay enough to support their families. Ultimately, the seasonal nature of work so frequently offered through southern-based research projects is likely insufficient when compared with the financial needs of many Inuit youth.

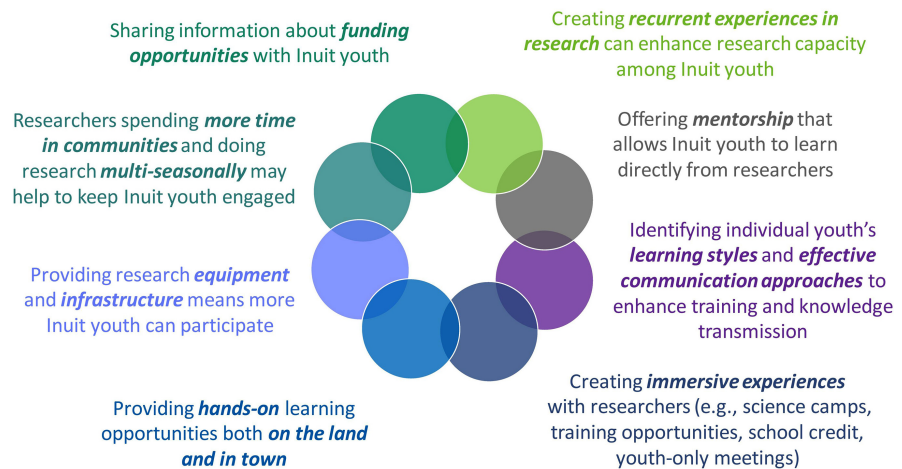
In addition to a lack of credentials and personal support systems, numerous other barriers were reported by contributors. Some described a conflict between wanting to work on research occurring between late spring and early fall and wanting to enjoy camping and other seasonal outdoor and culturally important activities with their families. Another reason disclosed by contributors who had previously participated in field- or land-based research was that many Inuit youth were not well-informed about the realities of work at field camps. For example, some contributors reported that they had felt (or heard of others feeling) out of place at field camps due to isolation from family and friends. During workshops, contributors also discussed having not been permitted to hunt while at field camps, consequently being limited in doing certain activities they usually enjoyed. Language barriers—including both spoken language and use of technical jargon by researchers—were also identified as obstacles to meaningful interactions between Inuit youth and researchers at field camps as well as in town. Technical jargon in particular is not widely used outside of research projects and can be difficult to understand without additional training. Contributors also commented on land-based skills, noting that many Inuit youth have acquired pertinent skills and knowledge from their family members, though it is not always recognized as valuable by researchers. All of these factors contribute to barriers to Inuit youth engagement in environmental research.

## Strategies

Contributors were asked about strategies that could be used to increase Inuit youth engagement in environmental research. Two main strategies were identified by contributors: balancing town-based and land-based experiences and building stronger research relationships. In addition, many other strategies were brought forward by contributors, including a few specific “new directions”. Strategies discussed by contributors are summarised in [Fig. 7](#). Many strategies, but not all, were linked to barriers identified by contributors.

### Experiential learning in town and on the land

To begin, contributors frequently talked about the value of opportunities to engage in research in town but also stressed that Inuit are inextricably connected to their surrounding environment. Our research questions focused on contributors’ experiences and thoughts about working on the land or in field camps; however, contributors frequently spoke about engagement strategies based in town as well. Results indicated that balancing opportunities to experience research both on the land and in town is relevant to enhancing Inuit youth scientific literacy and promoting research engagement. Contributors noted that activities in town have a greater reach (to include more people) than those taking place on the land or in field camps. Discussions of town-based activities were frequently linked to empowering Inuit youth to become impassioned about environmental science through increased exposure. Experiential (or hands-on) learning in town was connected to interactive presentations and activities, workshops, and presentations of artifacts or samples already collected from field work. Similarly, in Cape Dorset and Coral Harbour, Nunavut, [Henri et al. \(2020a\)](#) found that support existed for a combination of in-town (school-based) and on-the-land learning opportunities.



