

"If you show them respect, you're going to [get] respect back": a theory for engaging First Nations for knowledge translation within a national nutrition and health survey

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Abstract

Introduction: Knowledge translation (KT) research aims to bridge research results and knowledge application and can be applied to address nutrition-related health inequities. Despite the increasing emphasis on engaging Indigenous communities in research, our understanding of how community engagement can achieve Indigenous KT is limited. Further, no previous research has studied the incorporation of traditional foods in engagement activities for KT. Food, Environment, Health, and Nutrition of First Nations Children and Youth (FEHNCY) is a nationally representative survey working with 60 First Nations communities in Canada to understand the relationships between the environment, food, nutrition and, health. The goal of FEHNCY is to inform policies and programs that address First Nations' health needs. The FEHNCY Community Engagement and Mobilization component partners with First Nations communities and community stakeholders to support the translation of research findings into action.

Objective: This study aimed to examine how, for whom, and in what circumstances, the FEHNCY Community Engagement and Mobilization impacted KT and the specific role of traditional foods in supporting KT.

Methods: Data generation was conducted in a rural community and another semi-urban community located in the Atlantic and Eastern regions of Canada. An Advisory Circle from each community guided the data generation, engagement, interpretation, and approval of findings. A total of 26 in-depth interviews with community partners and FEHNCY team members followed by one modified Talking Circle and two focus group discussions were conducted. A combination of inductive and deductive coding was used to develop a theory connecting community engagement with KT that was grounded in the data.

Results: Our findings highlight five major themes highlighting the KT pathways spanning contexts, interventions, mechanisms, and outcomes. First, participants described the societal, study, and community-level contextual factors impacting successful community engagement for KT. The broader societal context of the COVID-19 pandemic and the unearthing of childrens' graves at residential schools affected engagement processes. The community context was characterized by self-determination and resilience in their cultural foodways and practices despite the colonial history and legal barriers limiting traditional foods access. Second, essential community engagement strategies included supporting Indigenous leadership within the research

team, supporting community decision-making, promoting project visibility, applying youth-specific engagement strategies, and incorporating Indigenous knowledges, methodologies, cultures, and languages. Given the community contexts, sharing traditional foods was highlighted as an important engagement activity to express local knowledge and build relationships. Third, the mechanism of community engagement as relational refers to the process of establishing, building, and maintaining partnerships throughout the research process. Fourth, valuing Indigenous knowledge systems was described as another mechanism contributing to decolonizing research. Lastly, participants described the following KT outcomes that they identified as important: contribute to reconciliation efforts, improve research findings, support individual and household awareness, enhance community program planning, bolster funding requests, and foster inter-community mobilization for regional and national changes in policy and programs.

Conclusion: Given the unique history of Indigenous communities with research, strategies that promoted Indigenous leadership with diverse partnerships and supported shared decision-making were essential. Traditional foods in engagement interventions had the potential of activating both mechanisms of relationship building and valuing Indigenous knowledges in the KT pathways to achieve the outcome of applying research on different levels. To our knowledge, this study is the first to collect data outlining KT pathways and develop a theory demonstrating how contextual factors interact with essential engagement interventions needed to trigger mechanisms for KT outcomes on multiple levels in nutrition and health research with First Nations communities.

Résumé

Introduction : La recherche sur l'application des connaissances vise à combler une lacune entre les résultats et l'application de la recherche pour redresser les inégalités en matière de nutrition et de santé. Malgré les efforts récents pour impliquer les communautés Autochtones dans la recherche, la mise en œuvre de cela pour l'application des connaissances auprès les peuples Autochtones est sous-examinée. À ce jour, aucune étude de recherche s'est penchée sur le rôle des aliments traditionnels dans l'application des connaissances. Dans le cadre de l'étude sur l'alimentation, l'environnement, la nutrition et la santé des enfants et des jeunes des Premières Nations (FEHNCY) qui habitent sur les réserves, une enquête représentative est menée à l'échelle nationale avec 60 communautés des Premières Nations. Son but est d'examiner les relations entre l'environnement, la nourriture, la nutrition et la santé et d'informer les politiques et les programmes qui répondent aux besoins de santé des Premières Nations. Le volet de Mobilisation et de l'Engagement Communautaire (MEC) collabore avec les communautés des Premières Nations pour mettre en action les résultats de l'étude.

Objectif : Cette étude visait à examiner comment, pour qui, et dans quelles circonstances, le volet de MEC et les aliments traditionnels ont influencé l'application des connaissances.

Méthodes : La collecte des données a été faite dans deux communautés, en milieu rural de la région Atlantique et semi-urbain en région Est du Canada. Un Cercle Consultatif a été formé dans chaque communauté pour guider la collecte des données, l'engagement, l'interprétation et l'approbation des résultats. En tout, 26 entrevues ont été menées avec des partenaires de la communauté et l'équipe de recherche, suivis par un Cercle de Parole modifié et deux discussions de groupes. Une approche réaliste qui combinait le codage inductif et déductif a été utilisée pour raffiner la théorie de programme du volet de MEC.

Résultats : Les résultats ont révélé cinq thèmes principaux qui composent les voies vers l'application des connaissances réparties à travers les contextes, les interventions, les mécanismes et les résultats. Premièrement, les participants ont décrit que le contexte élargi de la pandémie COVID-19 et la confirmation des sépultures non-marquées du pensionnat à Kamloops ont influencé les processus d'engagement. Les facteurs contextuels importants étaient la conception et les sujets de l'étude. Le contexte de la communauté était marqué par l'autodétermination et la résilience de leurs pratiques alimentaires culturelles malgré l'histoire coloniale et les barrières légales qui limitent leur accès. Deuxièmes, les stratégies essentielles d'engagement étaient

centrées sur la direction Autochtone dans l'équipe de recherche, la prise de décision provenant de la communauté, la visibilité du projet, des stratégies d'engagement distinctes pour les adolescents, et l'intégration des connaissances, des méthodologies, des cultures et des langues Autochtones. Étant donné les contextes communautaires, les participants ont accentué l'importance d'intégrer des aliments traditionnels afin de permettre aux communautés d'exprimer leurs façons de faire et de faciliter le développement des relations entre l'équipe de recherche et les communautés. Troisième, le mécanisme de prendre une approche relationnelle pour l'engagement communautaire était un processus à développer en partenariats. Quatrième, la valorisation des systèmes de connaissances Autochtones était un autre mécanisme qui décolonisait la recherche à travers des pratiques culturellement sécuritaires. Dernièrement, les participants ont identifié les résultats suivants étant importants pour l'application des connaissances : contribuer à la réconciliation, améliorer la qualité de la recherche, sensibiliser les individus et les familles dans la communauté de la nutrition, améliorer les programmes communautaires, soutenir des demandes de subvention et encourager la mobilisation intercommunautaire pour des changements de politiques et de programmes régionales et nationales.

Conclusion : En considérant l'histoire unique des communautés Autochtones, les stratégies qui donnaient de l'appui à la direction Autochtone et la prise de décision partagée étaient essentielles. Les aliments traditionnels dans les interventions d'engagement avaient le potentiel d'activer les deux mécanismes de développer des relations et de valoriser les connaissances Autochtones. Cette étude est la première à souligner les voies de l'application des connaissances et démontre l'interaction entre les contextes, les stratégies d'engagement essentielles, les mécanismes et les résultats d'application des connaissances dans la recherche en nutrition avec les Premières Nations.

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List of Abbreviations

CAC	Community Advisory Circle
CBPR	Community-Based Participatory Research
CIMO	Contexts, Interventions, Mechanisms, Outcomes
FEHNCY	Food, Environment, Health and Nutrition of First Nations Children and Youth
KT	Knowledge Translation
OCAP	Ownership, Control, Access, and Possession principles

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Contribution of Authors

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Jolian is a master's thesis candidate who was the main author. She assisted with research ethics board applications for the initial submission and amendments by developing the corresponding documentation needed for the addition of focus group discussions, an increased number of participants, and an additional community for data generation. Jolian conducted the literature review, supported the development of the research design to examine the role of traditional foods as a secondary objective, contributed to the research instruments including interview guides, and developed PowerPoint presentations for group discussions and colloquium. She conducted the data generation and analyzed the transcribed interviews and group discussions, co-coordinated research meetings, supported engagement activities, presented to the CAC, incorporated feedback from CAC members, and wrote the thesis.

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Dr. Jock is the thesis supervisor and provided guidance throughout the whole process of the thesis development and research. She co-developed the initial program theory for the Community Engagement and Mobilization component, designed the research methodology, and drafted the original design of this study. Dr. Jock provided in-depth revisions in the writing process and presentations developed for colloquium and community partners.

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Dr. Dave Bergeron

Dr. Bergeron is an external thesis committee member who co-developed the methodology with Dr. Jock and provided revisions for this thesis.

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The Advisory Circle members provided insight and guidance for this research study. They approved the study and contributed to giving feedback on preliminary findings and results. One member in particular provided direction during the analysis of the results and participated in the revision of the results and community description sections of this thesis.

Chapter 1: Introduction

The use of community-based participatory research (CBPR) in Indigenous health research is recognized as an equitable approach to engaging with Indigenous communities throughout the research process (Minkler & Wallerstein, 2008). However, there remain significant gaps in understanding how community engagement supports knowledge translation (KT) in Indigenous contexts. First, little is understood about the vital interventions that are needed to support KT of nutrition-related research in a representative survey with First Nations children and youth. The Food, Environment, Health, and Nutrition of First Nations Children and Youth (FEHNKY) study provides a critical opportunity to study how community engagement supports KT in the context of a representative survey with First Nations communities across Canada. As Indigenous food sovereignty plays a central role in the health and well-being of Indigenous Peoples, research on community engagement with Indigenous peoples supporting Indigenous food sovereignty is key to promoting Indigenous health research (Jernigan et al., 2021; Elm-Hill, Webster & Allen, 2023). Traditional food systems are crucially linked to Indigenous food sovereignty (Jernigan et al., 2021). However, to date, no research has studied how traditional foods can support culturally safe community engagement for KT. Second, understanding how community engagement activities can trigger mechanisms necessary for supporting KT is vital to developing the most effective community engagement approaches. Third, exploring a range of KT outcomes that include changes in policy and programs can expand knowledge on KT processes in research. Fourth, integrating an in-depth understanding of the context and how it interacts with the community engagement activities to achieve outcomes of community engagement is needed to assess the transferability of findings and theory of community engagement in this First Nation community to other contexts.

The use of realist approaches can address the gaps identified in the literature on community engagement and KT. Realist approaches have the potential to unearth unintended findings in the data (The Ramses II Project, 2017). Realist approaches can also rigorously generate theories of complex interrelated social realities that reflect the complex dynamics of relationship building and the diverse community contexts within Indigenous communities (Bergeron et al., 2021; Jagosh et al., 2015; Smylie et al., 2016). A systematic review of the effectiveness of KT strategies used in public health encouraged the use of realist approaches to examine the context in which interventions related to KT work best (LaRocca et al., 2012).

Therefore, the study of how, for whom, and in what circumstances community engagement and cultural safety results in KT outcomes with First Nations will contribute to KT theory development in Indigenous health research.

Purpose. This study examined how, for whom, and in what circumstances FEHNCY community engagement activities result in improved conditions for KT within a nationally representative study of First Nations children and youth health status. The specific objectives of this research were: 1) to describe community and research team perception of implementing FEHNCY Community Engagement and Mobilisation 2) to describe how the contextual factors and underlying mechanisms connect community engagement with First Nations communities and cultural safety connect to KT outcomes 3) to identify essential engagement strategies that connect to KT 4) to describe the role of traditional foods in community engagement interventions for achieving KT outcomes.

Chapter 2: Literature Review

2.1. Indigenous populations in Canada and history of research.

Indigenous populations have predominantly experienced the “helicopter research” model when researchers descend into communities, collect data, and leave without returning results to the community or involving communities in research (Wilson, 2008). Because this research has tended to benefit researchers as opposed to the participating communities, this approach is, considered to be extractive and problematic (Wilson, 2008). As a result of this model of research, there is a perception among Indigenous peoples in North America that they have been ‘researched to death’ referring to the numerous studies that have been conducted without community benefit, and at times resulted in harm (Brant-Castellano, 2004). In Canada, the Constitution Act of 1982 defines Aboriginal peoples of Canada (from here on, the contemporary term Indigenous peoples will be used synonymously) and refers to three groups: First Nations, Inuit, and Métis (Constitution Act, 1982). Within each group, there exists a diversity of cultures and languages; First Nations peoples in Canada are from over 600 diverse Nations with over 60 different languages spoken across Canada (Aboriginal Peoples in Canada, 2018). Despite the abundance of research about Indigenous peoples, health inequities continue to exist. Therefore, it is imperative for researchers to evaluate how the application of research findings contributes to community benefits and the wider advancement of knowledge.

2.2. Understanding health, nutrition, and traditional foods in Indigenous contexts.

There are significant gaps in understanding nutrition behaviors, food security and access, and nutrition-related health outcomes. The “nutrition transition” describes the shift from traditional diets to Western diets occurring simultaneously with the increase in the rates of nutrition-related non-communicable diseases such as obesity, diabetes, and cardiovascular diseases (Popkin, 2002). Indigenous food systems as described by Jernigan et al. (2021), “are ancestral, linking all people to their Creator, to each other, and other forms of life”, promote multi-dimensional health, and “supports communities taking greater control over their food systems by increasing traditional and healthy food access and reducing dependence on externally produced, packaged, and fast foods”. Traditional diets are regarded as complete with higher fiber and micronutrients and lower saturated fat and refined carbohydrates (Blanchet et al., 2020; Batal et al., 2017; Kuhnlein & Receveur, 1996). Western diets include high amounts of saturated fat, sugars, and refined foods, and lower in fiber (Blanchet et al., 2020; Kuhnlein & Receveur, 1996).

In Canada, the Indian Act facilitated the nutrition transition of First Nations peoples through forced relocation to reserves and assimilationist tactics such as the Indian Residential School system, disrupted intergenerational knowledge transmission and participation in Indigenous Peoples' traditional food systems where hunting, gathering, planting, and, fishing from traditional territories had been practiced since time immemorial (Elm-Hill, Webster & Allen, 2023; Kuhnlein & Receveur, 1996; Delormier & Marquis, 2019). As such, Indigenous food sovereignty is central to promoting Indigenous health and leveling nutrition-related health inequities (Blanchet et al., 2021).

Strategies supporting Indigenous food sovereignty promote access to and the consumption of traditional foods (Blanchet et al., 2021; Tait-Neufeld & Richmond, 2017). Traditional food systems are important to cultural connectedness and cultural identity which are linked with Indigenous Peoples' well-being (Blanchet et al., 2021; Auger, 2016; Oster et al., 2014; Gray & Cote, 2019; Ironside et al., 2020). Traditional food practices symbolize reciprocity in a caring relationship Indigenous Peoples have with the natural world which includes the land, animals, plants, and the people living on the land (Skinner et al., 2018). Food is a connection to places from which Indigenous Peoples draw identity and belonging (Delormier & Marquis, 2018; Blanchet et al., 2021). From a Haudenosaunee perspective (People of the Longhouse), Indigenous food sovereignty can be understood as a social responsibility that was upheld to ensure enough food for all the current and future generations to be healthy (Delormier & Marquis, 2018). Food has been described as a vehicle for connection and a demonstration of sharing within social relationships. Indigenous Peoples' Food Systems promote harmony and provide a sustenance-based diet that expresses Indigenous cultural worldviews of ecological and spiritual relationships (Jernigan et al., 2021; Skinner et al., 2018; Branch, 2019; Delormier & Marquis, 2019; Delormier et al., 2009; Milburn, 2004). Traditional diets offered essential nutrients and foods that were high in nutrient density within a sustainable ecological framework (Coté, 2016; Wittman, 2011). Moreover, Indigenous Peoples' Food Systems are recognized as important systems protecting biodiversity (Morrison, 2011).

In the context of increasing intake of highly processed foods and the cost of food that is low in nutrient density but high in saturated fats and overall energy, traditional foods can offer solutions to nutrition inequities faced by Indigenous peoples (Batal et al., 2017; Kuhnlein & Receveur, 1996). The consequences of the shift from traditional foods can be seen in data from

the nationally representative survey of First Nations on reserve called First Nations Food, Nutrition, and the Environment Study. The results from the study revealed that, by region per year, the number of days traditional foods were eaten was highest in British Columbia (180 days) and lowest in the Atlantic (68 days), followed by Ontario (70 days), and Manitoba (107 days). A high prevalence (greater than 50%) of inadequate nutrient intakes was found for vitamin A, vitamin D, calcium, and magnesium among First Nations men and women aged 19 years and older (First Nations Food, Nutrition, and the Environment Study, 2019). However, when the nutrient composition of participating adults was observed on days when traditional foods were eaten, the mean intakes of magnesium ($p < 0.0001$), vitamin A ($p < 0.05$), vitamin D ($p < 0.0001$) were significantly higher than on days when traditional foods were not consumed (First Nations Food, Nutrition, and the Environment Study, 2021). In addition to meaningfully connecting with Indigenous cultures and building relationships, sharing traditional foods had significant contributions to nutrition and physical health.

2.3. Cultural safety and community engagement in research.

With the growing recognition of the importance of decolonizing research approaches, research with Indigenous peoples has increasingly incorporated cultural safety to support the respectful inclusion of Indigenous knowledges within research. Culturally safe research practices recognize underlying intersections of power differentials in society with cultural and historical impacts, including colonialism, on health inequities among Indigenous peoples (Cameron et al., 2010). A recent systematic review found that the meaningful involvement of stakeholders, following Indigenous practices and protocols, and communicating intentions and culturally relevant knowledge were effective for desired KT outcomes (Ninomiya et al., 2022). An example of cultural safety in research was Rasmus' (2014) process of indigenizing CBPR where community engagement supported community ownership and the integration of the local Yup'ik knowledge into the research activities and meetings. Further, community engagement has been described as a way for community advocacy of culturally grounded strategies with the inclusion of traditional knowledges in achieving Indigenous food sovereignty (Maudrie et al., 2021).

An example of doing culturally safe research was including food and traditional foods in community engagement research. In a qualitative process evaluation of engagement with Australian Aboriginal communities, community visits for building relationships and data generation activities using a traditional method for sharing stories were often centered around

food (Peake et al., 2021). In a project on eating healthy with Native Hawaiians, food was identified as having the power to build community by forming new relational bonds between strangers (Miles et al., 2018). It was also described as social and was shared throughout major life events and brought up memories from the past, present, and future (Miles et al., 2018). Similarly, food has also been conceived as having a fundamental role in the local culture of Torres Strait Islanders and for engagement between the community and the research team but has not explained how it led to study outcomes (Quigley et al., 2021). Quigley et al. (2021) have highlighted ways to incorporate food, the type of food and conditions in which food was shared were additional layers to understanding community protocols in respecting reciprocity when sharing food (Quigley et al., 2021). Morning tea and homemade cake with an intentional space setup were more accepted by the community than store-bought cakes and drinks that were more frequently declined as an opportunity to build trust and rapport prior to data generation activities (Quigley et al., 2021). A recent systematic review on KT practices in Indigenous health research critiqued peer-reviewed KT literature attributing KT processes mainly to discussing findings over a feast rather than building on the essential roles of kinship, social networks, and community protocols for effective KT (Ninomiya et al., 2022). In Fisher & Ball's (2003) logic model on collaborations between researchers and American Native communities, since serving meals was an essential activity consistent with the cultural values of the communities, they highlighted the need to establish an allocation of funds for community engagement. Although food is often integrated into community engagement interventions, the significance of including traditional foods in promoting cultural safety and enhancing engagement has not been explored for achieving Indigenous KT.

2.4. First Nations health inequities and knowledge translation.

Although traditional foods have nutritional advantages and play an important role in promoting cultural safety, there are several barriers for First Nations communities to access traditional foods. The most frequently reported barriers to traditional food access at the regional level were the lack of hunters, resources like money, equipment, transport, and time needed for traditional food practices. Other barriers were the lack of availability of traditional foods, lack of knowledge on traditional food practices, government regulations impacting hunting and harvesting practices, and the presence of industrial extractive activities such as mining, forestry, oil, gas, etc. (First Nations Food, Nutrition, and the Environment Study, 2019). Furthermore, the

weekly cost of food was \$26 to \$71 higher for First Nations communities than the average cost in major urban centers across Canadian provinces (First Nations Food, Nutrition, and the Environment Study, 2019). Within the Northern Affairs Canada Remoteness Index Zone, fly-in communities greater than 350km from the nearest service center had food costs that were \$112-140 higher than the other zones (First Nations Food, Nutrition, and the Environment Study, 2021). With shifting dietary patterns and food systems, the rates of food insecurity among First Nations households on reserve are 3 to 5 times higher than the national average of non-Indigenous populations, with the highest percent of moderate to severe food insecurity observed in Alberta (47.2%) and the lowest in Ontario (29.1%) compared to non-Indigenous population nationally (8.1%) (First Nations Food, Nutrition, and the Environment Study, 2021; Milburn, 2004). Food insecurity was significantly greater among households with children compared to those without children across all regions, the highest being 64% in Alberta (First Nations Food, Nutrition, and the Environment Study, 2021). The most recent rate of food insecurity among Indigenous households living off-reserve across the 10 provinces in Canada was 30.7% compared to a national average of 15.9% (Tarasuk & Fafard St-Germain, 2022). Current nutrition-related inequities and health outcomes for First Nations include the higher prevalence of type 2 diabetes (17.2% of adult First Nations compared to 5% among the non-Indigenous population groups, after adjusting for age of 18 years and older and 12 years and older respectively) (Public Health Agency of Canada, 2011), higher rates of obesity (1.7 times among and First Nations adults aged 18-79 years old living off-reserve compared to non-Indigenous peoples) (Pan-Canadian Health Inequalities Data Tool, 2022), higher rates of cardiovascular diseases (1.4 times) and higher rates of hypertension (1.2 times) among First Nations adults living off-reserve aged 18-79 years old and older in comparison to non-Indigenous peoples in Canada (Pan-Canadian Health Inequalities Data Tool, 2022). Inequities among children can be seen with higher rates of obesity (2.2 times higher among First Nations children aged 5 to 17 years old living off-reserve than non-Indigenous peoples in Canada) (Pan-Canadian Health Inequality Tool, 2022). In response to these health inequities among First Nations in Canada, systematic data generation on the application of nutrition-related research into action for First Nations is needed to support policies and programs that effectively reduce these nutrition-related health inequities. Furthermore, as childhood and adolescent obesity are risk factors for obesity in adulthood (Simmonds et al., 2016), research on

the application of knowledge from nationally representative nutrition and health surveys is even more crucial to address nutrition-related health inequities for First Nations children and youth.