**Fig. 7.** Summary of community perspectives on strategies to Inuit youth engagement in environmental research according to interview and workshop contributors in Pond Inlet ( $n = 41$ ).

Contributors noted that Inuit youth were traditionally expected to learn through observation but remarked that Inuit youth now seem to prefer hands-on learning over observation or lectures. Research has examined the benefits of school-based learning, showing namely that, in a school setting, learning is decontextualized so that it may be widely applied as a tool in diverse scenarios (Barab and Hay 2001). At the same time, experiential learning provides opportunities to both acquire and apply context-specific knowledge (Barab and Hay 2001). Connections have been made between personal or contextual relevance and increased learning performance for youth, notably for those with “low expectations of success” for themselves in school (Hulleman and Harackiewicz 2009). Ultimately, study contributors thought that balancing research exposure in town with time on the land or in field camps was one of the best ways to encourage Inuit youth to pursue scientific studies.

Contributors frequently cited early exposure to science (for example, as early as elementary school) as being a driving factor in motivating Inuit youth to pursue careers and studies relating to the natural environment and wildlife. This position is supported by research that shows long-lasting interest development can occur early in childhood (Crowley and Jacobs 2002). Some contributors also indicated that Inuit youth are ready to begin learning about traditional land-based activities around the ages of 11–14 years. Development of knowledge in areas of interest can be influenced by access to informational sources, having people with whom to discuss ideas and information, and participation in activities that perpetuate learning (Crowley and Jacobs 2002). Contributors generally agreed that experiential learning was the most suitable way to engage young Inuit in environmental research, a finding echoed by Henri et al. (2018) and Gérin-Lajoie et al. (2018). In the context of field-based experiential learning, associated activities were cited as collecting samples, recording readings and measurements, wildlife tagging and tracking, and long-term monitoring. Importantly, experiential learning and time spent on the land may also present opportunities for IQ to become part of the research process.

## Importance of mentorship and relationships

Having greater opportunities to work directly with researchers was also identified as a key strategy to promote greater Inuit youth engagement in research based in and around Pond Inlet. The importance of relationships and interacting face-to-face with southern-based researchers was paramount within

workshop discussions. Contributors discussed the significance of having someone experienced to talk to about their research interests, help them with educational and funding applications, and mentor them in developing careers in research (Sadowsky 2019). In an interview, one contributor and co-author said,

“Maybe just have a simple tea and coffee. Tea or coffee, just talk about the subject and just roll with it. Knowledge sharing in a very impromptu way, you know? That’s the best part about having any researchers [here] because you get to talk about something [...] out of the box.”—Alexandra Anaviapik, Pond Inlet, (2018).

Contributors defined mentorship as being both a professional and a personal relationship. Relationships in which mentors affirm the value of youth’s work in their research has been found to enhance learning and the desire to perform research-related tasks well (Barab and Hay 2001). The workshop group further stressed the importance of forming long-lasting friendships with southern-based researchers. It was important to feel familiar and at ease with each other and to get to know one another as peers. An article authored by members of Ikaavik identified the importance of being a “human first and a researcher second” as a characteristic of meaningful research relationships, stating, “[i]ntroduce yourself as a person, not as a set of credentials” (Pedersen et al. 2020, p.334). Research partnerships are strengthened by a sense of familiarity that is built over time (Johnson et al. 2013). The sense of relationship also strengthens accountability and each party’s desire to move forward in ways that are mutually beneficial (Ferrazzi et al. 2018; Wilson et al. 2020; Wong et al. 2020). These relationship characteristics may be especially relevant in Inuit communities, as they link to concepts of relational accountability identified in Indigenous research methodologies (Wilson 2008; Healey and Tagak 2014; Morton Ninomiya and Pollock 2017; Ferrazzi et al. 2018).

Although this study was designed to look at researcher–youth interactions, it was found that approximately one-third of interview contributors wanted to see this relationship expanded to include other knowledgeable Mittimatalingmiut. Within the context of our research, “experienced” Mittimatalingmiut could refer to any community members that contributors deemed to have valuable knowledge and experience to contribute to Inuit youth’s land-based skills and scientific literacy. Having Inuit mentors was reported to help Inuit youth cultivate a broad body of local and Traditional Knowledge and land-based skills, including IQ, which could complement scientific environmental knowledge. It has been suggested that youth-focused research experiences that are inclusive of other community members may facilitate the intergenerational transmission of Inuit knowledge (Brunet et al. 2014; Henri et al. 2020a; Wilson et al. 2020). As an example of this dynamic relationship style in research working at the interface of Inuit and Western sea ice science in Pond Inlet, see the *Sikumiut* model in Wilson et al. (2020).

## Strategies and new directions for engagement

Contributors described a number of other strategies that could increase Inuit youth engagement in environmental research. To begin, some contributors reported that Inuit youth in the community were unaware of research opportunities, so improving communication between researchers and young people was very important. Methods recommended specifically to reach Inuit youth included making local radio announcements and posting on the Pond Inlet community Facebook page. A study by Henri et al. (2020a) revealed that, while the use of social media may be appropriate in one community, it may not be as efficient in others, depending on the scale of local use and internet connectivity. In the case of Pond Inlet, there was a noteworthy amount of support for the use of social media among contributors. Though not specific to targeting Inuit youth, some additional communication suggestions included having a booth at the local stores or flea market, going on two-way radio

(such as CB or VHF), and hosting meetings in the Community Hall or Visitor's Centre that would be open to the entire community.

Some contributors thought that identifying different youth learning styles would also be a wise strategy. On several occasions, a distinction was made by contributors between "book learning" and "experiential learning". In addition, one contributor remarked that researchers should also identify how their youth counterparts prefer to learn, either within peer groups or on an individual basis.

"Researchers should take time to learn what works best for the people they are working with"—Anonymous interview contributor, Pond Inlet (2018).

Some contributors also thought that recurrent research experiences and hiring the same Inuit youth year after year would be beneficial for enhancing scientific literacy among Inuit youth and potentially nurture interest in research leadership in the long term. [Crowley and Jacobs \(2002, p. 337\)](#) discussed the impact of repeated and deepening exposure to "domain-specific declarative knowledge, repeated practice in interpreting new content, making inferences to connect new knowledge to existing knowledge, [and] repeated conversations with others who share or want to support the same interest" in developing knowledge and expertise in a subject.

Similarly, many contributors thought that greater Inuit youth engagement would be facilitated if southern-based researchers were able to spend more time in town overall. Research is often carried out seasonally around Pond Inlet ([Gearheard and Shirley 2007](#); [Inuit Tapiriit Kanatami and Nunavut Research Institute 2007](#)), yet contributors thought Inuit youth would be more encouraged to become involved in research if it were visibly being conducted inter-seasonally. [Brunet et al. \(2014\)](#) noted that "idle time" in town can contribute to the development of community-researcher relationships. In addition, time in town could be used to help prepare Inuit youth for what to expect at field camps, get to know the research team, and become familiarized with research methods and equipment before heading into fieldwork.

Contributors also disclosed that, to help facilitate participation, southern-based researchers should provide the equipment necessary for participation in projects. They added that Inuit youth would benefit from having access to laboratory space and research tools to continue working on projects after the southern-based research teams leave (also contributing to multi-seasonal research), as a lack of equipment and infrastructure can stifle the sustainability of participatory research ([Gearheard and Shirley 2007](#); [Johnson et al. 2013](#)).

The idea of a collaborative science camp was brought up by some contributors, which could take place directly in Pond Inlet during the summer when researchers are already traveling to the area. Mittimatalingmiut and southern-based researchers could co-host educational sessions spanning several days or weeks, combining in-town and on-the-land activities and covering both Inuit and Western scientific knowledge and skills. Contributors reported they were aware that a science camp had taken place in or around Pond Inlet in the past; however, it may not have been accessible to all Inuit youth wanting to participate because of limited participant spaces. Contributors also did not know if the camp in question operated annually or the degree to which southern-based researchers were involved. It has been suggested that science camps located in youth's own geographic area increase both interest in the subjects of study and help youth to see how a variety of science is relevant to them ([Karagatzides et al. 2011](#)). [Barab and Hay \(2001\)](#) reviewed the potential impacts of science camps and the apprenticeship approach to learning science. They emphasised that, although short-term endeavours (two weeks, for example) were not sufficient to turn "peripheral participants" into "core scientists", context-specific practice builds understanding and authenticity of research (participants feeling that they made valuable contributions to real science projects) was important for kindergarten to grade 12 aged students. Long-term, repeated engagement and immersive exposure

such as that offered at science camps with apprenticeship-style experiences were effective in helping to move youth closer to the “core” (Barab and Hay 2001).