KT research supports understanding how research findings can be applied to address health inequities. An internationally recognized definition of KT by the Canadian Institutes of Health Research is “a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians” (2012). In their guide to KT planning, two main categories of KT can be identified as end-of-grant KT and integrated KT, representing how the field has evolved (Jull et al., 2017; Bowen & Graham, 2013). The first, end-of-grant KT emphasizes strategies to share the knowledge gained with actionable messages at the end of the research project. As KT research developed, there was more recognition for integrating collaboration at every stage of the process to support more effective KT, rather than considering it only at the end of the grant (Jull et al., 2017; Bowen & Graham, 2013). The latter, integrated KT, emphasizes strategies at every stage of the research process through equal partnerships and collaboration such that the research produced is more relevant and useful to knowledge users (Canadian Institutes of Health Research, 2013; Estey et al., 2008; Baydala et al., 2014; Jull et al., 2017; Crosschild et al., 2021). However, the diversity among Indigenous communities requires context-specific KT research methods to accommodate unique contextual factors that influence community engagement practices and outcomes. Falling within integrated KT approaches, Indigenous KT is the sharing of knowledge that can bridge knowledge to action and is contextualized for the local community with transferable relevance for other Indigenous communities (Smylie et al., 2009; Smylie et al., 2004). The study of Indigenous KT requires an understanding of the local community context and recognizes the integration of expertise from both researchers and Indigenous communities (Estey et al., 2008; Crosschild et al., 2021). What distinguishes Indigenous KT is the importance of partnerships between researchers and communities and equally valuing Western and Indigenous knowledge systems (Smylie et al., 2004).

To date, Indigenous KT research has been limited by a lack of consistent assessment and evaluation. A recent systematic review of Indigenous KT health research found studies rarely examined KT processes in research, pointing to the limited data available to support systematic evaluation and generation of recommendations on KT practices in Indigenous health research contexts (Ninomiya et al., 2022). Systematic reviews on KT in public health research found that

the evaluation of KT strategies remains limited by inconsistent measuring of KT outcomes (LaRocca et al., 2012). KT in clinical practice among allied health professions highlighted a generally low methodological quality of studies with overreliance on strategies that do not have clear KT purposes or outcomes (Scott et al., 2012) and a scoping review on KT in healthcare emphasized limited studies eligible for the review and limited detail of KT activities and how they were operationalized in part due to a lack of standard taxonomy in KT research (Gagliardi et al., 2016). More data generation and analysis of KT is needed to develop evidence-based practices and evaluation of KT processes to advance the field of KT research and with Indigenous Peoples in particular.

2.5. Indigenous health promotion, Community-Based Participatory Research (CBPR), and community engagement.

Health promotion provides a useful framework for addressing the gaps between researchers and communities through the centering of community self-determination. Health promotion as defined by the Ottawa Charter is “the process of enabling people to increase control over, and to improve, their health” (World Health Organisation, 1986). Health promotion action includes the mobilization of communities to develop public policy, create supportive environments, strengthen community action, enhance personal skills, and reorient healthcare systems that allow health for all (World Health Organisation, 1986). Indigenous health promotion requires supporting Indigenous Peoples’ control over the process of health promotion interventions and builds on Indigenous worldviews including concepts of wholism and interconnection to promote the well-being of all peoples and the natural world (Delormier et al., 2022; Tu’itahi et al., 2021; McPhail-Bell et al., 2015). In the practice of Indigenous health promotion, engaging with communities is imperative in sharing decision-making, supporting Indigenous self-determination, and centering Indigenous voices to reduce health inequities (Delormier et al., 2022; Harding et al., 2021; Tu’itahi et al., 2021; McPhail-Bell et al., 2015).

Community-based participatory research (CBPR) is a collaborative research approach for health promotion and KT that equitably involves all partners throughout the research, researching community priorities to generate knowledge for change in health inequities (Minkler & Wallerstein, 2008). Within Indigenous contexts, CBPR is an approach to decolonize research shifting from research conducted on Indigenous Peoples to research by and with Indigenous Peoples to support the application of study findings into action (Minkler & Wallerstein, 2008;

Simonds & Christopher, 2013; Smith, 2012). Minkler and Wallerstein outline the core principles of CBPR as follows: committing to action, community-identified research priorities, reducing health inequities, building community capacity, balancing research and action for mutual benefit, engaging community members and researchers in a co-learning exchange, and a power-sharing process that supports equitable partnership throughout all research phases (Minkler & Wallerstein, 2008).

For the purposes of this study, community engagement is defined by the intervention program that is designed to achieve KT outcomes and meaningfully involve communities in research. Community engagement supporting the participation of Indigenous peoples has been mandated in several policy documents like the Royal Commission on Aboriginal Peoples by the Indian and Northern Affairs (Dussault & Erasmus, 1996), the United Nations Declaration on the Rights of Indigenous Peoples Guidelines (United Nations, 2007) and has become imperative in research as outlined in Chapter 9 of the Tri-Council Policy Statement for research involving the First Nations, Inuit and Métis Peoples of Canada by the Canadian Institute of Health Research, Natural Sciences and Engineering Research Council and Social Sciences and Humanities Research Council (2018). Additionally, the First Nations Information Governance Centre developed the ownership, control, access, and possession (OCAP) framework which informs the codes of research practices with First Nations communities in Tri-Council Policy Statement 2 Chapter 9 (First Nations Information Governance Centre, 2014). The Tri-Council Policy Statement requires community engagement of Indigenous communities and documenting this engagement process (Canadian Institute of Health Research, 2018). Despite the requirement to document community engagement, researchers often do not describe these activities or evaluate community engagement in their study publications. A recent scoping review of participatory research practices with Atlantic Indigenous communities in Canada found a lack of change in community engagement which was reflective of poor reporting as opposed to no engagement (White et al., 2021). Murphy et al. also noted the important role of regulations in meeting adequate reporting of community engagement by emphasizing the need for funding organizations, universities, and journals to develop and enforce community engagement reporting policies (2021). However, at present, there is a limited understanding of effective community engagement for KT in health research with First Nations.

Data that provides insight into the health status of First Nations people can play an important role in facilitating KT by providing evidence and data on health inequities that need to be addressed via policy and programmatic change (Brant-Castellano, 2004; Ninomiya et al., 2022). However, there are few examples of systematic data for First Nations populations' health status at national and regional levels which is required to influence policy. The Canadian Community Health Survey is a cross-sectional survey that collects health-related data by health regions, but First Nations on reserve remain excluded from the Canadian Community Health Survey (Batal & Decelles, 2019). The First Nations Information Governance Centre administered the only national health survey for First Nations on-reserve and in remote northern regions and collected data on socio-economic demographics, oral health, chronic diseases, food security, nutrition, mental health, and substance abuse (Nations Information Governance Centre, 2018). The First Nations Food, Nutrition, and Environment Study was the first cross-sectional study to assess the food, health, and environmental contaminants in the food of First Nations adults living on reserve using a random sample (First Nations Food, Nutrition, and the Environment Study, 2021). Community engagement took the form of obtaining a Band Council Resolution and forming a partnership with the Assembly of First Nations. However, outcomes were limited to end-of-grant KT such as returning results in the form of community and regional reports, training workshops and discussion of study results, and advocacy by researchers with communities for policies and programs that serve First Nations. The support for a nationally representative study with FEHNCY presents an opportunity to learn how to effectively implement KT throughout the research process, disrupt the legacy of helicopter research, and address nutrition-related health inequities.

Among intervention studies, a notable example of a community-research partnership is the Kahnawake School Diabetes Prevention Program, which has served as a formative model for culturally grounded CBPR practice guided by health promotion principles and Mohawk self-determination through community-initiated and self-sustaining diabetes intervention projects (Tremblay et al., 2018). The Kahnawake School Diabetes Prevention Program interventions have operationalized KT by mobilizing communities to address community health priorities with research (Périllat-Amédée et al., 2021) and partnering with communities in health promotion projects that have led to mental, spiritual, social, and physical dimensions of health (Murdoch-Flowers et al., 2019). The Kahnawake School Diabetes Prevention Program interventions have

also contributed to changing school program planning (Macridis et al., 2019), developing a community research ethics code to guide research processes (Delormier et al., 2018), and forming a Community Mobilization Training dedicated to evaluating the implementation and impact of interventions (Kahnawake School Diabetes Prevention Program, n.d.). Yet such strong partnerships connecting multiple First Nations communities to achieve KT have not been exemplified within a nationally representative survey in Canada. Another pivotal example of community partnerships in epidemiology is a three-decade-long partnership between the White Mountain Apache and Johns Hopkins University that resulted in a nationally recognized surveillance system aimed at effectively reducing suicide rates of youth in this community (Cwik et al., 2014; Rasmus et al., 2019). The partnership resulting in the accomplishments of The Apache Surveillance and Prevention System at the community level demonstrates the prospective scale-up of cross-sectional data that can provide nationally representative health statistics.

2.6. The Contexts, Interventions, Mechanisms, and Outcomes of Community Engagement and Knowledge Translation.

We examined previous community engagement and CBPR literature that incorporated cultural safety for Indigenous KT and summarized the authors' reported contexts, interventions, mechanisms, and outcomes in Table 4. The context (C) refers to the background of a program that can facilitate or prevent mechanisms from being triggered. Examples of contextual factors are pre-existing socio-political structures, cultural norms, and interrelationships. The interventions (I) are the set of program activities that are done (Denyer, Tranfield & Ernst van Aken, 2008). The mechanisms (M) describe the underlying processes that link the program to generate outcomes (The Ramses II Project, 2017). The outcomes (O) are the result of the program on the micro, meso- and macro levels (The Ramses II Project, 2017).

All studies included were published in the last 10 years with Indigenous populations in Canada (n=6), the United States (n=5), and Australia (n=6). Out of the seventeen studies included in the table, three studies focused on Indigenous youth (Smylie et al., 2016; Firestone et al., 2021; Kholghi et al., 2018), seven studies were program evaluations (Parker et al., 2006; Kholghi et al., 2018; Peake et al., 2021; Rasmus, 2014; Jock et al., 2022; Firestone et al., 2021; Miles et al., 2018) and eleven studies reported direct community engagement interventions (Smylie et al., 2009; Ninomiya et al., 2022; Miles et al., 2018; Firestone et al., 2021; Delafield et al., 2016;

Quigley et al., 2021; Rasmus, 2014; Peake et al., 2021; Thurber et al., 2018; Kholghi et al., 2018; Parker et al., 2006).

Interventions/activities. To date, research on community engagement has not consistently reported its design for community engagement activities. Studies most often reported the frequency, duration, and total number of formal meetings throughout the research and were undertaken with one or several groups such as tribal councils, Elders, youth, community organizations, community partners, Advisory Boards, governing bodies, funding agencies, and the wider community (Peake et al., 2021; Parker et al., 2006; Kholghi et al., 2018; Thurber et al., 2018; Fisher & Ball, 2003; Miles et al., 2018). Other informal meetings that involved community visits (Peake et al., 2021) and attending local events were reported in their engagement with community groups (Quigley et al., 2021). Among the few papers that have described their community engagement in-depth from the literature (Parker et al., 2006; Peake et al., 2021; Fisher & Ball, 2003; Rasmus, 2014; Kholghi et al., 2018), a notable exception is a mixed methods impact evaluation of a Pasifika youth-led intervention conducted by Firestone et al. (2021). They demonstrated how engagement activities were operationalized to promote youth leadership and described activities that explicitly outlined the extent of youth partnership throughout the research process. For example, local members were hired as facilitators to lead engagement with youth, they co-developed action plans and timelines and made space for youth at decision-making meetings with research teams during each research phase (Firestone et al., 2021).

Culturally-safe engagement activities such as traditional games (Parker et al., 2006), poetry (Miles et al., 2018), creating groups that grounded research in the local traditions (Rasmus, 2014), social yarning (Peake et al., 2021), Talking Circles (Kholghi et al., 2018), photovoice (Kholghi et al., 2018) and sharing food (Peake et al., 2021; Fisher & Ball, 2003; Miles et al., 2018), only one study specified traditional foods (Quigley et al., 2021) were used. In a qualitative process evaluation of a project focused on healthy eating among Native Hawaiian mothers and children, food sharing was a powerful way to build community (Miles et al., 2018). Traditional foods played a fundamental role in engagement to build trust and impacted the acceptance of the research in a prevalence study on dementia among Torres Strait Islander peoples (Quigley et al., 2021). Cultural safety activities within the research team were described by applying the 5 R's (Oosman et al., 2021) critically reflecting on supporting community

engagement using a decolonizing lens (Oosman et al., 2021), reflexivity for researchers to examine their role in conducting ethical research and genuine engagement with communities (Quigley et al., 2021), learning and understanding the local and shared history and ongoing colonization (Quigley et al., 2021; Browne et al., 2016) and having cultural practices training (Browne et al., 2016).

Overall, most studies reported their engagement activities as formal meetings with a group that the community sees as credible (leadership, advisory board, organizations) and end-of-grant KT activities to facilitate the return and sharing of results. Engagement with community groups facilitated the process of conducting culturally safe research however, the types of activities and how this engagement process was done varied across studies. Moreover, the following end-of-grant KT activities were examples of engagement activities done at the end of the research: informal discussion of results, synthesizing reports, feedback sheets, booklets, lay summaries and recommendations (Kholghi et al., 2021), publishing in the local newspaper, newsletter distributions, holding interviews, Talking Circles, knowledge exchange focus groups and using photovoice to discuss results (Kholghi et al., 2021), writing grant submissions (Kholghi et al., 2021), funding transfers to other communities, the creation of materials like videos and manuals (Parker et al., 2006). Although there exists a range of examples of engagement activities reported in the literature, reporting engagement interventions that supported KT has not been consistently reported.

Outcomes. All studies have hypothesized the outcomes of community engagement but have not systematically collected data. Rasmus (2014) examined community capacity building as an outcome but did not examine changes in policy and programs as a KT outcome. Therefore, there is an important gap in the literature on community engagement and KT since studies have hypothesized KT outcomes related to changes in policies and programs. Postulated outcomes included improved health behaviour changes (Smylie et al., 2016; Firestone et al., 2021; Miles et al., 2018), decreased hospital admission and re-admissions (Browne et al., 2016), higher participation in research (Firestone et al., 2021; Miles et al., 2018), improved quality of research (Rasmus, 2014), greater acceptance, relevance and localized research findings (Thurber et al., 2018; Peake et al., 2021; Gwynn et al., 2019; Fisher & Ball, 2003; Quigley et al., 2021; Oosman et al., 2021; Firestone et al., 2021), greater use of results (Kholghi et al., 2018), culturally relevant research (Peake et al., 2021; Rasmus, 2014; Fisher & Ball, 2003; Quigley et al., 2021;

Oosman et al., 2021; Miles et al., 2018), knowledge exchanges (Rasmus, 2014; Delafield et al., 2016; Oosman et al., 2021), strengthened cultural identity (Smylie et al., 2016; Parker et al., 2006; Thurber et al., 2018; Oosman et al., 2021; Miles et al., 2018), building capacity (Parker et al., 2006; Peake et al., 2021; Rasmus, 2014; Gwynn et al., 2019; Fisher & Ball, 2003; Quigley et al., 2021; Delafield et al., 2016; Firestone et al., 2021) and enhanced sustainability of the project (Parker et al., 2006; Peake et al., 2021; Oosman et al., 2021). A systematic review of nutrition interventions that improved health outcomes in Australian Aboriginal and Torres Strait Islander peoples advocated for evidence-based nutrition policy targeting food environments that supported healthy eating (Gwynn et al., 2019). Only a qualitative formative evaluation examined local tribal policy changes as the outcome (Jock et al., 2022). One other mixed-methods descriptive analysis collecting data on the participation of Aboriginal and Torres Islander children in a national longitudinal study has connected reciprocity and trust in relationships to outcomes of high study participation and retention and perceived multi-level benefits of the research (Thurber et al., 2018). While most studies did not explicitly link their interventions to outcomes, engaging with community partners, members, and/or leadership and hiring local community researchers and staff were important interventions identified in supporting the outcomes of building community capacity and conducting relevant research.

Mechanisms. To our knowledge, no studies have examined the mechanisms for how community engagement connects with KT. However, there have been anecdotal explanations for how engagement activities could result in outcomes previously mentioned. Community ownership has been a recurrent mechanism hypothesized across the literature (Smylie et al., 2016; Parker et al., 2006; Kholghi et al., 2018; Peake et al., 2021; Rasmus, 2014; Gwynn et al., 2019; Fisher & Ball, 2003; Quigley et al., 2021; Delafield et al., 2016; Firestone et al., 2021). Included in community ownership is perceiving the program as intrinsic, community-controlled, and driven by the community (Parker et al., 2006). Community participation perceived as local use and support of the research was another postulated mechanism (Quigley et al., 2021). Champions in the community were essential to getting community buy-in through peer modeling (Delafield et al., 2016) and bridging the project with community members (Peake et al., 2021; Rasmus, 2014; Quigley et al., 2021; Miles et al., 2018). Types of community champions include multisectoral collaborations (Kholghi et al., 2018; Jock et al., 2022) and intergenerational groups like Elders and youth (Rasmus, 2014; Peake et al., 2021; Delafield et al., 2016). They were perceived as

credible within the community (Kholghi et al., 2018; Delafield et al., 2016; Firestone et al., 2021). Reciprocity and building relationships based on trust were themes that emerged from the data generation on the mechanisms linking engagement efforts and participation outcomes in a national survey of Aboriginal and Torres Strait Islander children (Thurber et al., 2018). A facilitator aiming to balance community interests with the research teams' (Fisher & Ball, 2003; Firestone et al., 2021) and integrating Indigenous researchers into the team (Quigley et al., 2021; Firestone et al., 2021) were important relationships. Decision-making and relational processes related to the relationship between research teams and the communities such as equal partnership and engagement throughout the research process could be mechanisms (Quigley et al., 2021; Gwynn et al., 2019; Peake et al., 2021; Delafield et al., 2016; Browne et al., 2016; Firestone et al., 2021) however, the connection of other characteristics of the partnership in relation to the CIMO configuration remain unclear.

Other studies have suggested cultural safety in engagement as a mechanism for KT (Laird et al., 2021; Miles et al., 2018; Oosman et al., 2021; Delafield et al., 2016; Fisher & Ball, 2003; Rasmus, 2014; Peake et al., 2021; Kholghi et al., 2018; Parker et al., 2006). The importance of localizing interventions and programs to the local cultural values and practices was discussed by authors (Oosman et al., 2021; Delafield et al., 2016; Fisher & Ball, 2003; Rasmus, 2014; Peake et al., 2021; Thurber et al., 2018; Kholghi et al., 2018; Parker et al., 2006). In addition, making a safe, fun, and accessible space for sharing and learning (Miles et al., 2018; Thurber et al., 2018), considering positionality and impacts of historical injustices in research (Browne et al., 2016; Peake et al., 2021) was described as implementing cultural safety. Team reflexivity was anecdotally described as a mechanism for producing a health resource promoting KT (Peake et al., 2021; Thurber et al., 2018) but could also be identified as an intervention to practically approach cultural safety and engagement efforts (Browne et al., 2016; Oosman et al., 2021). To date, systematic data generation to build a theory on community engagement has not been done.

Contexts. Of the studies describing community engagement, cultural safety, and impacts on Indigenous KT, few have highlighted the impact of the community context on mechanisms and outcomes for achieving KT. For example, a mixed-methods impact evaluation on mobilizing Pasifika youth to action postulated how community social cohesion provided better support and motivation for rural communities when compared to urbanized communities resulting in a greater impact of the intervention (Firestone et al., 2021). A qualitative formative evaluation of the

processes of developing policy, systems, and environmental changes in obesity prevention trials (OPREVENT 1 and 2) identified that the local historical trauma, tribal politics, and varying perspectives on tribal policies were community contexts that impacted policy, systems, and environmental changes (Jock et al., 2022). In addition, a high amount of existing trust, communication, and collaboration between tribal council and local health staff supported the health staff's ability to develop these policy changes (Jock et al., 2022). Since most studies described program contexts rather than the community context, there is much to be learned about how community context can impact community engagement approaches and KT outcomes.

2.7. Food, Environment, Health, and Nutrition of First Nations' Children and Youth Study (FEHNCY).

There is an absence of data about the environment, food, nutrition, and health status of First Nations children living on reserve. FEHNCY is a national study examining the relationship between food environments and food security, nutrition, housing conditions, indoor air quality, environmental contaminant exposures, and the health status of First Nations youth and children aged 3-19 years old living on-reserve in partnership with First Nations communities. The FEHNCY study aims to advocate for policies and programs that address the First Nations health needs at local, regional, and national levels. Over the next 10 years, the FEHNCY team will work with 60 First Nations communities across Canada to collect survey data with approximately 100 randomly selected youth in each community. FEHNCY will provide vital information on the health status of First Nations children and youth through its four major study components: 1) Food and Nutrition, 2) Housing Conditions, 3) Mobile Clinic, and 4) Community Engagement and Mobilization (Figure 1).

Figure 1. FEHNCY Components



The Community Engagement and Mobilization component has an integral role in fostering shared decision-making processes and research that is reflective of community priorities as the FEHNCY data collection occurs. The goal of Community Engagement and Mobilization is to apply CBPR principles to partner with First Nations communities to support the KT of the FEHNCY study findings. To achieve this aim, the Community Engagement and Mobilization component has multiple levels of engagement within communities, research teams, and governance levels. A phased approach to relationship building was used starting with establishing relationships to build trust and maintaining relationships during the co-interpretation of results and knowledge application. Activities supporting relationships and cultural safety were developed with the Community Advisory Circle (CAC). Examples of community engagement activities were an Opening Ceremony, a picture contest engaging youth, contributing a community-designed piece to the FEHNCY bundle, a community BBQ, and closing events. The FEHNCY bundle was inspired by the Teiakonekwehnsatsikhetare bundle created by Joe Jacobs, an elder in Kahnawake who had a dream that guided him to spread awareness about the importance of preventing type 2 diabetes among First Nations communities (Gibson & Jacobs, 2003). This idea of research carrying a message of the importance of supporting the well-being of the current and future generations was adopted by FEHNCY and facilitated by Indigenous researchers who sought guidance from the elder. The bundle is going from community to community, creating interconnections and carrying the health message of the community in the form of artwork placed on a moosehide. Ultimately, FEHNCY provided a unique opportunity to study the contexts, mechanisms, and outcomes of community engagement to support KT.

2.8. Hypothesis.

Our hypotheses were based on the design of the FEHNCY Community Engagement and Mobilization component. Through engagement within First Nations communities, across First Nations communities, with national and regional First Nations partners, and with the FEHNCY study team, the Community Engagement and Mobilization component aims to achieve cultural safety, trustworthy qualitative findings, and representative quantitative findings that can result in improved KT for the FEHNCY study. Supporting mechanisms were hypothesized to include relationship building, shared decision-making, team reflexivity, Indigenous methodologies, credibility, member-checking, and improving participation.

2.9. Rationale.

The use of CBPR in Indigenous health research is recognized as an equitable approach to engaging with Indigenous communities throughout the research process. However, there remain significant gaps in understanding how community engagement supports KT in Indigenous contexts. First, we need to understand what vital interventions are needed to support KT of nutrition-related research in a representative survey with First Nations children and youth. The FEHNCY study provides a critical opportunity to study how community engagement supports KT in the context of a representative survey with First Nations communities across Canada. In particular, understanding the role of traditional foods in community engagement is needed. Traditional foods have been central to gatherings and fostering connection among many Indigenous communities. To date, no research on KT has examined the role of traditional foods in supporting culturally safe community engagement for KT. Second, understanding how community engagement activities can trigger mechanisms necessary for supporting KT is vital to developing the most effective community engagement approaches. Third, exploring a range of KT outcomes that include changes in policy and programs can expand knowledge on KT processes in research. Fourth, integrating an in-depth understanding of the context and how it interacts with the community engagement activities to achieve outcomes of community engagement is needed to assess the transferability of findings and theory of community engagement in this First Nations community to other contexts.