Another proposed strategy was giving students school credit for research, which could also be either connected to science camp or be designed separately with the local school board. Hulleman and Harackiewicz (2009) linked opportunities for youth to pursue subjects of personal relevance to improving academic outcomes, especially among students with low expectations of their own academic performance. Creating opportunities to combine research with school work may seem intuitive; however, contributors had difficulty identifying examples of current research that aligned with their interests and perceived community priorities. As such, giving school credit for research may also incentivise Inuit youth to develop an interest in areas of study to which they may have previously been indifferent or were unaware of.

“Even getting the school more involved would—like, talking, for you to talk with DEA [District Educational Authority]—would be awesome because then maybe they could want to create curriculum for high school students. Actually doing projects with the high school students to get the marks. And then, right there you’ll see who’s actually passionate about the whole environmental stuff.”—Eleanor Pitseolak, Pond Inlet (2018)

Next, one contributor reported remembering that, as a youth, she was not allowed into community meetings. It was suggested that youth-only meetings could be held to discuss current environmental research projects taking place around Pond Inlet. Contributors also speculated that educational trips outside of the community could be used to help inspire Inuit youth to pursue research. Such trips might include going to conferences, museums, and research institutions to introduce Inuit youth to different careers and prospects in scientific research.

“Especially for the younger generation, since here in the Arctic we are very isolated, Internet is very slow [...] and TV programs are the same thing over and over, repeatedly. They should be traveling more and [...] they would dedicate themselves more into detail.”—Abraham Kublu, Pond Inlet (2018)

Finally, many contributors discussed funding as a strategy for encouraging Inuit youth engagement in environmental research. Contributors thought that research funds should be directed toward programs that align with local research priorities whenever possible, which would make it more interesting for Inuit youth from Pond Inlet. Contributors who had more extensive experience working on research projects also noted that it is difficult to know how and where to apply for research funding, which was seen as a key step toward running community-led projects designed to specifically address local priorities (Johnson et al. 2016). Since funding is not typically available to individuals, building funding and programs that are accessible to or linked to key community groups or organizations may have greater potential to elicit funding (Johnson et al. 2016; Wong et al. 2020). Contributors with greater research experience identified the importance for early-career Inuit researchers to know where, when, and how to apply for funding.

“I usually say this, that I would like to see more Inuit becoming a researcher to do their research projects. I think there’s lots to study, especially in Pond Inlet, maybe, where there’s lots going on around town or outside of town. I would want to see more young Inuit doing stuff. It’s just, the funding. And I think even you need to find someone that can work to find funding for it. It’s not easy to find to get money to do stuff like this. But, I think Inuit would have more opportunities—opportunity to become researchers.”—James Simonee, Pond Inlet (2018)

Some contributors reported having already helped others with funding applications and thought that, if southern-based researchers could teach Mittimatalingmiut to find and apply for funding, this



skill would be an asset in encouraging Inuit youth to become more involved in environmental research.

## Conclusion

This case study yielded rich qualitative data for inductive location-specific theory building (Eisenhardt and Graebner 2007), though it may still be broadly applicable in similar contexts in other northern communities. Although not financially feasible within this project, conducting similar studies in other Inuit Nunangat communities may prove beneficial in identifying and expanding upon the themes that emerged from our study.