The use of a realist approach can address the gaps identified in the literature on community engagement and KT. Realist approaches are theory-driven to evaluate contextual factors, activities, and underlying mechanisms that influence the outcomes of a program (Bergeron et al., 2021; Denyer, Tranfield & Ernst van Aken, 2008). They bring to surface a middle-range theory by testing an initial program theory. A middle-range theory describes a theory with a higher level of abstraction (The Ramses II Project, 2017). Since a range of KT outcomes related to community engagement was anticipated, a realist-informed methodology was suited for this objective as it has the potential to reveal unintended findings (De Weger et al., 2020; The Ramses II Project, 2017). Realist approaches can also rigorously generate theories of complex interrelated social realities which is reflected in the complex dynamic of relationship building and the diverse community contexts within Indigenous communities (Bergeron et al., 2021; Jagosh et al., 2015; Smylie et al., 2016). A systematic review of the effectiveness of KT

strategies used in public health also encouraged the use of realist evaluation to examine the context in which interventions related to KT work best (LaRocca et al., 2012).

This study examined how, for whom, and in what circumstances community engagement activities support improved conditions for KT within a nationally representative study of First Nations children and youth health status. A secondary objective of this study was to examine the role of traditional foods in community engagement in achieving KT.

Chapter 3: Methodology

This study used a phased approach to data collection and an inductive and deductive analytical approach to develop a theory describing how community engagement supported conditions for KT within the context of the FEHNCY study with two First Nations communities. Grounded Theory is a methodology for developing themes and relationships between themes that are grounded in a dataset for theory development (Charmaz, 2006). Realist approaches focus on the complex processes of program implementation by seeking to answer how, for whom, and in what circumstances these programs work (Westhorp et al., 2011). These approaches can rigorously generate theories of complex interrelated social realities which is reflected in the complex dynamic of relationship building and the diverse community contexts within Indigenous communities (Jagosh et al., 2015; Smylie et al., 2016).

FEHNCY uses a cross-sectional study design to examine the health status and environment of First Nations children and youth on reserve across Canada using mixed methods (survey and interviews/modified Talking Circles). The FEHNCY survey is collecting biological samples, anthropometric measures, health, food, nutrition, and housing questionnaires, environmental contaminant exposure, and dietary intake assessments to measure the health and nutrition status among First Nations youth and children aged 3-19 years old living on-reserve in 60 different communities across Canada. In addition to the FEHNCY survey, qualitative methods are included to understand food and nutrition and knowledge translation. As part of the Community Engagement and Mobilization component, FEHNCY sought community approval and collaboration with communities and worked to establish Community Advisory Circles with each participating community. Community Advisory Circles provided guidance at every stage of this study. The Community Engagement and Mobilization component was developed based on relevant concepts for Indigenous KT (Shearn et al., 2017) and included connecting community

engagement, relationality (Wilson, 2008), cultural safety, and KT. These topics served as the basis for the topics in the data collection guides.

3.1. Reflexivity.

The first author (JWong) was born and raised in Montreal, and she is of Han Chinese descent from Hong Kong. With an undergraduate degree in dietetics, her clinical work in the public sector and international volunteering with faith-based organizations have led to her interest in advancing health equity through community nutrition and building community capacity. This research study is part of her master's degree in nutrition at McGill University. Her graduate-level training based on participatory and qualitative research has been guided by her supervisor, Dr. Brittany Wenniser:iostha Jock from Akwesasne, and her committee member, Dr. Treena Wasontí:io Delormier from Kahnawake. Due to the COVID pandemic, JWong was introduced to the FEHNCY team and community members virtually beginning in September of 2021 and participated in monthly meetings Community Advisory Circle meetings, biweekly FEHNCY Community Engagement and Mobilization team, and weekly the FEHNCY coordinating team meetings throughout her master's training. She continued to support engagement activities that were implemented when FEHNCY adopted a hybrid model of in-person activities and online meetings starting in April 2022.

3.2. Participating Communities.

Communities who were interested in the FEHNCY study joined with a host department in the community who became key partners in the study. The Advisory Circle members in each community reviewed, modified, and approved the following description of their communities. We conducted this study in partnership with two different communities which contributed to a range of contextual factors influencing community engagement and pathways to KT. The two communities varied in terms of their proximity to urban centers, regional location, cultural groups, relationships with research, and experience with residential schools.

Community 1 is Kanehsatà:ke, a Kanien'kehà:ka (Mohawk) community situated on unceded traditional territory located in the Eastern region of Canada. Kanehsatà:ke is a semi-urban community that is rich not only in its diversity but in its resourcefulness. Languages spoken include traditional Kanien'kehà:ka, as well as English and French. Cultural and spiritual beliefs include cultural traditions, as well as religious and faith-based practices. They are historically and still known as a fierce people, who stand strong together to defend their land,

their people, and their rights when the need arises. Even though the community continues to live with the impacts of colonization and collective trauma which has resulted in high apathy and low community engagement, it is a community of people who care deeply about their land, their members, and the future generations. Many community members have maintained traditional food practices, despite the effects of the current colonial system that continues to disrupt traditional foodways. Recent concerns have been centered around multiple environmental contaminants and their impacts on community members' health, which in large part is why community members of Kanehsatà:ke wanted to participate in the FEHNCY study. Kanehsatà:ke was the first FEHNCY pilot and was invited to participate based on existing relationships from previous collaborations.

Community 2, Conne River also known as Samiajij Miawpukek, is a Mik'maq community on the Connaigre Peninsula and the only reserve on the island of Newfoundland. They are a rural community located ~150 km from the closest large community (Grand Falls-Windsor) and are accessible year-round by car. Although the number of registered band members living in Conne River has decreased by approx. 10% since 2017 (pre-pandemic), the percentage of registered band members less than 25 years of age remains steady at close to 35%. Conne River was invited to participate in the FEHNCY study during a FEHNCY knowledge-sharing workshop that was held in the Atlantic region of Canada. The community is active in traditional food activities such as fishing and hunting as part of their main food sources. Conne River is currently revitalizing the traditional knowledge and language in the community through its vibrant cultural and arts centers and language teaching at schools.

3.3. Data generation.

Data generation began in July 2022 and continued until May 2023 and occurred in 3 phases (Table 1). The first phase focused on understanding in-depth engagement processes in Community 1 and cultural safety in relation to KT using in-depth interviews with community partners and FEHNCY team members. A modified Talking Circle with community partners in Community 1 was used to confirm and clarify preliminary findings. The second phase examined community engagement in Community 2 specifically the role of food sharing and use of traditional foods using in-depth interviews with community partners. The third phase filled analytical gaps by conducting focus group discussions with FEHNCY participants to understand how cultural safety can be supported within the FEHNCY team. Community partners included

community leaders working across public sectors such as staff from the health center, housing and environment departments, schools and the band council, community members, and the CAC members (Table 2). The FEHNCY staff and researchers included FEHNCY principal investigators, community researchers, advisors, and collaborators (Table 2). Data generation included 26 in-depth interviews in total, 15 interviews total with community partners (including 4 follow-ups/repeat interviews), and 12 interviews total with FEHNCY participants (including 2 follow-up/repeat interviews). A total of 3 modified Talking Circles/focused group discussions were conducted, 1 modified Talking Circle with community partners and 2 focused group discussions with FEHNCY participants (Table 1 for breakdown). All data generation with Community 1 and the FEHNCY team was conducted using Zoom for healthcare out of continued concerns of COVID-19 transmission and in-person with Community 2 since community guidelines allowed in-person activities.

Table 1: Data generation phases and participants

Participants	Phase 1: In-depth understanding of community engagement based on Kanasehtà:ke			Phase 2: Examining community engagement in Miawpukek		Phase 3: Supporting cultural safety within FEHNCY
	In-depth interviews		Modified Talking Circle	In-depth interviews		Focus group discussions
	Initial	Repeat		Initial	Repeat	
Community partners	8	3	1 session; 4 participants	6	N/A	N/A
FEHNCY participants	12	3	N/A	*		2 sessions; 12 participants & 7 participants
Total	26		1 session; 4 participants	6		2 sessions; 19 participants

*Interviews with FEHNCY participants pertained to both communities

N/A: non-applicable information

Table 2: Participant group characteristics.

Participant groups	Description
Community partners	Community partners consisting of members from the CAC, community researchers,

	community partners in nutrition, health, and housing departments, and members of the host department
FEHNCY participants	FEHNCY research team members consisting of staff, researchers, advisors, community researchers, and collaborators

In-depth interviews. Verbal consent was obtained before starting the interview. Semi-structured interviews were conducted for an in-depth examination of community and research team perspectives and experiences with the Community Engagement and Mobilization component. The interview guides consisted of two sets of guides tailored to the roles and experiences of community partners and FEHNCY participants but still based on the same study topics. The topics included the following: perspectives on the quality and quantity of community engagement activities supporting KT, relationship building with communities, community context, cultural safety, and the role of food sharing and traditional foods (Refer to Appendix B and C for in-depth interview guides). Open-ended questions were followed by probes to understand the underlying processes of community engagement, how participants described KT, and how participants from the FEHNCY and community partners understood cultural safety (Charmaz, 2006). The duration of interviews lasted between 40-90 minutes except one interview lasted 25 minutes due to a scheduling conflict. All participants were sent recruitment emails explaining the study and interview objectives, the duration and format of the interview, and the compensation amount. Criterion sampling was used to include participants that had the most involvement in the study which included community partners (members of the CAC, staff from different community sectors, community researchers) and research team members (staff and principal investigators). All FEHNCY staff who have assisted in FEHNCY data collection and community engagement activities and all community partners who have worked with the FEHNCY team were deemed eligible. A total of 26 participants were recruited for in-depth interviews, including 6 FEHNCY staff, 6 FEHNCY researchers, and 8 community partners in Community 1 and 6 with community partners in Community 2.

Follow-up interviews in each community were conducted to collect additional data based on emerging concepts and categories from the data. These gaps included: defining the rigor and credibility of results, understanding the role of traditional foods in engagement processes, supporting youth mobilization, clarifying the role of community partners and community

champions, and identifying the roles and responsibilities in the research partnership. Participants were selected for follow-up interviews based on the analysis of their transcripts highlighting their knowledge of these gaps and triangulating data generation between community partners and FEHNCY team members. We conducted 7 re-interviews using theoretical sampling (Charmaz, 2006) that ranged from 40 to 60 minutes. Participants identified as community partners were compensated with a \$50 gift card per interview and FEHNCY team members were entered into a prize draw for a gift item valued at \$30.

Modified Talking Circles. A Talking Circle is an Indigenous method of group discussion embedded in the oral storytelling traditions and used by various First Nations peoples in Canada and tribes in the midwestern United States to foster mutual understanding, consensus decision-making, uncovering issues and developing strategies to address them (Brown & Di Lallo, 2020). This process emphasizes that all voices are equal and supports nonconfrontational group communication (Fleishhacker, 2011). In line with centering Indigenous methodologies and the work of decolonizing, traditional Talking Circles have been adapted to modified Talking Circles to reflect culturally appropriate methods to hear Indigenous voices for Indigenous solutions in research (Brown & Di Lallo, 2020). Participants were recruited for modified Talking Circles by email. The goal of the modified Talking Circles with community partners was to confirm and clarify preliminary findings with community advisory circles. Topics discussed included gaps in building trust, community buy-in, and how these concepts connected (Refer to Appendix D for modified Talking Circles guide). Convenience sampling was used to select community partners attending the modified Talking Circles based on a date when most participants were available. Community partners including advisory circle members or community researchers who have worked with the FEHNCY team were eligible to participate in the modified Talking Circles. The duration of the modified Talking Circle lasted up to 50 minutes with 4 participants in total. Participants were given a gift card valued at \$75.

Focus Group Discussions. The modified Talking Circles were adapted to a focus group discussion to provide more flexibility in data generation on supporting cultural safety with the FEHNCY team within limited participant availability (1 hour per focus group discussion) and increased participant sample in the group (FEHNCY team consisting of 25 people) compared to modified Talking Circles. Focused group discussions are a group interviewing method in qualitative research across disciplines such as market research, policy development, health care,

and many more (Krueger & Casey, 2000). Focused group discussions gather multiple perspectives and attitudes as well as group interactions on a topic of interest (Then, Rankin & Ali, 2014). Participants for focused group discussions were recruited by email. Two sets of questions were used for the corresponding group. The questions aimed to address the following topics within community engagement: cultural safety, food, relationship building, KT, and improvements for FEHNCY. (Refer to Appendix E for focus group discussion/modified Talking Circle guide). All FEHNCY staff who were involved with data generation and community engagement activities were eligible to participate in the focused group discussions. Participants were recruited by email and verbal consent was recorded individually at the beginning of the modified Talking Circles/focused group discussions. Convenience-based sampling was used for the modified Talking Circles with community partners and the focused group discussions with FEHNCY participants. Convenience sampling was used to select FEHNCY participants based on a date when most participants were available for the focused group discussions. The first focused group discussion lasted 1 hour with 12 participants total and the second lasted 1 hour with 7 participants. FEHNCY participants were entered into a prize draw for a gift item valued at \$30 as compensation for their time per session. Interview audio files from in-depth interviews and modified Talking Circles were sent to a transcription service, transcribed verbatim, and uploaded for analysis in Dedoose 9.0.107 (2023).

Analysis. Our analysis combined inductive and deductive coding to generate a theory that was grounded in the data and incorporated relevant concepts for program evaluation. The inductive coding was informed by Grounded Theory (Charmaz, 2006) and deductive coding approaches were informed by realist evaluation (Westhorp et al., 2011). Realist approaches have the potential to unearth unintended findings in the data (De Weger et al., 2020; The Ramses II Project, 2017). The CIMO-logic or design proposition was selected to examine KT pathways that highlight what works (interventions), in what circumstances (contexts), to produce which effects (outcomes) while providing explanations for why this happened (mechanisms) (Denyer, Tranfield & Ernst van Aken, 2008). As De Weger et al. (2020) highlighted, various interpretations of terms were used to describe the intervention element in different configuration types. In this study, engagement interventions, strategies, and activities were distinguished from each other (Gilmore et al., 2019). The engagement intervention was defined as the overall program that was designed to achieve health outcomes or health-related environments (University of Washington, n.d.). The

engagement strategies were defined as the concrete approaches that needed to be incorporated for the interventions to be successful (University of Washington, n.d.; McCormack et al., 2013). The engagement activities referred to the specific events that were done to apply strategies and achieve outcomes (Public Health England, 2021; Pawson et al., 2004). Engagement strategies that were essential were linked to activating mechanisms. While the meanings of terms such as intervention and strategies vary across studies using realist approaches (De Weger et al., 2020), these terms were explicitly defined for this thesis. The CIMO logic was suited for the objectives of this study related to evaluating a community engagement intervention design and supported the description of causal links between the CMOs (De Weger et al., 2020).

The analysis steps included line-by-line coding to develop themes, connecting themes to one or more of the following deductive concepts: contexts (C), interventions (I), mechanisms (M), outcomes (O), codebook refinement, and configuration development. The first transcript was selected because it covered a range of CIMO topics of interest from the FEHNCY Community Engagement and Mobilization. Line-by-line codes were developed based on in-vivo codes and gerunds to keep as close to the data (Charmaz, 2006). All line-by-line codes were then pile-sorted and were named by JWong and BJock to ensure that the names reflected the entire set of line-by-line codes in each pile. Following naming, codes were then assigned additional descriptors using a deductive approach to the individual or combination of CIMO categories outlined by Pawson & Tilley (1997). Codebook refinement involved identifying excerpts from other transcripts that involved additional concepts not yet included in the codebook. The refined codebook was then applied to the entire dataset. Through an iterative process of coding transcripts, memo-writing, and discussions with the first author's supervisor (BJock) connections between codes were drawn. These preliminary connections were then refined with community partners and further memo-writing and discussion with BJock.

Memos were written throughout in the form of free-writing initially and then cluster mapping (Charmaz, 2006). Free-writing memos were organized into the following categories: coding justifications, codebook changes, emerging patterns, CIMO configurations, reflexivity, and gaps and questions (Charmaz, 2006). New parent codes and/or child codes were developed to allow themes from the data to emerge inductively. A new code was developed by writing a memo on the coding rationale or conjecture on an emerging code (Bergeron & Gaboury, 2020). As this repeated itself within the transcript and across different transcripts, an additional memo was

written on the change in the codebook. Longer memos were written and dated to document interactions between the clusters. Re-interviews clarified gaps in the data using theoretical sampling (Charmaz, 2006) and the constant comparative method for phases 1 and 2. Saturation was reached when interviews confirmed results and further probing during interviews did not generate more information that would clarify existing data or generate more analysis gaps that were outside the scope of the project. Preliminary findings were validated with the CAC (Robins & Eisen, 2017), and interactions between the CIMO configurations were refined with memo-ing (Charmaz, 2006).

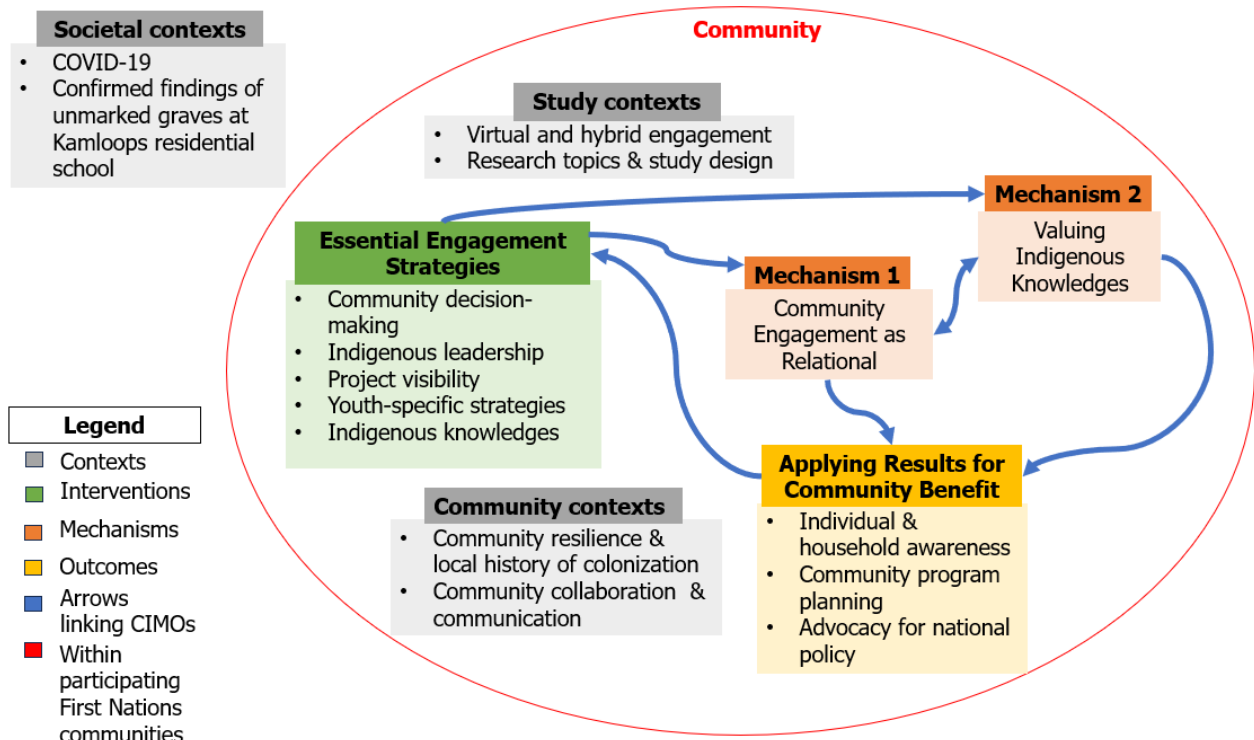
Ethics. The FEHNCY study was approved by the Research Ethics Boards (REB) of the University of Ottawa, the Centre Hospitalier Universitaire (CHU) of Québec- University of Laval, University de Montreal, McGill University, the Children’s Hospital of Eastern Ontario (CHEO) and Health Canada. The Community Engagement and Mobilization research, which included data generation for this study, was approved by McGill University REB 4 (#22-01-020; PI: BJock). Community approval was obtained for this research study in alignment with the FEHNCY Community Research Agreements and Bound Council Resolution with each community. The CAC provided approval for the dissemination of research findings. All participants provided informed verbal consent before each data generation activity. This study conforms with Tri-Council Policy Statement 2 requirements, having obtained ethics board review approval before starting research with human participants as written in Chapter 2 and by fulfilling engagement requirements for research within First Nations contexts as described in Chapter 9 (Canadian Institute of Health Research, Natural Sciences and Engineering Research Council and Social Sciences and Humanities Research Council, 2018). This research was carried out in collaboration with participating First Nations communities where research protocols, tools, methodology, interpretation, and communication of results comply with the principles of OCAP (First Nations Information Governance Centre, 2014).

To ensure participant confidentiality and agreements with communities, participant quotes are presented without specifying which community they are from.

Chapter 4: Research Results

Results from the data were depicted as a refined middle-range theory in the form of a CIMO configuration (see Figure 2 below). This figure visually depicts the major elements of the refined middle-range theory. Societal contexts were placed outside the circle due to their broader global impacts. The red circle delineates elements at the community level. We can find the study contexts and community contexts that affect community engagement processes. The engagement strategies activate mechanisms of building relationships and valuing Indigenous knowledges. Mechanisms connect to KT outcomes of applying results for community benefit. The broader context when the unmarked graves of children at residential schools starting with Kamloops were confirmed and the COVID-19 pandemic, the FEHNCY study design, and unique ways communities have shown self-determination and resilience despite their experiences of colonization directly impacted engagement processes for KT in the project. Given these contextual factors, essential engagement strategies were identified (supporting Indigenous leadership within the research team, fostering community decision-making, promoting youth-specific engagement, promoting project visibility, and incorporating Indigenous knowledges, methodologies, cultures, and languages). A description of sharing traditional foods was an impactful way to activate the two following mechanisms, approaching community engagement as relational and valuing Indigenous knowledges. Both mechanisms reinforced each other and separately led to outcomes of applying results for community benefit. Both FEHNCY participants and community partners described the relational nature of the research partnership and the cyclical process of KT pathways.

Figure 2. Refined middle-range theory from the Contexts, Interventions, Mechanisms and Outcomes of Results from FEHNCY Community Engagement and Mobilization.



4.1. Societal, study, and community contexts.

Participants identified multiple categories of contextual elements including societal, community, and study contexts that interacted with essential engagement strategies, mechanisms, and application of results (outcomes).

Societal context.

Participants described the confirmation of the unmarked graves at Kamloops and the COVID-19 pandemic as the broader societal context that shifted the study and community contexts. A few participants highlighted how First Nations communities' self-determination was increasingly recognized when the confirmation of unmarked graves of Indigenous children in the residential school system gained media traction nationwide. This shift framed discussions when the Community Engagement Mobilization component of FEHNCY was being adapted to COVID-19. A few community partners described the societal context being reflected in the communities' concerns for research with youth and children and the challenge in recruiting communities for the FEHNCY survey. Other community partners highlighted that the broader societal context together with the community context impacted the communities' relationship

with research. For example, when asked about how the societal context has shaped engagement processes, one community partner responded with the impact on the community,

“... if we do a timeline, historically, [...] there’s a lot that happened to the community because of residential schools, and relocation, and all of those things. So the different impacts of historic trauma on our community itself, on how it functions and our families. [...] I think people have given up on [different] system[s], because it has let people down over and over again, it fails to meet our needs...” - Community partner

Study context.

For the study context, participants described the impact of the pandemic on virtual and hybrid engagement within the study, on the FEHNCY team, and community members participating in the larger FEHNCY survey. All participants acknowledged the multi-faceted impacts of the COVID-19 pandemic on the FEHNCY survey and First Nations communities across Canada. The COVID-19 pandemic caused a complete shift to a virtual landscape for most of FEHNCY in Community 1 before continuing in a hybrid but mainly virtual format after community and public health guidelines permitted. The hybrid format for engagement continued to accommodate COVID-19 outbreaks in Community 2 as well as to overcome geographic distance. When asked about in-person and online engagement, a FEHNCY participant said,

“...I think ... both [virtual and in-person engagement are] absolutely necessary, especially because having online engagement ...also opens up accessibility to more remote communities, where...it's harder to travel to them. And there are pros and cons on both sides like children and youth may be more inclined to engage over a computer ...On the other hand, in some communities, internet might not be super reliable and there might be an issue with access in that respect... But it all is up to ultimately, each community and what their preferences are and ... what the expertise on the ground would advise when it comes to that, to online versus in person engagement...” – FEHNCY participant

Due to the COVID-19 pandemic, an unintended finding about the impact of the societal and study context was the FEHNCY research team’s adaptability with the engagement format. Since both virtual-only and hybrid engagement were used in the first and second communities, these contextual elements demonstrated the importance of in-person activities as well as a combined hybrid engagement for a study of this size. While perspectives still differed across participants on

which engagement activities needed to be in-person and virtual, FEHNCY and community partners highlighted researchers looking to the CAC in the decision-making process.

Further, the large size of the research team and different geographic locations of team members combined with the COVID-19 pandemic requiring an initial online engagement within the FEHNCY team were challenges to developing the team dynamics. As described by both FEHNCY and community partners, research was not a priority for communities during the pandemic and therefore, amplified the challenge of participation from community members in the survey and engagement activities, delayed communication with community partners who were responding to the immediate needs of the community, and increased the study team's workload to adapt the research and engagement to a virtual format.

In addition to conducting research and engagement with First Nations communities within a virtual landscape, FEHNCY participants identified other aspects of the FEHNCY study and its team as part of the study context. Some FEHNCY participants described the regional band council resolutions and signing a community research agreement demonstrated how FEHNCY sought support from different levels of leadership which were integrated into the study design. Prior to engaging with communities, FEHNCY partnered with the Assembly of First Nations, an existing First Nations organisation to advocate for community concerns on the national scale. Several FEHNCY team participants described a key element of the FEHNCY study, was including Indigenous researchers and staff on the core team and building local capacity through hiring community researchers. However, FEHNCY participants expressed that the additional time and energy required for conducting research in a culturally safe way amidst other competing academic obligations were added demands to the FEHNCY team's collective capacity. A FEHNCY participant highlighted research constraints from researchers,

"...to properly engage with the community, it takes a lot of time, and it takes a lot of time, not only because it's a slow process, but also because we're researchers and we have teaching commitments, and we have all these other commitments, that it's difficult for us to travel to community to properly meet with the community ..." – FEHNCY participant

Some community partners highlighted that the FEHNCY study topics and methods were impacted by the societal and community context. A participant explained the collection and handling of biological samples from children and youth was sensitive information considering the broader context of the confirmation of the unmarked graves of children in residential schools. In

addition, some FEHNCY participants and community partners described recruitment challenges related to the extensive survey questionnaires and random sampling for statistical significance of results while balancing community priorities in the study design. A FEHNCY participant shared about recruiting communities and the tension of the research team to bridge the study design with community needs,

“... we’re just not getting that traction. And so we’re asking [ourselves] a lot of questions...do we need to change the questions we’re asking [in the survey]? Do we need to drop randomization? Do we need to have more Indigenous-led projects? And this comes back to the cultural safety... we have our methods....PowerPoint is just one example. But that’s the standard...we go in with our PowerPoint and then there’s an opportunity for discussion...maybe we need to do things differently...if communities aren’t saying that this [project] is what they want, then,... the project does not survive ...And we’ve had this discussion even with the funder... what ... do we need to redesign or revamp things.” – FEHNCY participant

Community context.

Community partners described the context of their communities by their relationship with research and their community’s self-determination and resilience despite the colonial history and present impacts.

Community relationships with research. Participants highlighted community resilience and self-determination despite the ongoing impacts of colonization. Each community’s history has contributed to the different perceptions of research in First Nations communities. Community partners have described how previous experiences with research have shaped their relationships with research teams. In Kanasehtà:ke, community partners shared about research studies that have started but have been “shelved” or have not amounted to community benefit or action, adding to their skepticism of research outcomes for the community. Miawpukek was welcoming of research and incorporated research methods such as surveys to engage their community members. However, the short period between surveys with other research teams coincided with the start of the FEHNCY study which was expansive in its research area and required a longer time commitment from participants. A community partner explained the communities’ research fatigue could impact participation,

“[A lack of participation] could be because they’ve done lots of surveys before and they’re probably tired of doing surveys...or they just don’t have the time because an hour is a long time for ... these [families that] got small kids and they work ...and some people probably just don’t have any interest in it... because I mean surveys aren’t new to this community... we use it [ourselves] to improve on things here...– Community partner

Community self-determination and resilience. In both communities, the impacts of colonisation were marked by defining historic events of their self-determination and resistance in the face of oppressive colonial systems. The community resilience in adapting to the colonial context was explained by a community partner when asked about confirming community buy-in of the study,

“[Apathy in communities is] a result of colonization, broken promises, a continued colonial approach...and it’s [a] very unhealthy in the environment that we’re trying constantly, as best we can, to work through and heal and rebuild... - Community partner

Participants described the contextual influence of community self-determination and resilience through existing community collaboration and communication processes, a strong sense of pride for their community, and preserved traditional foods practices despite structural barriers.

First, community partners have described unique ways that communities mobilize despite colonial policies that have disrupted existing systems and structures of First Nations communities. There were different levels of multi-sectoral collaboration in the two communities which impacted engagement activities. In the community with more collaboration and communication between community sectors, participation in the CAC tended to rely on central community partners who were credible to the community. A community partner described the multisectoral collaboration in the community,

“... we got a lot of our departments all under one and everybody looks after everybody else. So, that's the good thing... for a small community. And now you could sit around a table sometimes, and you could have a good argument going too, but that's, like, everything. You're not going to agree with everything, right? But...they're there if you need it, if anybody needs anything.” – Community partner

Almost all participants identified central community members who were vital in their participation in the CAC. For example, when asked about why they participated in the CAC, a community member responded with,

“... [I]t was [community member] who asked me to participate in the committee. [They] said it would be beneficial.” – Community partner

Second, community resilience and self-determination were shown through their strong sense of pride for their community and Nation. Community partners from Community 1 have highlighted their perseverance in preserving their cultural and traditional knowledge and language despite a mixed spectrum of cultural practices among community members. A community partner in Community 2 also shared about the revitalization of their traditional practices and cultural knowledge,

“...it's just people's ... want[ing to learn] the history... And ...a lot of people don't want to ... read a huge book on... how we used to catch rabbits back in the day, most people would find that boring... we went [on] a trip this winter, a skidoo trip and brought us up to this ... mountain ...But along the way we stopped and ... the guides from here, from [our community] ...showed us the beaver traps... and then they ate beaver...So, it was like putting activity into learning and I think people just want to learn history...” – Community partner

Many community partners in Community 2 described the community’s strong roots in their community values to prioritize children and youth,

“...the young generation is our future so we hope that they’re going to learn from our elders... and run this community with the benefit of the people not for yourself...” – Community partner

Third, preserved practices of traditional foods emphasized communities’ self-determination and resilience. One community partner highlighted their self-determination in maintaining traditional foodways,

“...the effort that we put into eating traditional and healthy food is...a lot. And, you know, the reason why we have access to traditional food as [a community] is because we’ve always ... pushed boundaries... [around] policy with the Canadian government...” – Community partner

Similarly, in Community 2, a community partner highlighted an example of their resilience through sustained traditional food practices,

“We haven’t forgotten our way...we still got that traditional part of us left in us that’s our food because...the Pow Wow brings us all together with your hunting and your fishing...”

– Community partner

However, both communities have described legal barriers, environmental changes, and socio-economic factors limiting access to traditional food practices such as hunting and gathering. Community partners gave examples of legal barriers such as land restrictions, land dispossession, and licensing requirements. In both communities, environmental changes related to residential developments near hunting grounds that impacted hunting practices were described by some community partners,

“So I understand the fact that our traditional foods are just more rare ... because of communities surrounding..., the building, the expansion [and] there’s no more green areas ...unless you go up North....” – Community partner

Some participants also described the socio-economic barriers such as having access to a hunter or a connection to learning how to hunt and financial costs related to transportation and licensing. In contrast, one community partner expressed that once these conditions were in place, traditional foods were more affordable when compared to the monetary price of food sold at grocery stores. A community partner shared,

“So I think the wild game, like the moose and stuff like that is why it’s – well, is successful and is big here. People do love it. But it’s definitely more affordable than going to the store and trying to buy ... like \$10 a steak. And ...processed meat in the can.” – Community partner

While the ability of community members in both First Nations communities to sustain traditional foods practices was affected by legal and socio-economic barriers, each community was impacted to a different extent. Some community partners from Community 1 highlighted how socio-economic and legal barriers made their intake of game meat unpredictable and scarce. Although Community 2 had greater access to hunting grounds, a community partner emphasized the important impact of legal barriers to their traditional food intake,

“...[I remember] people were saying “Oh, it’s going to be a hard winter ... We never got the license. The government screwed us over...” So, now if I don’t get my moose, my children are not going to get it. My mom and dad is not going to get it. Grandparents is not going to get none. And that’s how it was back then. You get a moose, and I guarantee

you everybody in your area, everybody they knew, had moose...[Now] you go in, if you get caught you're looking at losing whatever machine you went in. Hunting knife. Your gun. Could be your truck. And if you don't pay...[you get] a big fine. So, I think all that played a big role because...I got uncles, that's all they did. They hunt, they fish, and now what's the point? ...now you've got a time limit when you could go, when it's open, you can't get it first part of the season, it's too hot. Then you only got this little span...And if you don't see it, then that's too bad. Then comes December. Moose season's closed. Could be a moose standing in your backyard. You can't do it... – Community partner

Despite these legal barriers, many community partners explained that formal community policies that were recognized by the provincial government enabled elders in the community to have access to traditional foods through paid hunters and fishers as well as a special quota to hunt in preparation for the annual Pow Wow that provided free traditional foods at the event.

Interactions between the study context and the community context. Building on the study context, a participant shared that the focus on food and nutrition was considered sensitive information. Given that the community context highlighted the communities' self-determination and resilience in the practice of traditional foods, the community partners mentioned the study topics could cause fear in the results casting a poor reflection of the caregivers' ability to provide adequate traditional foods without considering barriers in the community context. A community partner connected aspects of the study design with the barriers to community members' participation,

“...we have access to traditional food as [COMMUNITY] ... because we've always ... pushed boundaries ... and that comes to more like policy with the Canadian government ... the fear of having this data proves something ...in a published material that it would give access ... to the information by the wrong people. And that was ...a personal fear of participating in this study and – because I know there are a lot of families that would say no to participating in it just because of the way it can feel a little bit intrusive and being asked like, “What kind of traditional food do you eat how times a week?” going in to saying yes to a questionnaire that I have no previous knowledge about what the questionnaire would be, I would probably say no.” – Community partner

In light of community strengths, a community partner explained that the remnant colonial impacts in the community contexts require more effort from study teams when doing research with Indigenous communities,

“And if you look at our culture, [...] it's very focused on responsibility. [...] And if you look through colonization what has happened, one, how did they try to assimilate us is to take our culture away [...] they've separated us from [who we are]. So that has a lot of impact, socially, economically, on the side of health.... I think in research... it has to be more focused on the responsibility of what you want to achieve as a researcher ... in [our] Indigenous contexts, you're going to have to obviously put a little bit more – probably a lot more effort than you would if it was in another context, because of that reality....” – Community partner

4.2. Essential community engagement strategies.

Both community partners and FEHNCY team members described essential community engagement strategies that were done in the community and additional strategies that were seen as valuable. Engagement strategies included supporting Indigenous leadership within the study, supporting community decision-making (with the CAC), promoting project visibility in communities, promoting youth-specific engagement, and incorporating Indigenous knowledges in research.

Supporting Indigenous leadership in research. Both community partners and FEHNCY team members described supporting Indigenous leadership within the FEHNCY team to extend the credibility and accountability of the research project. Indigenous leadership in the research can be supported through cultural safety activities that prompt researchers to prioritize Indigenous voices on the team. Participants highlighted the extent of the impact that supporting Indigenous leadership within the research team had on community partners with FEHNCY. When a community partner was asked about their thoughts on FEHNCY community engagement, they responded,

“...The fact that there were Indigenous participation at the head of this project was very meaningful for myself as a community [member]... it made me feel like that there was a collaboration between community members of different communities... But it allowed me to meet new community members from other places and to feel supported in my community by other community members... So on a personal level I feel like [the Indigenous research team members] did a very good job at being present; and I think it's what allowed the success of this project having their presence and their lead on the project...” – Community partner

FEHNCY team members listed examples of activities supporting Indigenous leadership in research including cultural safety workshops, OCAP training, the structure of co-chairing CACs between the research team and community partners, recruitment of local community researchers, individual reflections on points of tension and power differentials between the research team and community members throughout the study. These activities supported Indigenous leadership within the research team by prompting researchers to critically self-reflect and shift the power dynamics when working with communities throughout the research process. When asked about how FEHNCY could improve working with the CAC, a FEHNCY team member responded with,

“...if [FEHNCY is] running [the advisory circle]... it’s this automatic power dynamic where FEHNCY is setting the agenda, FEHNCY is calling the meeting, FEHNCY is answering questions and guiding the discussion. So ...[FEHNCY asked the CAC to] suggest a co-chair... but the problem is there isn’t a capacity. Nobody has the time to serve as a co-chair...Even though it’s completely unintentional...it’s this ...subtle way of who has the power to speak...And that’s subtle, but also powerful.” – FEHNCY team member

Some FEHNCY team members expressed adopting an open and flexible attitude, listening, and adapting to communities were characteristics of the research team that supported their ability to prioritize Indigenous leadership in the team. In a focus group discussion about how FEHNCY team members can be supported in adopting culturally safe practices, a FEHNCY team member said,

“...one thing that we do well is our ability to adapt and be flexible. And I think without that we’d be in trouble. Like, if we were really set in our protocols or our timeline even. ...So that’s one thing we can continue to do is be open and flexible and responsive.” – FEHNCY team member

Many FEHNCY team members and some community partners expressed that exemplifying these characteristics that FEHNCY adopted, and the activities previously mentioned supported Indigenous leadership by building capacity within the research team to act based on the guidance of Indigenous team members or organizations and creating space for communities to lead in the research. When asked about community ownership, a community partner responded with,

“... I think ownership was a concern of the community, but it was also a central theme to FEHNCY and the research team because I know you guys are following OCAP principles, so we know that within that frame community ownership is central. And I think that was always part of our discussions. It was something that was always considered, and I think because if we think of ownership not only as ... who owns the findings or the data, but ownership over the process ...how do we want this to go down, ...what works best, ... ownership and responsibility of how the work would go. FEHNCY has been all along the way about collaboration and finding out from the community what is best to reach the community. – Community partner

A few FEHNCY team member agreed that debriefing information about the participating community and Nation before working with each community would be beneficial to understanding their history and recognizing the diversity and uniqueness of each community’s context. A FEHNCY team member suggested,

“... we're going to different Nations throughout the project and we have an advisory circle in every Nation we work with. However, we're not all of us available all the time to be attending those Advisory Circles. So I think at the beginning of every involvement with every Nation it would be good to have some coaching, some sort of cultural information... to work with other people, other Nations...basically cultural training... with recognizing the diversity among Nations. – FEHNCY team member

Supporting community decision-making. FEHNCY aimed to support community leadership in the study, particularly through establishing a CAC that guided the research process from the planning stages of the research starting in the community, recruitment, data generation, interpretation, data sharing, and knowledge dissemination activities. Many research team members and community partners described the role of the CAC in sharing decision-making and responsibilities during monthly and ad-hoc meetings.

Some community and FEHNCY team members explained that engagement with diverse community partners could bring multiple perspectives and ways to mobilize within their roles in the community. Participants identified a diverse selection of CAC members which included community members in different life stages such as elders, adults and youth, community partners from multiple sectors, and the band council, which was important to have a more wholistic

engagement of the community. A community partner shared that a wholistic community engagement provided a more diverse representation of the community,

“... like most things that we think about in our culture, it would be a wholistic engagement or systemic engagement in that it’s not just certain people involved, or just certain parts of the community that are involved, but really a good representation of everyone in the community. So that would be very much like we did in the FEHNCY, ... there was interviews for youth, and then parents, so sort of making sure we have all the age groups. And I think that’s kind of where we stop thinking about community engagement. But I think we need to go even more in that we have key people in positions, such as either political leaders, the people in the education centre, or in the employment centre, or in the schools. Community engagement involves everybody in the community, leaders as well as community members. So it’s... having a collective effort and vision, and focus on wellbeing of the community.” – Community partner

However, a FEHNCY team member also raised an important consideration related to the capacity for conducting culturally safe research,

“Well I guess the flip side of the coin is because we rely on the communities to tell us how to proceed, so it – we put pressure on the community to help us... it takes a toll on the capacity... So this is something that can be challenging in some communities...” – FEHNCY team member

While the CAC supported community decision-making, most participants described the finite capacity to conduct research within communities and research teams and that was even more strained during the pandemic.

Project visibility for community outreach. Many participants emphasized that promoting the visibility of the FEHNCY study in the community was vital for building trust with the community. The CAC was key in guiding the process of bringing the project to their community members. A community partner described the vital role of the CAC in recruitment,

“...[there was work done on] establishing a bond [with the CAC] to be able to ensure participation and to promote it [to community members], and, at the end, to ensure success of whatever initiative or project you're doing. So, [with the] Community Advisory Circles... everything was ... coming back to community members, some partners, some

just community champions or interested parties, and you promote that.” – Community partner

As community members worked closely as partners in the project, they were also able to share it within the community through their connections. A community partner explained that the visibility of the project enabled communication of the study information which contributed to the agency of community members to make informed decisions about their participation. Social media was a medium to increase visibility due to its widespread use and ease of access. Most community partners and FEHNCY team members described the importance of doing in-person activities for relationship building and recruitment for the study. Considering the communities’ relationship with research, a community partner explained the importance of increasing the project visibility,

“[The project]... need[s] to be more visible. And you don't have to be plastered everywhere. But you need to just keep ...coming up into people's minds. Reminding them who you are, what your vision is, what the intent is, how long you're going to be here...I find that if you have more people understanding your project, you have more of a buy-in from community members... But being invisible, forget it. You won't get people really that interested....we're very used to having a lot of research and just being shelved. And in the beginning everybody...want[s] to participate because ... there's [the possibility of] ... change happening...And then after a while, for the older ones who have been through it a few times... just take an empty binder and put it up on the shelf next to the other projects. And just put the label on... the front cover. Because that's as far as it's going to get after. So that's what [researchers focus on answering when increasing visibility], what is the intent of all this data after? Why ask people what they want? What [do researchers] see happening?” – Community partner

Youth-specific engagement strategies. Intervention strategies that targeted engagement for youth representation and mobilization were described as engaging with youth directedly in youth spaces and providing “mentors” or “navigators” to guide the youth activities. A FEHNCY participant explained the importance of youth representation in the study for mobilization,

“... I think that's important [to have youth representatives in the study], because...I can speak to what I think the kids might like. But of course, I'm not a kid, so if someone could bring that information to us, I think we should really listen to it...they really need to give

us what they would like to do, and how can we get them involved. I think the most information would come from them on that, right, because we could guess all we want...’’

– Community partner

Activities held in youth spaces were vital because they provided an accessible, familiar, and structured space for the youth and children who were already there. Both community partners and FEHNCY team members highlighted youth spaces as schools, youth centers and community centres for the implementation of in-person youth activities related to the study. Some FEHNCY team members and community partners also explained the value of using a mix of social media outreach due to the widespread use of it among youth with in-person activities held in collaboration with the staff at schools or community centers. When asked about how to create spaces for youth engagement, a community partner stated,

“...be in the places where they are. Use the devices they use...you're not going to do newsletters because they will [not] read that...maybe go talk to the older youth...You need to talk to the youth... Tell us ... how can we reach out to your peers? What interests you?... what is it and then fill in the blanks. Get them to tell you what interest them... Prizes, and food always work.”

– Community partner

Both community partners and FEHNCY team members identified the need for the “mentors” to have the experience working with children and youth and show their ability to create spaces for youth to develop their leadership potential. A FEHNCY team member distinguished the role by the distinct strategies that were needed to engage with youth in contrast to adults. When asked about what strategy were needed to mobilize youth specifically, a community partner highlighted community support from community members who were seen as “mentors”,

“I’d say community support...If they see... the mentors... the teachers, the parents, and the directors and people of say the clinic and the bank... if they see ... us as individuals and mentors ... expressing the importance of [the FEHNCY project implications] ... it will be definitely something to motivate them... They are easily motivated...but if they see the value and importance of it and the leaders around them ...put an importance in, I think that it will be beneficial to them... they’ll catch on to it more so like that.”

Community partner

A few FEHNCY team members and community partners identified the importance of incorporating an intergenerational aspect, a valued trait of the local knowledge. Although

building intergenerational capacity was part of the original study design in FEHNCY, some community partners identified intergenerational activities as effective for youth and community-wide engagement. A community partner described it as building on the strengths of the different roles of youth, adults, and Elders in the community.