This study sought to explore community perspectives on strategies to increase Inuit youth engagement in research. Our findings reflected the need for recurrent, immersive experiences and reciprocity throughout the research process. Further, many facilitative factors, such as having access to mentors—specifically mentorship-style relationships between researchers and Inuit youth—and hands-on research experiences in a variety of settings may help to improve Inuit youth engagement in research, as well as help to enhance their scientific literacy. Importantly, youth empowerment and capacity-building can be derived from mentorship and multi-directional knowledge transmission among southern-based researchers, Inuit youth, and other Mittimatalingmiut.

By extension, this study identified a complex set of barriers that may hinder Inuit youth's ability to engage in environmental research in a way that meaningfully enhances their scientific literacy and meets their desired outcomes from research partnerships. The two main barriers to Inuit youth engagement identified by contributors included a lack of various credentials and a lack of personal support systems. Importantly, while southern-based researchers have the capabilities to address a number of barriers faced by Inuit youth, such as language barriers and field equipment needs, broader systemic barriers, such as conditions contributing to chronic economic instability, are many times beyond their immediate scope of influence. Though it was not within the scope of this study, southern-based researchers may also encounter systemic barriers that could diminish their capacity to engage Inuit youth more extensively. For example, southern-based researchers frequently operate under tight schedules and deadlines, have limited funding for community-level outreach and engagement, rapidly expend funding due to the high cost of northern travel, and require significant amounts of resources to access remote field sites (Mallory et al. 2018). As such, we acknowledge that the responsibility does not lie solely with southern-based researchers to address barriers and limitations in Inuit youth environmental research engagement; indeed, many individuals and institutions have a role to play in tackling systemic barriers that impact youth engagement capacity.

At the same time, contributors of this study believed that it does indeed fall within the purview of southern-based researchers to create a variety of opportunities for Inuit youth to partake in research by building appropriate levels of funding into their field expenses and seeking out dynamic, multi-faceted community-based partnerships. Ultimately, the barriers that Inuit youth face and strategies that may be helpful for increasing research engagement can vary greatly from person to person. Accordingly, southern-based researchers should work to understand the barriers faced by their Inuit youth partners and identify ways to overcome them through appropriate strategies. Although the mentorship that researchers can provide to Inuit youth cannot replace the guidance of Inuit Elders and family, we believe that researchers may nonetheless facilitate opportunities for Inuit youth to gain training and mentorship in science through diverse field- and land-based experiences.

This paper has also suggested that many Mittimatalingmiut find significant value in having Inuit youth assume roles in research that will serve the community's interests in the long term. This support may promote Inuit leadership and self-determination in research in line with the goals of the National

Inuit Strategy on Research (Inuit Tapiriit Kanatami 2018), which may be achievable through greater Inuit youth research engagement and enhanced scientific literacy supported by southern-based researchers. Further, meaningful engagement of Inuit youth in environmental research is an important step in facilitating mutually beneficial, long-term partnerships in research. However, capacity development through scientific research should also empower Inuit youth to uphold their values and act as stewards for their community. Though this study focused on field- and land-based experiential learning pathways, we believe that capacity development should also extend into fostering Inuit youth's leadership in environmental research. Contributors from Pond Inlet stressed the need to foster Inuit youth's learning pathways in ways that transcend perceived boundaries between Western science and Inuit Qaujimajatuqangit. The inclusion of Inuit Qaujimajatuqangit in scientific literacy for Inuit youth further ensures that Inuit values and community research priorities are upheld in the long term, underpinning the well-being and resilience of Inuit communities (Pedersen et al. 2020). We believe that Inuit youth are uniquely qualified to assist and lead research in Nunavut into the future. Effective research partnerships foster interpersonal relationships, create opportunities for Inuit youth to participate in research, contribute to Inuit youth's scientific literacy, and empower Inuit youth to feel that they are making valuable contributions to research and to their community.

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## Author contributions

HS, NDB, and DAH conceived and designed the study. HS, NDB, AA, AK, and CK performed the experiments/collected the data. HS, NDB, AA, AK, CK, and DAH analyzed and interpreted the data. HS, NDB, AA, AK, CK, and DAH contributed resources. HS, NDB, AA, AK, CK, and DAH drafted or revised the manuscript.

## Competing interests

The authors have declared that no competing interests exist.

## Data availability statement

All relevant data are within the paper.

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