“... the traditional teachings that we have ...we envision [the different life stages] ... in a circle, because as we believe, life is circular...I think it's important to know the life stage of the group that you're working with. Because traditionally, each stage comes with a role and a responsibility. So children, for example, babies and children, babies, young babies, their job is to bring joy to their parents [and] ... to the community, and they do that flawlessly. Because everyone that looks at a baby, just feels that warmth and that joy... So for youth, their role, they're looking to know who they are, their identity. They're looking to know where they belong. They're looking to understand who they will become in the community, how they will contribute to the community. And also they challenge us, they challenge the adults, they challenge the status quo, they challenge what is. Because they're the future leaders and they're there to push us and to question what works and to question and what doesn't work.” – Community partner

Incorporating Indigenous knowledges, methodologies, cultures and languages. Many FEHNCY team members and community partners emphasized the importance of incorporating local cultures, practices, languages, and protocols as an engagement strategy. Some community partners expressed the importance of this strategy as a way to value Indigenous knowledge systems and promote health. When asked about the importance of using the local language in FEHNCY materials and events, a community partner responded with,

“Well it's very important to be a [group of] people, to be connected to your land you need your language... it's uplifting [for] mental health I think it's ...[a] really helpful... start [to] finding [our] roots and really making that connection. And ...[from] losing our language... [to] having the language is one step closer to becoming that [much] more healthy in the community.” – Community partner

Participants mentioned several examples of successful integration of Indigenous knowledge systems were having an opening Ceremony or information session to introduce the study to the community with simultaneous translations from an Indigenous language to French and English, sharing moose burgers during a community-wide event, engaging local food experts

to include community-specific foods on the survey and seeking local Indigenous artists and youth to create their message of health onto a wampum bundle. Some community partners described the use of Indigenous methodologies such as storytelling and the FEHNCY bundle as ways to bridge Indigenous methods with western research. However, a few FEHNCY team members highlighted that conducting culturally safe research was an ongoing learning process for the research team. A community partner described the bundle as a culturally safe method,

“... if you think of the bundle we have... the leather bundle that’s going to travel, even though the work is happening in a very sort of academic professional way, the cultural way is to have that story... FEHNCY use[d] that sort of oral tradition of, like, the storytelling and for that to continue along with the project and [COMMUNITY NAME] being part of that story, and to carry on to the next community-... [and] take what you learned in [COMMUNITY NAME] like the obstacles, the successes... what did FEHNCY learn as a team that is helpful for the next community and is it helping, but [it is important] to remember that time and to build on what was started in [COMMUNITY NAME] and what can be done for the next community.” – Community partner

Many community partners described the inclusion of traditional foods as an important strategy for engagement. Given the societal context of the pandemic impacting opportunities for sharing traditional foods in-person and contextual factors limiting access to traditional foods, incorporating traditional foods was seen as a way to express the local knowledge, teachings and traditional ways. The COVID-19 pandemic and geographical distance decreased the ability for in-person gatherings and therefore, limited activities that included traditional foods in both communities. A community partner who was reflecting on the FEHNCY Community Engagement and Mobilization component said,

“...Let [the research] be community-based and let the people bring in their practices and their culture and incorporate it in the activities that you do...we could have had a social...have a feast, things of that nature that brings in the people and that are their traditional cultural practices ...passing on of knowledge through these songs...and it really relates to the FEHNCY concept, the thing that we’re studying... We [were] going to share some food, some traditional food hopefully and some traditional activities that promotes mental health, physical health [...] we were just really impeded by the pandemic...”- Community partner

For both communities, community partners explained that sharing food and traditional foods brought people together in building relationships.

“...[Traditional foods] was definitely a big part of the community here and it certainly brings people together. Like especially in the celebration of food...definitely is a big part of us getting together here and how we celebrate. Especially traditional foods, we [would] use in any celebration normally... – Community partner

The significance of traditional foods in the form of moose burgers was attractive because of the scarce access to it. A community partner explained,

“So I understand the fact that our traditional foods are just more rare ... because of ...surrounding communities, the building, the expansion – there’s no more green areas hardly, unless you go up North...so it was to attract the people because ...we can get a burger anywhere so – but [with] mooseburgers ... we attracted the people. And we got over 60 parents that came to the school...– Community partner

Since access to and preferences for traditional foods differed between and within communities, some community partners acknowledged that having a mix of both traditional and non-traditional foods could attract more community members. However, a few participants explained that having traditional foods needed to be incorporated in engagement activities such as community feasts. A community partner explained that it demonstrated community resilience in preserving their cultural ways of doing,

“And for here we always – like food is a big part of the celebration. Everything we have in the community...[has] a community feast... But [traditional foods has] always been a big part of this community and obviously really important and I think we all play a part in trying to keep it alive and the children. It’s kind of naturally inherited in a kind of way. It’s like what you know...” – Community partner

4.3. Community engagement as relational.

Many participants expressed community engagement interventions as a vehicle to trigger the mechanism of seeing community engagement as relational. This mechanism focused on the relationship building between the FEHNCY research team and participating communities and within the FEHNCY team. Participants described this relational mechanism as the process of establishing, building, and maintaining relationships.

Community partners described the significance of this mechanism being rooted in reconciling historical ruptures in relationships from colonisation and the foundational anchor of relationships when doing research with Indigenous peoples. Participants gave examples of how this mechanism was applied in the Community Engagement and Mobilization component of FEHNCY. First, healthy working relationships between FEHNCY team members and community partners rippled through their kinship and social networks in communities. Second, FEHNCY partners described the rippling effect of building strong relationships within the FEHNCY team and extending to their relationships with communities. Third, another example was creating partnerships that supported community governance over the research process. Almost all participants explained that developing trust and demonstrating shared values were building blocks for healthy relationships between FEHNCY and the community. Finally, the section ends with participants highlighting the format of engagement and timeline affecting relationship building.

Historical relationships. As previously discussed, all participants have acknowledged the pervasive impacts of colonialism and helicopter research on the community context and on the relationship between Indigenous Peoples and settlers. Within this context, several community partners described the significance of working relationally within the context of historical ruptures in relationships. A community partner described why community engagement as relational is important,

“I think it's important in our communities ...for [community engagement] to be relational. The relationship is really important between the people who are trying to engage the community, because so much has happened with different professions and professionals, that there's a lot of mistrust...to trust that that will be beneficial or to trust that it will mean anything or make any change happen. So I think that's important ...approaching it from a relational perspective as well as... reciprocal...” – Community partner

Moreover, most participants equally from the FEHNCY team and in communities emphasized the importance of relationships in conducting the FEHNCY study and for research in general. A FEHNCY team member pointed out relationships as the critical infrastructure that was vital to conducting Indigenous health research,

“...when you're in [academia], you can apply for these infrastructure grants ... And it's big money, it'll buy you a big piece of equipment...Because certain research requires that

kind of infrastructure, but really, [community-engaged research] ...need[s] relationships – that’s the infrastructure for doing this kind of work. And so, how do you build relationships? It comes with experience, but you have to learn how to do it. And institutions don’t have infrastructure to provide the capacity to researchers who want to do research with Indigenous communities.-For [communities]... it’s all residing on the community engaging in those relationships with the research team, and the research team respecting how the community is going to express their self-determination, decision making power, their expertise and knowledge... It relies on that, building those kinds of relationships so that they can work together and figure out...And when [that] infrastructure is not there, you're not going to have a research project...” – FEHNCY team member

Examples of approaching community engagement relationally within FEHNCY. First, all community partners and FEHNCY team members described the effect of positive and foundational relationships between the research team and community partners rippling through their kinship and social networks. With the COVID-19 pandemic and geographic distance not allowing researchers to physically be in communities, participants highlighted the vital role of community champions and community partners from the CAC in sharing the study information in their community networks and guiding the research process, especially the recruitment of community members.

Some participants described community partners as people who were in leadership positions in the community and community champions as community members who were regarded as credible in the community. Participation outcomes of community members were attributed to the social networks and kinship ties in the community. A community partner explained the key role of hiring a community member who championed the study,

“[The community researcher] has been part of our community for a long time but [they’re] from a different nation. And I think that allows [them] to be able to have communication with just about everybody in the community while operating under our community standards ... how to conduct [their self] in our homes. So that’s an extra layer of comfort in willingness to participate in the project itself; ... [it] does have an impact who the community researcher is so that could be a way to ensure that more participation is had in the future...” – Community partner

Further, a few community partners described how good relationships between the research team and community partners can absorb shocks from political changes through their continual commitment to work together in partnership. A community partner highlighted contextual factors influencing community engagement during the FEHNCY study,

“... we were really restricted ...[by] the global pandemic ...There was stagnation. There was resistance. For sure, in the end we were able to kind of overcome that and ... political shifts happened, people came into the right positions to make it happen, but the efforts were there. Work with the people, establish yourself with partners, identify your champions...make it so that these pillars that you identified in your community are the ones making the pitch...” – Community partner

Second, FEHNCY team members described relationships within the FEHNCY team as another example illustrating the foundational basis of relationships that worked as a mechanism. The rippling effect of strong relationships within the team extended to relationships between the team and the community was an unanticipated finding highlighting the importance of good research team relationships in addition to relationships between the research team and communities. Some FEHNCY participants explained that strong relationships within the team enabled better communication and understanding of each other. Many participants highlighted that healthy relationships were foundational to research with Indigenous groups. Due to the large size of the research team, initial connections in the team led to establishing more relationships between other research team members and extended to communities. A FEHNCY participant explained the snowballing of connections,

“[There’s] the domino effect... if [a team member] ... is vouching for the PI’s, and [another is] vouching...for all of our co-ordinators... [t]hat’s how you build those networks ... each person kind of has some form of more personal relationship with somebody else. You start to build that more personal network with everybody, even if you haven’t met them.” – FEHNCY team member

A few FEHNCY and community partners described Indigenous leadership on the core research team in addition to community partners were important in establishing relationships with communities. Indigenous scholars and staff on the FEHNCY team extended credibility to the study through relational accountability as described by a community partner,

“... the thing with coming ... from a community with a lot of...cultural network is that ... for example I'll be able to identify [the FEHNCY Indigenous researchers and staff] for the rest of my life. And there are other players in the research project who I may never see in my life again...” – Community partner

When asked about community buy-in, the community partner responded with,

“... you see other community members being part of the work, part of the research. So it's [the FEHNCY Indigenous researchers and staff] that's your buy-in...because...this is how our communities work. We see people that we're familiar with that we trust that can be held accountable...” – Community partner

Third, community engagement as relational worked as a mechanism through partnerships between the research team and communities that supported community governance. Most community partners described community governance in research as a research process that was community-owned and community-driven. Many participants identified community ownership in having shared decision-making with the CAC and supporting Indigenous leadership within the research team. Community partners have also explained their involvement in the study as a responsibility that CAC members, multisectoral community partners and community members uphold and were accountable to within their roles in the community and in the FEHNCY project for results to benefit the community. A community partner shared how community-driven research was operationalized with the CAC,

“So, whether it's a community participant or a champion [who responded to the research project saying] ... “Hey, this is really interesting for us.” And then from there ... everything that's developed in terms of making things happen is worked in full collaboration between the research team and your community participants and your participating champions... And it's how it was done at the Advisory Circle, [asking them] how do you think we should proceed? This is what [the research team is] thinking, what do you guys think? And then when there was some level of consensus, then that's how we proceeded... when we talk about driven, we're ... thinking metaphorically, driving, but there's a navigation aspect to your research too, and how we're going to go about it and that was done in full collaboration...your evidence is there in terms of being community driven.” - Community partner

Building healthy relationships. To build healthy relationships, most participants expressed the need for trust and demonstrated shared values between the research team and the communities. Many FEHNCY and community partners identified reciprocity and respect as key values. A community partner expressed the importance of relationships and how to approach relationship building,

“The relationship is really important between the people who are trying to engage the community, because so much has happened with different professions and professionals, that there's a lot of mistrust...to trust that that will be beneficial or to trust that it will mean anything or make any change happen. So I think that's important ...approaching it from a relational perspective as well as a reciprocal, right.” – Community partner

Participants described trust as a building block for relationships. Building trust was an ongoing process in establishing, developing and maintaining the relationship. Given the nature of the FEHNCY survey collecting sensitive information, some community partners described community engagement as a way to build trusting relationships. A community partner explained how the sensitivity of the study topics affected the need for more efforts to build trust,

“I think that just the nature of the study itself can right on the onset have some barriers, have some hurdles to go over because we're talking about very private information. Not necessarily nutritional but even then I think people are a little bit guarded as to sharing about what they eat and talking about their personal physical health. So this is a very personal matter, so right away you have that hurdle to get over. So I think that the level of trust required to be built is much higher than if you're just inquiring about something a little bit more benign. But I think FEHNCY right off the bat with the notion that the project be community lead is the first big step. So essentially you're not coming in as a big university and saying, “we're doing this participate.” No, we were saying, you're coming in, you establish partnerships.” – Community partner

Community partners saw the research team honouring their commitments in the research project built trust. A community partner explained that when community members raised questions, this was a testing of trust to see how the research team responded to their concerns. Another community partner expressed that the research team was accountable and responded to the questions and concerns of the community which strengthened the trust that was already built in the relationship.

Some community partners also explained that there was a threshold of trust that needed to be achieved to build the research relationship. For example, a higher amount of trust was required in building relationships with communities particularly when the community sectors have independent working processes and the community had negative experiences with research. A community partner linked building trust in relationships to the community context,

“...at all levels [our community] ha[s] a climate of apathy and disengagement. It’s just been a consequence of the political climate, it’s been a consequence of poor administration in the public sector, unfairness, injustice...If you can as much as possible establish a link of trust with the individuals that you’re trying to attract, to engage with, that will go a long way into fostering that safe..., [and] inviting environment. I think trust is the basis of most, if not all, ...healthy relationships in essence.” – Community partner

An example of how to build trust was through food sharing activities. The significance of a gathering for a meal was described by a participant as showing trust in the people gathered for the meal which set up conditions for listening and sharing. Sharing food was seen as a door to sharing oneself,

“...When people gather for a meal we break bread together ... So they're more open, and listening, and in sharing we share food. That way that opens the door to sharing ideas, to sharing feelings, to sharing stories ... just sharing. And sharing your opinion... you're eating with these people. So obviously you trust them... it opens up the door for that to share about you know what we think.” – Community partner

Many participants described demonstrating the values of reciprocity and respect between the research team and the community were needed to build good relationships. A community member highlighted the importance of respect in working in relationship,

“Well you’ll get support from people... If you show them respect, you’re going to[get] respect back. But I mean if you’re going to be talking down to your people, they’re not going to listen to you or want anything to do with you. And I don’t think we got that here. I think we got a good working relationship with everybody...” – Community partner

Some community partners described reciprocity as exchanges that were mutually beneficial. Reciprocity in research with the communities was shown through the community benefits of the research, on the individual, community, and national levels. On an individual level, community and FEHNCY team members described that health information returned to individuals and

culturally appropriate gifts given out during engagement activities demonstrated reciprocity. A community partner explained how reciprocity was expressed through offering back to participating community members,

“Culturally...our worlds are created through our relationships...having that sort of give and take, not just approaching [participants] like they’re subjects... In the context of research...when we want information from a certain group. And...FEHNCY did a really good job in being reciprocal, in that something was offered back. There were gift cards or ...giving plants...there's a reciprocity that happens. And so there are gains on both sides, it's not just taking from the people...” – Community partner

Including Indigenous knowledges, methodologies, cultural practices, and languages such as community events sharing traditional foods, and research results that benefit community programming was honouring reciprocity on the community level between the research team in partnership with communities. A community partner connected KT activities at the end of the research could demonstrate reciprocity honoured in the relationship,

“...to come back and present [the findings], it would be important to have, maybe there's a meal with it, honouring of those who contributed so that we can honour those who shared and who came out to participate and ... honour the efforts. And to honour and recognize the relationship that was built in doing this... there was many people in the Zoom from different places, different schools and it's all relationship building...it's important to highlight it because the fact of FEHNCY coming in to do a research project and successfully doing it so, that's relationship building.” – Community partner

The broader COVID-19 context affected the format of engagement to build relationships. The necessary shift in the research to a complete virtual landscape did not allow in-person activities such as gatherings and shared meals until community and public health guidelines declared it safe. Therefore, there were few instances of in-person connection and communication in Community 1. Some participants expressed a missing sense of meaning that came from working alongside people physically. The virtual engagement and staff turnover in the FEHNCY study limited the extent of collaborations and the number of activities conducted with the youth. Therefore, there were less opportunities for youth mobilization in the KT pathways to occur. In contrast, the hybrid engagement with Community 2 with regular community visits and online CAC meetings created more opportunities to develop relationships in-person and continue a

hybrid engagement format. A FEHNCY participant who was involved in virtual and hybrid engagement in both communities explained,

“...[with in-person engagement] being able to have really organic conversations with members of the community in order to learn a little bit more about their personal experiences and relationship to the project, relationship to research in general, relationship to culture and tradition... [which was] not something that...I personally was...able to really get to with the virtual engagement...” – FEHNCY participant

A few FEHNCY participants highlighted how virtual engagement limited relationship building within the team. A FEHNCY participant described the impact of relationship building within the team on relationships with communities,

“I feel for us as a team to be successful in the community, we need to be ... strong inside [the team]...the pandemic didn't allow for us to meet in person... this is a very important research project, ...in terms of its size ..of funding, for example... we owe to the project being available for it and putting a higher priority on [the study]. And so that can transpire through our time commitment – all of us – to this. And also to understand the people's roles and difference between researchers – like the academics – and the staff; and to understand that the difference is not in intellect. Nor is it in importance to the project. But it is in responsibilities; and to keep in mind the experience, the knowledge of everybody and respect that. I think that will sort of be a model for us to use in the community when you're looking outwards.” – FEHNCY participant

However, an added element of the pandemic highlighted the time needed to build relationships. The duration was prolonged in Community 1 from 6 months to 3 years. The longer timeline strengthened relationships and enabled more connections with the community within a virtual space while following the community's timeline and capacity. A community partner described the impact of COVID-19 on time in developing research relationships,

“COVID was a gift for this project in our community because it stretched it out longer. It made things a little bit slower, and not being in a rush to complete certain aspects. Like I know there's always a timeline and a budget and stuff like that but realistically the way research is like cold, hard and fast is, you know – it can have an effect on the outcome of participation and the participating, willingness of community members while doing the actual interview.” – Community partner

4.4. Valuing Indigenous knowledge systems.

FEHNCY defined cultural safety as valuing Indigenous knowledge systems. While both FEHNCY and community partners have been introduced to this term through meetings and discussions, participants also described valuing Indigenous knowledges as re-affirming Indigenous knowledges as equal to other knowledges, supporting communities' expression of their culture and ways of doing and working in partnerships and relationship building. While most participants described both mechanisms occurring simultaneously, valuing Indigenous knowledges was a mechanism that focused on how research teams created space for Indigenous cultures and worldviews within the research relationship. In a focus group discussion, several FEHNCY participants agreed that valuing Indigenous knowledge systems could activate the potential for communities to exercise their collective agency in acting on research. A FEHNCY participant shared about the importance of valuing Indigenous knowledges in research,

“Cultural safety is a vehicle...to make sure that collective agency can be expressed within the community... we make sure that they can express the research, express their goals. Is [the research done] in a way that they could take action upon their destiny or cultural system or food system? And I think [it's] very important ... as a researcher to take into account that where one community is [is different from another] ...” – FEHNCY researcher

Valuing Indigenous knowledges systems on par with western knowledge systems. Most participants described valuing Indigenous knowledges being demonstrated when Indigenous knowledges was treated as equal to western scientific knowledge. A community partner advocated for an equal regard for both knowledge systems,

“I think that as modern scientists coming in to value Indigenous knowledge is to... understand we call it Indigenous knowledge but it is scientific knowledge, it's not like magic, it's not mythical. Our people have lived with the land for so long, so in terms of knowledge it's factual. Perhaps it was never documented and reported and peer reviewed, but it ... was in a way because oral transmission and peer reviewed in that sense that ...when you look and you go across Turtle Island we share a lot of different medicines, we share a lot of different knowledge [with other nations]... So recognizing Indigenous knowledge as scientific knowledge I think goes a long way and promoting that and

making it known to our people that that's why that knowledge is valued, you recognize its value, intrinsic value and worth.” – Community partner

Some FEHNCY team members also highlighted the differences in worldviews with Indigenous and scientific knowledge systems. A FEHNCY team member described bridging Indigenous knowledges to research,

“So for a scientist who is very observing of natural things, for them the world is observable and only the things that you can know are the things that you can see, that you can touch, that you can experiment with. But there's other ways of seeing the world. And what I read often is that for Indigenous people is that the world is seen as relational – that it's made up of relationships...what does that mean for methodology, right? ... we're not integrating knowledges, because you can't. You can't bring together ...two different things and make them one. The two-row wampum tell us that...where one is the settler and one is the ... Indigenous person, they can co-exist side-by-side, but when you do this, there's going to be tensions... [but] we can co-exist with different world views... the other thing about Indigenous knowledge is that ...it's always been practical. ..[T]here's no point in doing something if it's not going to bring benefit to the community, to the family. Sharing about healing, about ceremonies – there's a benefit there...” – FEHNCY team member

Similarly, both FEHNCY team members and community partners connected intervention strategies that incorporated Indigenous knowledges, methodologies, cultures, and languages to value Indigenous knowledges. For example, given the historical colonial context, a community partner expressed that sharing traditional foods with non-Indigenous peoples was different because the act of sharing the meal was symbolic of seeing each other as equal. When asked about the significance of sharing traditional foods with outsiders, a community partner responded with,

“That would make for, me personally it would make me feel that you're no different that I am, you know, because some people do put themselves above [First Nations] ...– Community partner

A few community partners described another example of bridging Indigenous and western scientific knowledges was through storytelling. They explained this activity as an engagement strategy that included Indigenous knowledges, methodologies, cultures and languages. When

asked about how to value the local knowledge a community partner linked storytelling as an Indigenous method to share knowledge,

“...probably a lot of ...Indigenous communities ... sort of comes back to storytelling... that’s how a lot of knowledge is passed from one person to the other... So that seems to me to be ... a very positive way to share knowledge, is through storytelling.” –

Community partner

The community partner then further elaborated on how Indigenous knowledges could be valued in research,

“...from an Indigenous perspective... storytelling...[has] been there through history to a way of passing knowledge...And just engaging with the actual conversation, instead of just having a questionnaire where they can answer yes or no...[community members] would elaborate a lot more with their knowledge through the process that they have of telling a story, if you can engage with them in that aspect.” – Community partner

Supporting local culture and ways of doing. Valuing Indigenous knowledges was shown through supporting communities’ expression of their culture and ways of doing. Both community partners and FEHNCY team members expressed the importance of valuing the uniqueness of each community by following protocols and traditions when engaging with the community. Some FEHNCY team members also described activities to learn about the local context that could allow communities to express their unique histories and cultures. FEHNCY team members added that this information informed how the team would proceed with conducting research in the community. A community partner emphasized the need to supporting each communities’ ways of doing,

“Just respecting the traditions...we work in circles. Everything’s a circle in life...the advisory circle is a circle. Nobody is higher than the other one... We know our communities, we know our people... All the communities are different. We each have our own needs. We know each other. We know what works, and what doesn’t work ... we know the way we work... [and have] respect [for] how we do the work ... and don’t come and [impose] the way you think we should work ...” – Community partner

Many community partners and FEHNCY team members connected interventions that supported community decision-making to valuing Indigenous knowledges. Many FEHNCY team members described leveling power between researchers and communities through activities that

prompted individual and collective reflection on their attitudes, positions, and behaviours. Some community and FEHNCY team members also described activities such as OCAP training and the research team adopting a posture of responding and listening to the guidance given by the CAC demonstrated valuing Indigenous knowledges. A community partner reflected on a cultural understanding of community ownership of the research process and balancing power,

“... even in the process and in the way it was done, ownership, empowering us to figure out how to do this research and how it would be best for our community like that for me is also under ownership, that umbrella of ownership, and, like, in a cultural sense ownership of the process... ownership of the power. Because research comes in and there’s a power differential... there’s experts or there’s people coming in to research and then leaving and so, I think when we think of ownership from a cultural sense, sharing of that power as well [and] not power over...— Community partner

Similarly, a FEHNCY team member also described making opportunities for communities to shape the design of the study to value Indigenous knowledges,

“...with this project, we are trying to find opportunities where communities can actually shape the study design. Which is a bit challenging, because the study design is a survey to be replicated in multiple communities...we focus on ways in which we can best implement it...all through being flexible for timeframes... for all sorts of conditions ... I think that the Community Advisory Board [is] where we say, “Tell us what to do,” ... that’s where we give up our decision-making power. You know, we’re providing resources to the community... we’ll actually provide the financing or the funding or whatever resources are required, to you ... and not for the researcher saying, “Well, no, it’s got to be this way” ...” – FEHNCY team member

Some community partner and FEHNCY team members explained having Indigenous leadership on the research team supported communities’ expression of their ways of doing the research and bridging different knowledge systems. A FEHNCY team member linked supporting Indigenous leadership to valuing Indigenous knowledges,

“...one of the strengths ... of the FEHNCY project is that we do have Indigenous PIs and Indigenous staff members who... [can be] the bridge between the researchers versus communities... in order to do research properly with First Nations Indigenous

communities, you need to have Indigenous researchers as part of the team to help guide that research.” – FEHNCY team member

With Indigenous researchers on the core research team, a few FEHNCY team members also acknowledged the need for a collective process to ensure the value of Indigenous knowledges throughout the research process. A FEHNCY team member shared about the ongoing process of building this team capacity,

“...we’re working in a really new space...it’s a learning process, and I don’t feel anybody’s really resisting doing that work [of culturally safe practices]. I just think sometimes it’s not clear what needs to happen ... And it’s a process of figuring out how... [with different] component[s like]– with community engagement... [having] Indigenous researchers involved on the team, then how, as a team, are we ensuring that we’re proceeding in the best way? ...it sort of means a whole other set of practices...to put in place. But that’s what comes with doing new kinds of research... we need to be able to work within the constraints by adjusting our practices so that we can feel more enabled... [to] doing research and creating knowledge for the support of Indigenous people’s wellbeing and to address health inequities.” – FEHNCY team member

Research teams working in partnership with communities. Many community partners and FEHNCY team members described that valuing Indigenous knowledges was demonstrated by working in partnerships and relationship building. While each mechanism was linked to the application of results as outcomes, both mechanisms reinforced each other. The processes of valuing Indigenous knowledges were built upon a solid relational foundation. At the same time, seeing community engagement as relational demonstrated the mechanism of valuing Indigenous knowledges. A FEHNCY participant illustrated how both mechanisms reinforced each when talking about valuing Indigenous knowledges on par with western knowledges,

“But we’ve learned that knowledge [is] how do we think about what do we know about the world... I think about how I was trained to be a researcher...[and that] there [are] different perspectives of how people understand the world around them...what I read often is that for Indigenous people is that the world is seen as relational – that it’s made up of relationships. And even as an individual...we’re not in relationships – we actually are the relationships that we hold. So if we think about a world, like that is understood as

...we're in relationships with these things, relationships matter...” – FEHNCY team member

A central example of an engagement strategy that activated both mechanisms was sharing traditional foods. The significance of traditional foods as an expression of their cultures and knowledges and its potential to also create opportunities to build relationships simultaneously activated both mechanisms. Many have explained how the value of sharing food and traditional foods were embedded in their Indigenous cultures and interrelated with their way of life inhabiting the land. A community partner connected traditional foods with land-based practices, culture, and ways of living,

“... [It's] a strong part of the culture here, for one... it's something that... [people here] have in common and not only in the culture and heritage but people have been doing it for so long it's what we know and it's the way of life from the people...A lot of the memories and people like to do it for fun....” – Community partner

Sharing traditional foods was understood through traditional ways of supporting food sovereignty, namely, the one dish one spoon concept.

“... people come together and everyone kind of chips in, you've got to eat to live so everybody who can bring something bring[s] something and feeds the next person...this [is the] concept of one dish, one spoon...the land on which we live offers us this dish, we can grow food, we can harvest, we can gather and we can hunt, fish and that's our dish right there, that's where the food is. And there's just one spoon because everyone should have that same portion, everybody should have a chance... everybody has the right to have their portion of this massive dish...” – Community partner

Some have also expressed its importance in contributing to the physical, emotional, and spiritual dimensions of health from an Indigenous worldview. A community partner highlighted that traditional food contributed to health and reinforced the connection to the land,

“...in terms of overall health, physical health, but I think you need that balance of physical health, mental health, spiritual health, that's the trifecta that I say that all human beings should have. And traditional foods play an important part in there because if the balance is broken then everything is ... thrown off, off cue. So traditional foods are the foods for me that people have eaten living with this land for such a long time.” –

Community partner

Both FEHNCY team members and community partners described this mechanism of valuing Indigenous knowledge as conducting culturally safe research.

4.5. Applying results for community benefit.

Community partners and FEHNCY team members described the KT pathways as a cyclical process that focused on valuing Indigenous knowledges and was sustained by the relational mechanism. Some participants described the cycle of the KT pathways as a sustained relationship that varied based on the stage of the relationship and the needs of partners in the study. Different participants described that the engagement process activated mechanisms that could connect to immediate, intermediate and long-term outcomes of KT. However, many community partners in particular, have described the continuation of the research partnership for changes that impact community and higher levels. When asked to describe the community's relationship with FEHNCY, a community partner described the relational engagement process for community mobilization,

“There's been different events. There's been posters. There's been invitations for surveys. So, like, people know that FEHNCY happened...you guys began the project and followed it through to the end, right to closing and bringing it back to the community so, like, there was accountability all along through the whole process...not once...did we slack on... that relationship and that relationship was maintained to the end....doing the closing and like what would be helpful or beneficial for the community and in what format they would do the closing... right from beginning to end, there was a focus on the relationship and what was the best way to engage with the community. I think along the way we're talking about community mobilization and how to collaborate together, how to work together, and this process modeled that for us and for everyone...” – Community partner

Participants from the FEHNCY team and the community partners described applying results for community benefit as a multi-step process. The first condition in this process was contributing to reconciliation efforts coupled with improved research findings and perceived credibility of the results from the research partnership that leads to the application of results on multiple levels.

Reconciliation efforts and decolonizing research. A FEHNCY team member described relationship building as a mechanism for reconciling past research dynamics,

“...And I see FEHNCY's – like our role is about changing these dynamics with research and having a different way of collecting this systematic information so that we have these

good relationships. And that can facilitate some change if this information is needed to create change. So it's hard to think of, like, how do we measure direct outcome – like, how we measure outcomes or these indicators of our success is complicated. But I think it centres on these relationships ... that we build.” – FEHNCY team member

A few participants explained reconciliation in light of the community context and history of ruptured relationships between Indigenous peoples and colonial settlers. Other community partners described more specifically, reconciliation outcomes of valuing Indigenous knowledges as a strengthened sense of their Indigenous identity and healing experienced by community members and partners involved in the research. When asked about the outcomes of valuing Indigenous knowledges, the community partner replied,

“...if we're looking at reconciliation and decolonization and sort of moving forward into a different future, I think Indigenous knowledge needs to have a valuable, an as valuable place as all other knowledge. And it has been the culture, the people, the values, the worldview has been diminished for so long. As well as shaming the culture for so long that it has been integrated into people's identities. We have people who are ashamed of their identity as an Indigenous person. So when you can start to see your culture as just as valuable as the West or whoever, that's a source of pride for people. And one of the dangers in not valuing, giving space to Indigenous knowledge is again, someone coming in with a set of information or understanding that they presume is better than another, which causes oppression... it just perpetuates the cycle of oppression and systemic oppression.” – Community partner

Some community partners also connected contextual elements of the study on food and nutrition and the communities' experiences of colonization to both mechanisms of working relationally and valuing Indigenous knowledges. Some community partners connected these mechanisms to the process of decolonizing research. One community partner explained how the research results of FEHNCY have contributed to reconciliation efforts by re-enforcing knowledge of traditional practices,

“...the individual scientists didn't have a direct hand in colonization. But in working with us in this scientific aspects and in certain communities that are separated from our lands, from our things like that, bringing back some of our knowledge through a scientific approach, through modern data, it's helping us as well. Everybody's putting in the effort,

but it's still a form of decolonization because we're relearning certain things, we're reconnecting. It's having a part in ...reconciliation. [Reconciliation is] not one thing. It's many, many things that need to be done by many, many different people.” – Community partner

Additionally, a few other participants also expressed reconciliation outcomes from the mechanism of approaching community engagement relationally and valuing Indigenous knowledges through building community capacity. Some FEHNCY team members and community partners described meaningful research partnerships contributing to building community capacity by setting the standard for subsequent research partnerships in the future. A FEHNCY team member linked building relationships with building community capacity,

“...you get that built up trust. You get both sides that are then able to feel they formed a meaningful relationship that could potentially lead to better work or connections in the future. Both sides have that healing aspect of repairing past mistakes that weren't made by the study. And are per se, it's not our job to fix. But showing that there is that care, showing that both sides want that relationship...you're creating so much potential for more positive outcomes in the future... You're setting the bar for how communities should be treated. And communities are setting the bar for how they want to be treated. And it gives that advocacy role...” – FEHNCY team member

Scientifically rigorous and community-reflective results. Most participants linked outcomes of engagement interventions that could trigger necessary mechanisms to improved research findings and mutually perceived credibility of results. Participants described the outcome of improved research findings in terms of scientific rigour and a reflection of community realities. First, improved research findings were described by FEHNCY and partners as representative quantitative samples through participation in the survey. For example, by incorporating engagement intervention strategies at prioritizing Indigenous leadership through diverse community partners across multiple sectors and life stages, the mechanism of community engagement as relational was activated. More credible community partners and community champions with the research team could reach wider social and kinship networks to lead to survey participation.

Some community partners connected survey participation as an indicator of building trust as described below,

“I think we know that we’ve been able to build trust is the participation of community members, first and foremost. If we don’t have the trust, it would have been reflected right then and there. Nobody’s participating, nobody’s filling out the surveys, nobody’s making time – or very few are making the time to participate. And it helps that, you know, like [COMMUNITY RESEARCHER] was there doing a lot and it was familiar faces, that builds trust as well. Community members helping community members. It’s not just, like, parachuting in, taking care of everything and then parachuting out. It’s community members reaching out. I think that really helps build the trust and the community buy-in.”
– Community partner

A few participants have explained that including foods and traditional foods especially, could support more participation. A community partner responded with the following after being asked the outcomes of incorporating food sharing in engagement activities,

“I think it would get a lot more participants. They would get a lot more participants and the people will be more open and listening to the message that’s being sent out to that gathering. It would rally up more people. Plus you can’t have an event without food in [our communities]. And especially traditional food. Not just any food.” – Community partner

Similarly, other community partners agreed that a community-led research process could be reflected in the survey participation. When asked about the impacts of community leadership in the research, a community partner shared,

““It would definitely be easier [for someone in the community to lead the data collection] than anyone outside, because everyone knows each other, so they would be more welcoming, probably, to the people [here]. Come in their house or ask them questions or instal things or even with the kids, whatever they’re doing with the kids physically... It would be easier for sure, you’d get probably more participants...” –Community partner

In addition, some FEHNCY team members and community partners described challenges in survey participation and representative data included conducting research during the pandemic, attrition between study components, selective participation from community members with more interest in the study topics and those who experienced greater financial constraints. Nonetheless, considering the layers of contexts, a few community partners and FEHNCY team members affirmed the level of participation obtained in the survey highlighted the strength and

perseverance in the research process. Overall, a community partner highlighted prioritizing children in their communities supported their interest to participate in the study.

“I think all the... community members are interested in the health ... of the whole community. I would think that ... purely just being interested in being able to do something about that, if need be, would be enough of an impact, enough of an important impact... any parent would be interested in a child's, the children's results, not just their own, but overall [in the community] too...” – Community partner

In addition to improved quantitative findings, some participants also described an improved survey participation as enhanced qualitative results. Selective community partners and FEHNCY team members described the trustworthiness of interviews based on trust and the relationship between the interviewer and participant. When asked about the impact of participatory research, the FEHNCY team members explained that participants would be more open to sharing information honestly,

“... from a research perspective [is] a more complete data set... if somebody doesn't trust you... particularly in qualitative research...you can get ...a surface layer of response. But if somebody trusts you, then they're going to give you ...a response [that goes more in] depth ...to get a [more] complete picture.” – FEHNCY team member

Second, the process of working in partnership and valuing Indigenous knowledges, led to community-specific results that reflected their realities. A FEHNCY team member connected the relational mechanism to the credibility of the results,

“...since we've talked so much about the importance of establishing a relationship...if there's no relationship there's no trust. If there's no trust then the communication of the results is not useful. People would not listen to it... So this whole thing is that the partnership, the engagement, the building of the relationship is important ... so that the information will be deemed ... accurate and useful.... Without the first part you don't have a second part and there's no point in doing the study.” – FEHNCY team member

A community partner also related the mechanism of valuing Indigenous knowledges to seeing the usability of the results,

“So, for the data to be impactful ...to be actionable, it has to mean something to the people. It has to impact... their realities, and it has to be correlated to [the]... system [of our traditional knowledge]... [for example] let's say X amount of children tested positive

to this thing. So, this means this, and it's linked to that...I'm able to do something about it." - Community partner

Many participants identified the CAC as essential to be able to support Indigenous leadership and activated mechanisms that led to the credibility of findings. A community partner shared,

"So, at the end of the day, everything was kind of coming back to community members, some partners, some just community champions or interested parties, and you promote that ... [The Community Advisory Circle]-are your community members. These are the people who are guiding us and driving us through this project...there's active participation and there's oversight from our own as this is happening. So, there's a safety net there to ensure that our ...positions or concerns are looked after at least." – Community partner

This was echoed by a FEHNCY team member when asked about the credibility of the research,

"And then the confidence in that, for me as a researcher in being really enhanced, knowing that we have a Community Advisory Board... the Community Advisory Board and community members involved in the research, and the process of doing the research, that creates the space, that creates the opportunities for communities to provide that feedback, to provide the expertise on who holds this knowledge. And as researchers, you need to talk to them because you're going to get good information from them. It's something that is, I think, relevant about credibility for research results when we talk about that kind of data." – FEHNCY team member

Moreover, a community partner linked the credibility and rigour of the research to both mechanistic processes,

"[The research] could have the most credible data if you wish scientifically because you followed every step of your process and testing and the lab regulations were there. But for us, like, unless we were part of everything, and we can see the global aspect of it, and we were in the whole thing to understand how it's happening, why we're doing it, that's where the credibility comes in. You have to look at the totality of the circumstances and how this came about versus you come in, I don't really know what's happening...But because we're involved throughout the process, and we're working collaboratively, we understand what's happening, why we're doing it. We're taking that extra time to discuss things and make sure there's a mutual understanding and then the results come about,

and you're like, "Yes, I understand that. I was part of it. I feel this is true. This is reflective." – Community partner

Third, improved research results that were scientifically rigorous and community reflective as well as credible to communities and research teams were seen as mutually beneficial. When asked about the benefits of bridging both Western and Indigenous knowledge systems, a community partner responded with,

"...I would think that it would just be better information to use, rather than just one or the other...[the community] could probably use the information...it would give... [the research team] a better understanding going forward to see some of the traditional things ... it would be helpful to them...in their research or in their reports... it would be beneficial to both I would think." – Community partner

Another community partner explained the usability of rigorous research findings for communities and for the government,

"...for one, data is very beneficial in dealing with outside institutions. So, governments move on data because they get to say, "The scientists are telling me... this is what I have to do, this is what I have to invest in." And in terms of internally, it helps to because... we're knowledge-driven... as much as we believe in [the Indigenous spirituality] ... we're still pragmatic- So, when you come with concrete evidence we're more likely to consider it...[because] you've observed it. You tested it...-versus someone else that comes with a frivolous claim." – Community partner

Applying results for community benefit. Finally, when the previous conditions were present, participants described the application of results on the individual and household, the community and regional and national levels of action. Participants described the individual and household level changes as increased awareness of their health and nutrition status as well as knowledge to maintain or improve their health across FEHNCY study components. A FEHNCY participant related engaging community members through the return of results and KT activities at the end of the research to individual and household changes,

"...for individual results it's at a household level, what can I do and what's my, what personal responsibility do I actually have to improving ventilation in my home... [we] want to maintain each occupant's individual agency ... these are the tips and you can do

what you want with them, it's not prescriptive, so that's important.” – FEHNCY participant

Some community partners mentioned youth mobilization as an outcome in changing individual and household health behaviours. A community partner explained a greater awareness for structural limitations when looking at individual and household health,

“I could look at a family and say, “...this is what their house looks like...there's only one income here and that's all they're getting.” Maybe they're eating all this junk food because they can't afford the real good stuff like milk because you got one income house. So, it ... makes you think like that. It changes your attitude...That questions [from the survey] ...brings that stuff out:” – Community partner

On the community level, participants from the communities described the application of results for community program planning. Some participants described initiating or modifying existing community programs to respond to the gaps identified from the research. Other participants also emphasized opportunities to apply for funding with the data in different sectors that could contribute to program planning. One participant highlighted funding as a KT outcome that communities can apply on the community level, regional and national levels to start community initiatives or mitigation efforts. A community partner explained an example of a community application of the results from engaging a diverse representation of the community,

“...everyone [has] lots of different resources in different departments, and they could work together, [for example, if] our goal is wanting to provide each household with monthly [resources]. And because this study shows that they're eating [this], they're not [eating this], we're not being healthy, so this is why. I think that makes a really good proposal for funding ...” – Community partner

A FEHNCY team member also distinguished results used by different community programs,

“...the main benefit [of community results] is being able to look at community profiles as a whole and then being able to identify certain areas where programming is needed or targeted policies are actually, would actually make a real difference and then. And so, returning results to communities is also a way of supporting that search for better infrastructure in environmental health and in environmental children's health, specifically.” – FEHNCY team member

A FEHNCY team member also described the FEHNCY team taking the role of facilitating discussion and identifying avenues for advocacy and funding while community partner and community leaders such as band council members would be key in actively applying for funding opportunities and giving approvals for the appropriate sectors. A community partner linked the engagement of multiple community sectors activating the relational mechanism for anticipated action,

“...Know [your staff] ... so they can make plans and ... programming later for prevention... you’ve got to look at your social network. And you have to really depend on that. Because ...you’re trying to give the people the best information at that time. And to make the best decisions going forward. So, if you’re equipping your health centre with that [information], you’re equipping your politicians with that [information], if you’re equipping your community with that [information], you all work together, you all get on board, you know where you’re going to go, you know what you need to do... And you prevent. Or you treat...” -Community partner

Another community partner also described the outcomes of the research application as a community initiative that could impact larger levels of change,

“...if we look to how to integrate the findings into the community, I think it’s important go directly to the program, to make sure that the program, say the nutrition program, even maternal child health would have that information so that they can integrate it from the ground up, in the community. And so if we can generate enough change in [our community], noticeable change, that gives us also more momentum to go at a higher level...” – Community partner

For regional and national level application of results, participants described the FEHNCY team as taking the role of catalyzing connections alongside communities. For example, a community partner described the FEHNCY team as a project that was building inter-community connections that could lead to anticipated collaborations to advocate for regional and national policies and programs. When discussing the application of results, a community partner pointed out,

“...the format of the interviews, the questionnaires ...on a personal level allowed me to reflect on how much access we do have to traditional food. And I’m interested in seeing the comparisons as this research project moves into other native communities...I have

access to my child's information but there is the actual results... I hope to be able to see the data ... showing comparisons that are meaningful to our community [compared to others] ... because every community is different and ... each community has their own results...” – Community partner

From the perspective of a FEHNCY team member, these inter-community connections based on building relationships could be catalyzed through continued knowledge sharing activities,

“...in the past when we've had multiple communities, they come together... we give back their data and then talk about ways to use it.-Talk about like basic statistics and how you can interpret this data and ways to use it. So it would be... with other communities, but they're not sharing their data with each other... it's an opportunity for them to also even talk about programs they have in their communities that others might be interested in...if we have multiple communities coming together, they can make suggestions about existing programs that others might be interested in... – FEHNCY team member

A few community partners highlighted the role of sharing traditional foods as another example of catalyzing inter-community connections. When asked about sharing traditional foods between communities, a community partner made the link to traditional Pow Wow routes,

‘We [shared traditional foods] because there was always a Pow Wow route – the Pow Wow route [where] communities are going into one community to do their Pow Wow to meet others and to interact... then they bring ... what they have ...we always ... brought what we had and that was ... what we could share.’- Community partner

Some community partners and FEHNCY team members described the study context of FEHNCY's regional and national partners as avenues for future advocacy in national policies and programs. A FEHNCY team member used an example to outline how inter-community connections the study context could facilitate impacting regional or national policy,

“...the extent of mould or air quality... [is] quantified in multiple communities throughout – [they are] able to bring [this data] to Indigenous services to support their existing programs for housing, for example... Or go to the AFN [Assembly of First Nation] with ... a resolution towards something to change, to create a policy. Or the AFN [Assembly of First Nations] takes it ... to the feds to see about applying that.” – FEHNCY team member

A community partner connected the relational mechanism of community engagement that created potential avenues for advocacy on higher levels of governance,

“...you have to know the people. It’s important to know the people and ..., it’s relationship building, knowing the people ... in those regional or national areas, and knowing who’s important for the topic we’re talking about...”– Community partner

However, many participants talked about anticipated impacts on regional and national levels of policy and programs as such applications require longer timelines for which change can be implemented and examined. A community partner explained the anticipation of KT outcomes requiring a longer timeframe,

“Well, we haven’t had exactly any type of impact on a national level because data is just starting to come in and we haven’t had time to really look and analyse it yet to date. However, there is no practical approach, there is nothing there that can tell you how what to do or what words to say. The only thing you can do is present your findings and be honest. Always be honest about what you’re saying...”– Community partner

Chapter 5: Discussion

This study describes how, for whom and under what circumstances community engagement supports Indigenous KT within the context of a nationally representative study of First Nations children and youth nutrition and health status. Our findings are the first middle-range theory of community engagement for KT. Because of our phased data collection design that triangulated perspectives from two First Nations communities with different contexts (rural and semi-urban, Atlantic and Eastern region in Canada, different experiences with research and residential schools, different Nations and cultural practices) and both community and FEHNCY staff perspectives as well as broad topics of the FEHNCY study, we put forward a theory that can be transferred to understand community engagement for KT in different Indigenous contexts and research topics with Indigenous peoples. This is the first evidence-based theory that outlines the pathway for how engagement processes connect to KT in Indigenous health research. Given the unique history of Indigenous communities with health research and the COVID-19 pandemic, essential engagement strategies were supporting community decision-making, supporting Indigenous leadership on the research team, promoting project visibility, youth-specific engagement and incorporating Indigenous knowledges, methodologies, cultures, and languages. To achieve the outcome of applying research results on multiple levels, the mechanisms of working in relational ways and valuing Indigenous knowledges needed to be activated. Contextual factors also reinforced how sharing traditional foods as an engagement activity activated mechanisms. This analysis contributes to the KT research through the refinement of a middle-range theory on the contexts, interventions, mechanisms, and outcomes of community engagement processes with Indigenous communities to achieve KT. In the discussion, our findings were compared with the existing literature and to the initial program theory.

Examining contextual characteristics impacting engagement in research.

This is the first study to examine contextual factors on community engagement processes in the KT pathways. The societal, study and community contexts were the main contextual factors that influenced essential engagement activities, contributed to activating mechanisms and connected to achieving KT outcomes. A major contextual feature that emerged from the data was the impact of the COVID-19 pandemic on engagement processes. Despite Indigenous health research literature emphasizing the importance of recognizing the uniqueness and diversity of Indigenous communities (Domingo et al., 2023; Browne et al., 2016), no previous research has

reported on how contextual factors interact, impact engagement and influence KT. Smylie et al. highlighted the socio-political and geographical factors, community structure impacting the dissemination of health information and the local effects of colonization as key contextual elements influencing health knowledge pathways in an Inuit, Métis and First Nation community (2009). Although Jock et al. (2022) did not examine community engagement interventions since their research was used to inform an intervention, they highlighted contextual factors including the relationship between tribal council and health staff, historical trauma and tribal politics impacting policy, systems and environmental changes for obesity prevention. Similar to our findings, Jock et al. also found differences in the degree of collaboration and communication between community sectors influenced the type of engagement activities needed to activate mechanisms for KT. In contrast, most studies on Indigenous health have descriptively included the context in community engagement and KT research and have not examined the impact of contextual elements on KT. Some have described the historical and colonial context (Thurber et al., 2018; Fisher & Ball, 2003; Browne et al., 2016; Ninomiya et al., 2022), many have defined the community characteristics based on demographics, community location and target population (Miles et al., 2018; Firestone et al., 2021; Oosman et al., 2021; Quigley et al., 2021; Gwynn, 2019; Peake et al., 2021; Kholghi et al., 2018; Parker et al., 2006) and most outlined the background information on the partnership, program or project characteristics (Ninomiya et al., 2022; Miles et al., 2018; Firestone et al., 2021; Delafield et al., 2016; Quigley et al., 2021; Fisher & Ball, 2003; Gwynn, 2019; Rasmus, 2014; Kholghi et al., 2018; Parker et al., 2006). To continue culturally safe research practices and recognizing that Indigenous peoples and communities have distinct and diverse contexts, future research that examines the impact of contextual elements on engagement processes with different Indigenous communities is needed to advance our understanding of engagement processes with different Indigenous communities to achieve KT.

Essential engagement strategies for activating mechanisms linked to KT.

Based on this analysis, prioritizing community decision-making, supporting Indigenous leadership within the research team, and incorporating Indigenous knowledges were essential engagement strategies that participants connected to mechanisms of relationship building and valuing Indigenous knowledges and linked to outcomes of applying results.

a) Supporting community decision-making

First, participants highlighted the CAC as a vital activity to engage multisectoral partners in supporting community decision-making to trigger mechanisms and KT outcomes. Likewise, previous studies in Indigenous health have widely reported formal meetings at certain points in the research process with community groups consisting of different people such as leadership, Elders, youth, local organizations, and community members (Peake et al., 2021; Parker et al., 2006; Kholghi et al., 2018; Thurber et al., 2018; Fisher & Ball, 2003; Miles et al., 2018). In contrast, Fisher & Ball's (2003) study on research collaborations with Indigenous communities in the United States advocated for an appointed committee by tribal council specifically as a way to support tribal oversight of the process. Ninomiya et al. (2022) emphasized the meaningful involvement of community sectors, knowledge keepers and grandparents in their systematic review of the promising practices for KT. In addition to whom research teams engage, a range of community participation levels have been reported in previous studies (Murphy et al., 2021; Snijder et al., 2015). Both FEHNCY and community partners explained that involving the CAC at every stage of the research process was key in creating research partnerships that support community mobilization. Among the few studies that have documented the extent of engagement with the CAC (Peake et al., 2021; Kholghi et al., 2018; Rasmus, 2014; Quigley et al., 2021; Oosman et al., 2021; Smylie et al., 2009; Jock et al., 2022), Thurber et al. (2018) connected shared decision-making with the CAC at multiple stages of the research to participation outcomes. As the current literature on community engagement continues to expand, future studies need to document the extent of community involvement in decision-making and examine further impacts on KT outcomes.

b) Supporting Indigenous leadership within the research team

Additionally, both FEHNCY and community partners described supporting Indigenous leadership through having Indigenous scholars and staff members and prompting researcher reflexivity within the FEHNCY team. While more studies have reported on hiring local community researchers to build community capacity (Kholghi et al., 2018; Rasmus, 2014; Fisher & Ball, 2003; Firestone et al., 2021; Miles et al., 2018; Smylie et al., 2009), Quigley et al. (2021) highlighted the importance for non-Indigenous researchers to develop and integrate Indigenous researchers onto research teams. Ninomiya et al. (2022) also found that supporting Indigenous academics, staff members and local researchers was effective for KT. In this study, supporting

Indigenous leadership within the research team impacted the participation of community members.

Another essential activity described by many FEHNCY team members was supporting individual and collective reflexivity of their positionality and how it impacted their assumptions and behaviours in relation to Indigenous communities and to the research team to support shared decision-making. Similarly, Browne et al. (2016) recommended researchers to reflect on power differentials and positionality in their framework promoting equity-oriented care with Indigenous peoples. Oosman et al. (2021) also described critical reflection and a decolonizing lens in community engagement to support reconciliation. This study adds to the literature on community engagement by linking how research teams can facilitate shared decision-making processes with communities. Future studies can examine constructs that can capture and evaluate shared decision-making throughout the research process.

c) *Incorporating Indigenous knowledges, methodologies, cultures, and languages*

Lastly, community partners expressed that activities incorporating Indigenous knowledges, methodologies, cultures, and languages were essential to conduct research in culturally safe ways. A qualitative study by Domingo et al. (2023) also emphasized the importance of integrating Indigenous worldviews and values in engagement interventions. Parker et al. (2006) used traditional games as a health promotion intervention while other studies have more commonly reported the use of culturally appropriate data generation methods like social yarning, photovoice, and Talking Circles (Kholghi et al., 2018 and Peake et al., 2021). This study also highlighted the critical role of sharing traditional foods in relationship building and affirming Indigenous ways of doing. Previous studies have reported sharing food or traditional foods while sharing stories (Peake et al., 2021; Miles et al., 2018; Fisher & Ball, 2003). In a study on healthy eating with Native Hawaiians, Miles et al. (2018) described food as having the potential to form new connections between people and build relationships. The cultural importance of traditional foods for First Nations was also found by Quigley et al. (2021) who worked with Torres Strait Islanders in Australia. They emphasized following community protocols for food sharing rather than serving any kind of food (Quigley et al., 2021). However, this study highlights the distinct role of traditional foods in engagement that reinforces Indigenous knowledges in addition to relationship building. Future research can focus on examining strategies to incorporate traditional foods for effective community engagement.

Building relationships through community engagement.

This research is the first to collect qualitative data on the mechanisms connecting essential engagement strategies to the application of research findings. Both FEHNCY and community partners described relationship building between the research team and communities as an important foundation for conducting research with Indigenous peoples.

Participants also described how to build trusting relationships and mirroring values of respect and reciprocity in the relationship. Domingo et al. (2023) outlined the integration of using a CBPR approach and KT frameworks to support community food sovereignty also found that establishing trust created space for recognizing and respecting community governance, leadership, and protocols. They also acknowledged the importance of fostering relationships in identifying opportunities for collective actions (Domingo et al., 2023). This study dives deeper into the causal links of this relational mechanism for KT. Similarly, Thurber et al. (2018) conducted a mixed-methods descriptive analysis on a national survey with Torres Islander and Aboriginal children and found reciprocity, trust and connection as mechanisms for participation. Their study focused on connection as a facilitator of trust and relating reciprocity as a way to build trust throughout the research (Thurber et al., 2018). This research expanded this analysis by demonstrating that building trust and valuing reciprocity and respect were key ways to build healthy relationships with community partners and community members to achieve KT outcomes.

The ability of realist approaches to unearth unintended consequences was demonstrated in this study by highlighting the importance of good relationships within the research team which rippled to relationships between the research team and communities rather than solely focusing research team and community relationships. Quigley et al. (2021) have called for non-Indigenous researchers to support the integration of Indigenous researchers onto the team however, most published studies have largely focused on research team and community relationships. Rasmus (2014) reinforced partnerships between the university and the community as a major variable in the success of their engagement. Jock et al. (2022) also reported building strong relationships within the community sectors and community members as a mechanism in the processes of developing policy, systems and environmental changes. Other studies have also anecdotally described strong relationships and building trust as potential mechanisms (Gwynn, 2019; Quigley

et al., 2021; Delafield et al., 2016; Oosman et al., 2021; Firestone et al., 2021; Ninomiya et al., 2022).

The relationship building mechanism was illustrated in a research partnership that supported community governance and ownership over the research process. Domingo et al. (2023) complemented these findings in their thematic analysis by highlighting an advisory structure and partnerships that enable community-driven research as another principle to guide community mobilization for KT. Rasmus (2014) who conducted a qualitative process evaluation on their engagement intervention connected community ownership and community champions as important elements of their CBPR implementation. Miles et al. (2018) also identified credible community champions bridging the research to community members. Smylie et al. (2009) found community ownership was needed to generate health messages and their dissemination through family and community networks. Likewise, much of the literature has identified anecdotal mechanisms such as the role of community champions (Kholghi et al., 2018; Peake et al., 2021; Delafield et al., 2016) and supporting community ownership (Khloghi et al., 2018; Parker al., 2006; Smylie et al., 2016; Peake et al., 2021; Fisher & Ball, 2003; Delafield et al., 2016; Oosman et al., 2021; Firestone et al., 2021). Our findings situate the role of community champions within the vital need for relationship building with a diverse representation of the community. Participants connected partnerships with community champions and community partners to support community governance for achieving KT outcomes. The analysis of this study has synthesized more comprehensive interrelationships between anecdotal and studied mechanisms scattered across community engagement studies in the literature. Future research can examine the synthesis of indicators for effective partnerships for KT.

Cultural safety: valuing Indigenous knowledge systems.

Community partners connected essential engagement strategies activating this mechanism with impacts on reconciliation. This mechanism was demonstrated by valuing Indigenous as equal to western scientific knowledge, supporting communities' expression of their cultural ways of doing and working in partnership with communities. Parker et al. (2006) postulated cultural safety as a mechanism in their health promotion intervention and explained it as centering Indigenous holistic approach to health. Cultural safety was a postulated mechanism that has been described in previous studies as creating space that was safe, encouraged sharing of their local

culture (Thurber et al., 2018; Peake et al., 2021; Rasmus, 2014; Browne et al., 2016) and specifically bridging Indigenous knowledges with the research (Eni et al., 2021; Oosman et al., 2021; Kholghi et al., 2018; Rasmus, 2014; Fisher & Ball, 2003; Delafield et al., 2016). Similarly, Miles et al. (2018) hypothesized the mechanism of cultural safety was demonstrated through community self-empowerment, honouring the communities' perspectives, and creating accessible spaces for community members. Smylie et al. (2006) have alluded to cultural safety as a mechanism in health knowledge sharing pathways. This analysis conducted qualitative data collection and demonstrated how cultural safety acts as a mechanism. In addition, this study also adds to the literature as it is the first to highlight the interconnection between valuing Indigenous knowledges and working relationally for KT. Future research can further examine the interrelationship of cultural safety and relationship building to evaluate the extent of this mechanism in achieving KT.

Knowledge translation.

Conditions for KT were described by both FEHNCY and community partners as contributing to reconciliation efforts and capacity building, improved qualitative and quantitative research and community reflective results and the application of findings on multiple levels for changes in policies and programs. Ninomiya et al. (2022) described outcomes such as capacity building, new sustainable programs and increased self-determination and self-governance. Some examples of capacity building were increasing knowledge or awareness of health and changes in health behaviours and health care practices (Ninomiya et al., 2022). Parker et al. (2006) also reported a strengthened sense of cultural identity and building community capacity as outcomes of cultural safety. The findings in this study clarify how community capacity for future research partnerships can be built from the outcomes of decolonizing research. Smylie et al. (2009) connected mechanisms of community ownership and decolonizing research with context-specific understanding of knowledge creation, sharing of information and utilisation of health information to inform KT in Indigenous communities. Our findings also highlighted research partnerships that incorporated culturally safe practices were linked to research findings that were reflective of community realities and upholding scientific rigour for the application of results. Rasmus (2014) also found improved quality and validity of research from following CBPR. Thurber et al. have focused on observing survey participation as an endpoint. Firestone et al. (2021) connected

increased participation to greater health behaviour changes. This study linked indicators of improved research findings based on scientific rigour and communities' standards to the utilisation of results.

This study also adds to KT research understanding by outlining multiple levels of action of research results, especially with changes in policies and programs. In contrast, previous research has linked individual and household health behaviour changes related to postulated mechanisms and disaggregated concepts that are captured within the relational mechanism (Smylie et al., 2016; Miles et al., 2018; Ninomiya et al., 2022; Firestone et al., 2021). Smylie et al. (2016) has linked improvement in health behaviours to concepts within the relational mechanism, namely community ownership and community participation. Additionally, Firestone et al. (2021) reported building youth capacity and subsequent community mobilisation with postulated mechanisms of relationship building, community ownership and youth engagement. While our study highlighted youth mobilization bringing potential changes in household health behaviours, more research connecting youth-specific engagement to mobilization outcomes is needed.

This study explicitly connected the engagement of multisectoral partners and regional and national partners who were part of the study context with bringing changes in policy and programs in KT pathways. However, previous studies have broadly defined postulated KT as informing policy (Gwynn, 2019), bridging knowledge to action (Quigley et al., 2021; Oosman et al., 2021), addressing health inequities (Fisher & Ball, 2003; Browne et al., 2016) and postulated these outcomes rather than demonstrating connections to KT outcomes on multiple levels (Quigley et al., 2021; Fisher & Ball, 2003). In contrast, Kholghi et al. (2018) highlighted the outcomes of revising their Health Education Program for diabetes prevention which supported healthy lifestyle policy changes. Jock et al. (2022) also examined the process of policy changes within Indigenous communities and similarly found that collaboration between multisectoral partners supported policy, systems, and environmental changes in Native American communities in the United States. While this research highlighted KT conditions needed, future research can directly evaluate changes in programs and policies as KT outcomes following the implementation of KT conditions.

CIMO configurations.

The results of this research highlight two examples of CIMO configurations that have emerged from the refined the initial program theory. Given the following contexts, the historical and colonial impacts on Indigenous communities' relationship with research, essential activities that supported community decision-making were the CAC and researcher reflexivity. These engagement interventions activated the relational mechanism demonstrated through partnerships that support community governance and ownership of the research process. This mechanism was connected to outcomes of repairing historical ruptures in relationship through research, improved scientific results and community-reflective research and contributing to community programming based on results. Under the existing study partnerships with regional and national First Nations organisations that were part of the study contexts, participants have also connected strong and diverse community partnerships to bring research results for policy changes at higher levels of governance connected to FEHNCY and/or the local leadership.

Similarly, Smylie et al. (2016) conducted a qualitative realist evaluation of Indigenous prenatal and infant toddler health promotion programs in Canada. They found that programs with interventions aimed at developing personal or collective commitment activated community ownership and community involvement in the program (Smylie et al., 2016). These mechanisms were highlighted by the historical and ongoing colonial context and the health program context which resulted in health behaviour changes as well as other outcomes ranging from pre-natal and infant nutrition, and breastfeeding to the use of Indigenous languages and cultural traditions (Smylie et al., 2016). Their findings supported the relational mechanism found in this study while this study expanded on the engagement interventions and included multiple levels of KT outcomes. Although both CIMO configurations agree, the developed CIMO from this study offers a higher level of abstraction and includes more in-depth connections between CIMOs.

A second example of a CIMO configuration highlighted the important contextual characteristics of the study. The community's resilience and interest in the study topic on nutrition highlighted their preserved traditional food practices which were part of the community context. These contextual factors brought forth activities that incorporated Indigenous knowledges, methodologies, cultures, and languages such as sharing traditional foods and including Indigenous languages, methods of storytelling and ceremony. These activities triggered the mechanism of valuing Indigenous knowledges by centering these knowledge systems on par

with western scientific knowledge systems. In addition, sharing traditional foods also triggered the mechanism of relationship building to catalyze intercommunity connections. Meanwhile, the immediate outcomes of valuing Indigenous knowledges were described as contributing to decolonizing research, credibility of the research and subsequent applications of results on the individual and community levels.

In a systematic review on promising practices for KT in Indigenous health research, engagement activities reported supported community decision-making, incorporated Indigenous knowledges and supported Indigenous leadership in the research teams (Ninomiya et al., 2022). These engagement strategies were hypothesized to have activated the mechanisms of relationship building and cultural safety (Ninomiya et al., 2022). The study gave several examples of the relational mechanism at work by demonstrating researcher accountability in building kinship and social networks and reciprocity (Ninomiya et al., 2022). There was minimal contextual influence reported other than the program contexts (Ninomiya et al., 2022). These mechanisms were linked to health and wellness outcomes such as capacity building in awareness of health among community members, health care practices, new programs and reinforced self-determination (Ninomiya et al., 2022). Despite our CIMO configuration better capturing the impact of contextual interactions, the engagement activities were supported by our findings within engagement strategies that participants described as meaningful for triggering mechanisms. Our findings refine hypothesized mechanism and highlight engagement interventions that activated the mechanisms of relation building and/or cultural safety. In addition to multi-level outcomes that were supported in both the study and our results, our findings expanded on the process from contributing to reconciliation and building capacity to improved research findings and applications.

Quigley et al. (2021) who reported on the implementation of their engagement process within a cross-sectional dementia study with Torres Strait Islanders were among the few to expand on the role of food sharing in their engagement. They highlighted the central role of food in the local culture and in their engagement process which anecdotally contributed to relationship building (Quigley et al., 2021). They anecdotally described that intervention activities that supported community decision-making, supported Indigenous leadership in the research team and incorporated Indigenous knowledges activated anecdotal mechanisms of building strong relationships based on trust (Quigley et al., 2021). Examples of how this mechanism applied to

their context were through working in partnerships, community ownership and highlighting the vital role of community champions (Quigley et al., 2021). These mechanisms are also connected to outcomes such as sustainable capacity building and ethical research practices as reported by the researchers (Quigley et al., 2021). The CIMO configuration highlighted by Quigley et al. (2021) was supported by our qualitative data generation and provided a sub-analysis of the role of traditional foods in community engagement. Findings on engagement interventions were similar between studies apart from our study including youth-specific engagement strategies and project visibility. Even though the study and program context were similar in that both studies were prevalence studies, our findings made meaningful connections between the context and subsequent IMOs. Our findings reinforced the relational mechanism reported by Quigley et al. (2021) and also identified an additional mechanism, cultural safety. Through systematic data generation, our findings connected these mechanisms to broader KT outcomes for health equity extending beyond ethical considerations.

Comparisons to the initial program theory.

These two CIMO configurations were examples of the refined middle-range theory. The initial program theory was refined in the following ways, it clarified contextual characteristics, expanded engagement interventions based on strategies, refined the processes of major mechanisms, and further developed KT conditions needed. In general, key elements from the initial model were organized and conceptualized differently in the middle-range theory. For example, “supporting research team reflexivity”, “sharing decision-making” and “incorporating Indigenous methodologies” were mechanisms in the initial model that was part of the intervention in the middle-range theory. Differences between the initial and middle-range theory included the visual depictions and interrelationships between concepts. The middle-range theory also highlighted the cyclical nature of the KT pathways in contrast to a more linear model in the initial.

Second, the data generated confirmed the contexts in the initial program theory. However, these contextual elements were refined and organised under societal, study and community contexts. The middle-range theory highlighted broader societal contexts including the COVID-19 pandemic and the confirmed findings of unmarked graves at Kamloops residential school. The impact of the study design and topic area were identified as study contexts that emphasized

engagement strategies of supporting Indigenous leadership in the team and fostering community decision making. and KT. FEHNCY's partnership with Assembly of First Nations was a study context that facilitated the application of results to achieve KT. The interactions between the community contexts on other contextual factors shaped community engagement strategies. For example, the community history and the confirmed findings of unmarked graves of children at residential schools contributed to the community's relationship with research. Therefore, engagement strategies such as community decision-making were important to build trust. The preserved traditional food practices in the community context contributed to engagement strategies that incorporated Indigenous knowledges from the communities. However, more research examining the contextual factors in different First Nations communities is needed to understand CIMO configurations and support interventions.

Third, the initial program theory focused on representing engagement between different groups rather than engagement strategies. The middle-range theory confirmed the effective application of interventions in the FEHNCY pilot. It also identified the essential engagement strategies, supporting Indigenous leadership within the research team, fostering community decision making, including youth-specific strategies, promoting project visibility, and incorporating Indigenous knowledges, methodologies, cultures, and languages. The role of traditional foods was a powerful engagement activity that could activate both mechanisms. The interactions between the intervention strategies within the given contexts highlighted the need to tailor interventions to each community. However, there was insufficient data on engagement at regional and national levels to support conclusions on the confirmation or refinement of the initial program theory. Further research is needed to examine community-level recruitment.

Fourth, while the importance of centering relationships and supporting cultural safety was confirmed in the middle-range theory, differences were present. The mechanisms in the initial program theory linked engagement between specific groups (the FEHNCY team, the community, community partners, youth in communities and with regional and national organisations) to immediate outcomes and then to improved KT. However, in the middle-range theory, mechanisms link engagement strategies to KT outcomes. It expands on the significance of relationships, how to build healthy relationships and examples on how it was applied with FEHNCY in both communities. The process of cultural safety and how it worked as a mechanism for KT were clarified in the middle-range theory. It further explored how the mechanisms

mutually reinforced each other and worked independently to achieve outcomes. Future research can identify ways to measure whether mechanisms have been activated.

Fifth, both the initial program theory and middle-range theory build towards the goal of achieving KT. The refined theory confirmed the intermediate outcomes in the initial model, namely, trustworthy qualitative and representative quantitative findings. It also confirmed the credibility of results for communities as an important step for KT. However, the middle-range theory also expanded on the multistep process in the KT pathways. The conditions were the following: contributing to reconciliation efforts, improved credible research findings that reflect community realities in addition to the scientific rigour of results. Once satisfied, these conditions were followed by the multilevel applications of research results demonstrating KT. The credibility of the overall research process was important rather than solely based on the scientific rigour of the qualitative and quantitative findings. The middle-range theory expands on different possible KT outcomes that can happen based on the C-I-M and conditions needed for KT to occur. However, future research could examine KT after they have occurred to directly observe outcomes related to multi-level changes to policies and programs.

Table 3: Comparing the initial program theory to the refined middle-range theory.

	Similarities	Differences	Neither; for future research
General	<ul style="list-style-type: none"> • Similar elements were present in the initial model but were organized in a different way in the refined version • I.e., Initial mechanism “supporting research team reflexivity” became an engagement activity in the middle-range theory • Initial mechanism “sharing decision-making” became an engagement strategy in the middle-range theory • Initial mechanism “incorporating Indigenous methodologies” became an engagement strategy in the middle-range theory 	<ul style="list-style-type: none"> • Expanded on the cyclical nature of KT pathways relating engagement to KT outcomes rather than a linear depiction 	N/A
Context	<p>Confirmed:</p> <ul style="list-style-type: none"> • Existing research relationships • Existing practices for sharing information within community • Historical trauma (e.g., residential schools) • Mistrust of health research, and even moreso in research with youth 	<ul style="list-style-type: none"> • Identified multilevel contextual factors (i.e., societal, study and community), highlighting the importance of understanding community contexts for developing community engagement activities • Highlighted the role of broader societal contexts (i.e., COVID-19 pandemic & the confirmed findings of the unmarked graves at Kamloops residential school) • Expanded on the impacts of the study contexts on engagement strategies needed to activate mechanisms and trigger outcomes (i.e., Including Indigenous scholars and staff to support Indigenous 	<ul style="list-style-type: none"> • Examining contextual elements in more First Nations communities to understand CIMO configurations and support intervention development

		<p>leadership in research team & fostering community decision-making in the study design)</p> <ul style="list-style-type: none"> • Identified multilevel contextual factors (i.e., societal, study and community) • Highlighted the role of broader societal contexts (i.e., COVID-19 pandemic & the confirmed findings of the unmarked graves at Kamloops residential school) • Expanded on the impacts of the study contexts on engagement strategies needed to activate mechanisms and trigger outcomes (i.e., Including Indigenous scholars and staff to support Indigenous leadership in research team, fostering community decision-making in the study design, existing partnership with Assembly of First Nations that facilitated application of results) • Describing the importance of the community contexts interacting with other contextual elements (i.e., Community responses to the confirmed findings of unmarked graves of children from Kamloops residential school affecting their relationship with research) • Highlighting the importance of understanding community contexts for developing community engagement strategies (i.e., community’s self-determination & resilience despite colonial history reinforcing strategy to incorporate Indigenous knowledges) 	
Intervention	<ul style="list-style-type: none"> • Organised as engagement with whom (FEHNCY team, between FEHNCY and the community in general, community partners & regional/national partners) 	<ul style="list-style-type: none"> • Identified essential engagement strategies for engaging with participating communities: <ul style="list-style-type: none"> ○ supporting Indigenous leadership within the research team, ○ fostering community decision making, 	<ul style="list-style-type: none"> • Engaging at regional and national levels & community-level recruitment

	<ul style="list-style-type: none"> Confirmed that intervention strategies used for the FEHNCY pilot were effective 	<ul style="list-style-type: none"> including youth-specific strategies, promoting project visibility, and incorporating Indigenous knowledges, methodologies, cultures, and languages Described the role of traditional foods as a powerful strategy to activate both mechanisms. Highlighted how intervention strategies interacted with the context and the importance of tailoring activities to the community context 	
Mechanism	<ul style="list-style-type: none"> Confirmed the importance of centering relationships and supporting cultural safety 	<ul style="list-style-type: none"> Expanded further on the significance of the relational mechanism, how to achieve it and examples on how it worked within the context Clarified the process of achieving cultural safety and how it worked as a mechanism within the given contexts 	<ul style="list-style-type: none"> Identifying ways to measure whether mechanisms are being activated
Outcome	<ul style="list-style-type: none"> Confirmed the outcomes of trustworthy qualitative, representative quantitative findings & KT Confirmed that the communities find results credible as an important intermediate step 	<ul style="list-style-type: none"> Expanded on the different types of KT outcomes organized by ecological levels Refined intermediate steps in the KT pathways: reconciliation & decolonizing research, improved scientific research findings and credibility of research results Highlighted the importance of the credibility of overall research results (rather than qualitative and quantitative separately) 	<ul style="list-style-type: none"> Directly observing KT outcomes such as changes to policies and programs at the community, regional and national levels

5.1. Strengths & Limitations

Strengths.

The reporting criteria used was based on Lincoln & Guba for qualitative research and Pawson's rigour criteria for realist approaches (Lincoln & Guba, 1986; Flynn et al., 2019; Porter, 2007). The proposed research had several important strengths to consider. First, audit trails of the research process and researcher reflexivity were documented using memo-writing and fieldnotes to increase the dependability of the research (Lincoln & Guba, 1986; Charmaz, 2006) and its transparency for outside scrutiny (Flynn et al., 2019; Porter, 2007). Second, the lead author's (JWong) prolonged engagement in the FEHNCY study, community engagement meetings, and community engagement activities in community enhanced the credibility of findings and can enhance the richness of interviews (Lincoln & Guba, 1986). Third, the CAC played an active role in member checking through discussion of preliminary results which strengthened the credibility of findings (Lincoln & Guba, 1986) and propriety which includes alignment with OCAP and compliance with ethical obligations (Flynn et al., 2019; Porter, 2007). Fourth, triangulation of participants and methods supported the improved credibility (Lincoln & Guba, 1986), purposivity and utility of findings (Flynn et al., 2019; Porter, 2007) including the recruitment of different participant groups to account for multiple stakeholder perspectives and combining in-depth interviews and modified Talking Circles. Fifth, data was generated with two First Nations communities, the different geographical contexts (rural and semi-urban), host community organisation, and community relationships with research which enabled cross-comparisons between communities also contributing to the utility in different research settings with Indigenous peoples (Flynn et al., 2019; Porter, 2007). This enhanced the transferability of results to support the reader's assessment of whether this research can be applied to other First Nations and Indigenous health research contexts (Lincoln & Guba, 1986). In keeping with the specificity for reporting standards, this thesis follows the reporting standards from McGill and qualitative research and is made accessible on the McGill library online to increase accessibility of this study (Flynn et al., 2019; Porter, 2007).

Limitations.

This proposed research also has some limitations to consider. First, focused groups discussions were an adaptation to the circumstances of the research study, despite having planned for using modified Talking Circles to ensure that Indigenous research methods were incorporated.

However, this adaptation was acceptable for research team members and to respond to time constraints which allowed for a more focused discussion on the topics outlined by the facilitator (Green & Thorogood, 2018). The focused group discussions accommodated a larger group while working within time constraints and availabilities of the large research team. The two principal investigators of the Community Engagement and Mobilization component who were members of the FEHNCY team and Indigenous researchers were also recruited for the focused groups discussions on supporting cultural safety. While their presence could have influenced the discussion, since there were two focused groups discussions held, each principal investigator attended one of the two discussions to allow for a comparison of how their absence and presence shaped participation from other team members. Second, although our research protocol was to clarify and confirm findings with the CAC, due to time constraints and research fatigue, a modified Talking Circle was not done as a data collection activity with Miawpukek to respond to community needs. However, research results were still confirmed and clarified during a regular Advisory Circle meeting. Third, the COVID-19 pandemic limited in-person activities and therefore, our ability to have in-person activities with traditional foods was limited. Although we included traditional foods for in-person engagement activities as much as possible data generated was also based on community partners' knowledge of their communities and how traditional foods have impacted engagement. Fourth, data generation via Zoom was done to protect participants in Community 1 from COVID-19 which made interviews more convenient. While virtual interviews limited our ability to build rapport with participants especially when discussing more sensitive topics, we were able to assess non-verbal cues through video and subsequent recordings. Moreover, FEHNCY's relationship with community partners and JWong's prolonged engagement with community partners contributed to building trust for participants to share comfortably about their perspectives. Fifth, varying definitions of youth within Indigenous communities and contextual elements limited opportunities to engage with youth in decision-making processes. For example, although FEHNCY extended invitations to youth, youth members from 3-19 years old did not participate. Rather, community partners suggested youth that were outside of the 3-19 years old age range since they were still considered youth based on the community definition of youth that are commonly practiced. As a result, very strong youth partnerships were developed with these youth through the advisory circle. However, future direction can include data generation with youth ages 3-19 years old and their engagement with

FEHNCY. As FEHNCY engages with other First Nations communities, future research should also include those in the studied age range. Sixth, given the breadth of topics related to community engagement and the richness of interviews, there was limited information specifically on regional and national level engagement and community-level recruitment as it was outside the scope of this study. Rather, findings from this study took an in-depth examination of engagement processes with and within communities aligning with the objective of the Community Engagement and Mobilization component on community-specific engagement. Lastly, given the timeframe of the FEHNCY study in the community, we are unable to observe KT directly since we would need more time to examine outcomes of policy changes. This is seen in the results focusing heavily on the essential engagement strategies and mechanisms based on participant knowledge of supporting KT in these contexts rather than the occurrence of KT. Future research should examine CIMOs when KT is occurring and compare findings to refine the current middle-range theory developed.

Chapter 6: Conclusion & Summary

The objective of this research was to examine how, for whom, and in what circumstances FEHNCY community engagement activities result in improved conditions for KT within a nationally representative study of First Nations children and youth health status.

Systematic data was generated outlining the contexts, interventions, mechanisms and outcomes of community engagement processes impacting KT. Major findings include contextual characteristics, essential engagement strategies such as supporting community decision-making, supporting Indigenous leadership and incorporating Indigenous knowledges, mechanisms grounding the research process in community engagement as relational and valuing Indigenous knowledges and KT outcomes including decolonizing research, improved research that was mutually credible and a multilevel application of results.

Findings contribute to the development of a middle-range theory. In using a realist methodology, the initial program theory for the Community Engagement and Mobilization component of FEHNCY contributed to a middle-range theory that can inform how FEHNCY approaches community engagement in current and future First Nations communities. Findings are also valuable to communities as they re-affirm and contribute to their knowledge of working in research partnerships. The cross-community comparisons can also identify how this process can be applied in different contexts, highlighting the diversity between communities. This research can fill an important gap of developing theory to underpin ethical research practices that result in research promoting shared action among First Nations communities. Since this is the first study to examine community engagement, cultural safety, and the role of traditional foods in KT pathways, the middle-range theory adds to the knowledge of KT research and community engagement in nutrition and health research with Indigenous Peoples in Canada. Moreover, this research on community engagement advances health research with Indigenous Peoples as it promotes traditional food systems which are central to the well-being of Indigenous Peoples. The development of a middle-range theory on how community engagement supports KT provides a higher level of abstraction that can be tested in different research or community contexts.

Lastly, in the process of collecting this data, facilitating discussions, presenting results, and synthesizing reports to share research findings, conversations and thinking around community engagement served to positively advance FEHNCY Community Engagement and Mobilization, research partnerships with First Nations communities and the broader Indigenous

KT literature. In addition to advancing research in this field, this study modeled the process of decolonizing research as data was being generated and analyzed. From studying to seeing the process unfold before me, this study has transformed the way I see reconciliation transcend through relationships in research with Indigenous Peoples for health equity.

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Appendices

Appendix A. Table 4: Key Studies Describing the Contexts, Interventions, Mechanisms and Outcomes in the Literature on Community Engagement and KT.

Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms <i>Link for how interventions led to outcomes</i>
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	
Smylie et al., 2016, Elsevier	Qualitative realist review on Indigenous prenatal and infant toddler health promotion programs in Canada	History and ongoing colonization context Program context: Health promotion programs range across health domains	No direct CE intervention Programs with interventions aimed at achieving community investment threshold, level of personal or collective commitment and support (Indigenous or allied individuals/organizations) affiliated with the community	Outcomes range from birth outcomes, pre-natal and infant nutrition, breastfeeding and use of Indigenous languages and cultural traditions	Improvement in behaviour change outcomes listed but don't know the role of KT in that. Has not mentioned role of policies in changing behaviours.	-Community ownership: perception of the program as intrinsic -Community participation
Parker et al., Journal of Australia, 2006	Mixed-methods process evaluation on community-based health promotion intervention for men and older people's health	Project context: Our Games, Our Health Partnership characteristics Target population demographics and location	Community forums, traditional games, asset audit workshops, training community members to lead games, engaged with regional Indigenous Sport and Recreation Officers, newsletter distributions, grant applications, funding transfers to other communities, videos and manuals created	Positive community feedback Process evaluation completed Sustainability of project (integrated project into local programs)	No formal mention of outcomes but discusses health promotion impacts anecdotally. -Enriching community capacity -Developing social capital beyond the project -Re-establishing cultural identity	Discussion focused on anecdotal mechanisms: -Time and funds for engagement -Focusing on community strength -Community ownership: driven by and targeted whole community from the outset -Inter-community links: cultural exchanges, extending social networks -Cultural safety: centering Indigenous holistic approach to health

Kholghi et al., 2018. Family Practice	Mixed methods process evaluation on Health Education Program (HEP) for diabetes prevention and using principles of KT to improve HEP delivery	Partnership characteristics with Kahnawake School Diabetes Prevention ProgramKSDPP Community context Target community demographics	CAB and research team meetings, local community researcher, culturally appropriate engagement method KT activities: discussing results with research team and CAB, reports and recommendations for funding agencies and stakeholders, lay summary for community newspaper, in-depth interview with stakeholders, photovoice and Talking Circles with grade 5 and 6.	Strategic planning of health program to integrate health and safety, revised HEP recommendations and teacher training (study results)	Aimed to support healthy lifestyle policies by making revisions to the HEP program. Anecdotally conclude their approach resulted in maximum use of results and significant researcher and community capacity built	Mechanisms for program engagement from data generation: - Community champions: credible messenger -Community ownership -Cultural safety: using culturally appropriate methods and engagement Mechanisms anecdotally discussed: -Detailed KT activities -Applying CBPR -Actively engaging all stakeholders (principals, teachers, parents, children
Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms <i>Link for how interventions led to outcomes</i>
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	
Thurber et al., International Journal of Equity for Health, 2018	Mixed-methods descriptive analysis on the participation of Aboriginal and Torres Islander children in a national longitudinal study	Historical context	Consultation meetings, developing new data generation methods, sharing interpretation of results, feedback and dissemination strategies: incorporating community input in survey design, feedback sheets, community booklets, incentives, knowledge exchange focus group	-Successful recruitment/participation, retention rate -Strengthened cultural connection -Perceived individual, family and long-term community benefits -Relevant findings to inform organisations,	Does not connect participation with KT but alludes to the need for policies to be informed by research to improve health and wellbeing of target population -Highlighted next steps for research on increasing KT for changes in policy and practice -Anecdotally described enhanced capacity	Reciprocity Connection facilitating trust: relationship building -Sharing local culture in safe space -Aligning study with local values Anecdotally described: -Flexibility of team

				government/policy and attract funding/resources		
Peake et al., Journal of Transcultural Nursing, 2021	Qualitative process evaluation on engagement with Australian Aboriginal communities in developing culturally appropriate stroke resource	Target population demographics	Phase 1: community engagement (volunteering at clinic, visiting community, listening and sharing laughter, social yarning with food and stories, 'lunch and laugh' gatherings with Aboriginal stroke survivors and others, acknowledging knowledge and wisdom of Elders and key community members, seeking community feedback consistently, asking for permission at each stage of the research Phase 2: used culturally safe way to collect data, no participation incentives, constant contact with co-researcher via phone and monthly visits	-Meaningful and sustainable health message -Authentic engagement -Creation and use of culturally appropriate/localized stroke education resource in health facilities -Improvement in access to medical attention of Aboriginal people with signs and symptoms of stroke	No mention of wider KT outcomes. -Greater acceptance of health resources -Sustainable health resource -Enhanced health literacy -Increase capacity to develop resource for health issues	Anecdotally described: -Strong relationships and building trust with endorsement by community champions (respected Elder) -Cultural safety: culturally sensitive interactions, equal power distribution, reciprocity -Community ownership -Described as a result of interventions but can be a mechanism to creating stroke resource: cyclical reflection and analysis
Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms <i>Link for how interventions led to outcomes</i>
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	
Rasmus, Am J Community Psychol, 2014	Qualitative process evaluation on engagement with a Yup'ik Alaska Native community using CBPR	Program context: Elluam Tungiinun (Towards Wellness) Project Partnership characteristics	No intervention outside of data generation but RQ about the community engagement process. Teleconference and research meetings, weekly research meetings, community planning group, 'Indigenizing Group',	-Successful CBPR process -Researcher enculturation to Yup'ik ways -Overcoming intergenerational divide	Does not directly mention KT nor to policy. -Outcomes related to KT: reciprocal, knowledge exchange and building local capacity to lead intervention in traditional	-Community ownership -Cultural safety: localizing intervention with Yup'ik cultural values and practices -Community participation: shifted from passive participants to active leaders, involved elders

			youth engagement: making space for youth		ways as an indicator of change -Improved quality and external validity of CBPR research to ultimately improve lives of Indigenous peoples	-Community champions: having bridge people between youth and Elders, language barriers
Jock et al., 2022	Qualitative formative evaluation on actors and processes of developing policy, systems and environmental (PSE) changes for obesity prevention	Community context: 1) high amount of trust, communication and collaboration between tribal council and health staff; more flexibility for staff to develop PSE changes. 2) Higher Tribal Council members turnover= less likely to sustain health policies and administration of changes, more informal avenues for PSE changes 3) Historical trauma and tribal politics impacted PSE changes Program context: Obesity prevention trial/interventions	No community engagement intervention but community perspective of engagement: active engagement (focus groups/committees and CACs) and passive engagement (bringing feedback and concerns to Tribal representatives or department staff during Tribal Council, board meetings or meeting with departmental staff/Tribal Council members directly)	PSE changes with: -Input and feedback by community members -Health staff identifying PSE solutions -Multisectoral collaboration through grant writing -Tribal council approval -Contextual factors impacting use of tribal policy	Did not mention KT explicitly but implementing PSE changes is successful policy change	-Emphasized community engagement is necessary -Community participation -Building strong relationships: multisectoral partnerships and collaborations within community -Tribal council authorization of local tribal policies/grants
Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	<i>Link for how interventions led to outcomes</i>
Gwynn, BMJ, 2019	Systematic review on nutrition interventions that improve diet-related and health outcomes in Australian	Program context Target population demographic	No community engagement intervention but identified nutrition interventions	Outcomes ranging from nutritional status, intake, biochemistry and anthropometrics	-Relevant study findings -Building capacity -Evidence informing nutrition policy targeting all food environments to support healthy eating	-Community engagement -Community ownership: enhancing trust between partners

	Aboriginal and Torres Strait Islander peoples			-Wider range of outcomes		
Fisher & Ball, American Journal of Community Psychology, 2003	Qualitative logic model on collaborations between researchers and American Indian and American Native communities (AIAN)	Partnership characteristic Program/model context Historical context	No interventions formally described but describing logic model. Described as mechanism Tribal oversight: resolution, appointed committee by Tribal Council, meetings on-reserve/casino, compensation, were compensated, mileage reimbursement, meals served prior or following committee meetings , developing and implementing tribal research code, training and hiring community members as staff	-Increased research capacity of the tribe -Active involvement of AIAN communities in the research process	Did not connect to KT but postulated locally constructed meaning and greater credence given with culturally grounded science as outcomes of engagement -Greater community acceptance of research to address behavioural health disparities	-Community ownership -Other mechanisms of the TPR model: facilitator balancing researcher and community involvement -Cultural safety: developing culturally specific interventions and balancing scientific integrity
Quigley et al., Rural and Remote Health, 2021	Reflections on the implementation of ethical and culturally appropriate research conduct in a cross-sectional study on dementia among Torres Strait Islander peoples	Partnership characteristics Program context: Dementia prevalence study	Attending community events/meetings, learning local history, protocols and culture, participating in forums, community radio, engagement with local associations, informally chatting over tea , reflexivity, training local health workers, getting feedback -Central role of food in local culture and fundamental in engagement: morning tea offered impacted acceptance of	-Practical demonstration of ethical research conduct -Sustainable capacity building	Anecdotal outcomes reported: -Relevant research to local needs -Culturally relevant research -Supporting putting knowledge into practice	Anecdotally described mechanisms: -Building strong relationships: genuinely engaging with communities, developing partnerships, starting with trust -Integrating Aboriginal and Torres Strait Islander peoples researchers in team -Community ownership -Community champions

			research; conversations, trust and rapport formed KT activities: written reports, informal talks with community groups, media outlets/community radio, newspapers			
Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms <i>Link for how interventions led to outcomes</i>
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	
Delafield et al., Program Community Health Partnership, 2016	Qualitative Community-to-Community Mentoring (CCM) model applying CBPR principles in interventions with aim of knowledge dissemination	Program context: Partnerships to Improve Lifestyle Interventions (PILI) Ohana Project Partnership characteristics Partnership characteristics: mentor-mentees paired based on shared socio-economic, political, cultural and geographical contexts	Engagement was not with community but between mentors and mentees. Activities in CCM model: regular consultations, material support (incentives, curriculum) and assistance with problem situations, mentors training mentees, mentees observing intervention facilitation	Has not explicitly mentioned KT and does not relate to policy changes. Outcomes outline pathways to achieve change: -Building critical consciousness, community capacity, and social capital to influence behaviour changes Dissemination and implementation of evidence-based interventions by applying CBPR principles		-Building strong relationships: reciprocity, equal partners, strengthening social networks, mentees positioned as leaders -Community champions: mentees seen as credible to the community they serve, consider context. Include intergeneration approach. Other postulated mechanisms: -High compatibility of mentorship relationships -Peer modeling and self-efficacy -Recognizing outcomes as valuable -Community ownership -Cultural safety: Indigenous methodologies
Oosman et al., Int J Circumpola	Scoping review on health promotion interventions	Target population demographics and location of published papers	No intervention in study but described engagement with Elders ranging from design/development to being	Has not mentioned KT and does not connect to policy changes. Described outcomes that facilitate process of bridging action to knowledge		-Cultural safety: grounding research in Indigenous worldviews

r Health, 2021	supporting Indigenous ageing		advisors and participants in each research stage -Reported engagement at 2 highest levels on continuum: collaboration and shared leadership -Applying 5 R's of reconciliation -Critical reflection on supporting effective community engagement among community and scholars (on accountability and decolonizing lens)	-Passing of knowledge and cultural teachings, reciprocity (between youth, young adults and Elders to enhance health) -Communal healing -More sustainable -Relevant and localized research	-Building strong relationships: engagement with community throughout research process -Community ownership: let communities drive level of participation	
Browne et al., BMC Health Serv Res., 2016	Mixed-methods ethnography on a framework promoting equity-oriented care with Indigenous peoples	Historical context	No interventions for the study but recommended strategies: partnerships with local Elders, community organizations, boards, other governing bodies and CAC, understanding local and shared history and colonization, reflecting on impacts of strategies, power differentials and positionality, tailoring to local contexts, cultural practices training	Not systematic data generation. Described outcomes as -Optimized effectiveness of health care services delivery for Indigenous peoples -Health equity with foundational organizational policy statements, processes, and structures for more equitable health services for Indigenous populations -Potential impacts extending to the following indicators of change: decreasing hospital admissions, readmission rates and emergency department use	Inequity-responsive care: -Cultural safety: addressing ongoing impacts of historical injustices, using a decolonizing lens -Contextually tailored care: requiring partnerships -Orienting action/practices to address all levels (intra-personal, inter-personal, organizational and community)	
Author, year, journal	Study objectives and study design	Context <i>Interactions with interventions/mechanisms</i>	Intervention <i>Community engagement design</i>	Outcomes		Mechanisms
				<i>Of study/program</i>	<i>Of community engagement in relation to KT</i>	<i>Link for how interventions led to outcomes</i>
Firestone et al., N Z Med J, 2021	Mixed methods impact evaluation of a community-based intervention led by youth in mobilising	Community context (postulated): rural social cohesion unit providing better support and motivation than urbanised community resulting	Training local members as facilitators to engage youth, delivering piloted empowerment modular programme, youth co-developed action plans and	Primary outcome ranging from adherence, bodyweight loss, step count increase,	Has not demonstrated role of policy in KT. -Building youth capacity: community mobilisation, enhancing knowledge on	Anecdotal mechanisms: -Community ownership of project by the Pasifika youth, youth-led

	Pasifika communities to action	in greater impact of community-based intervention Program context: Pasifika Prediabetes Youth Empowerment Programme (PPYEP) project Target population demographics	timeframe of interventions, decision making meetings with research teams and youth in each phase of the research, Pasifika facilitators leading engagement process	improved knowledge and awareness of prediabetes Secondary outcome: intervention user engagement and sustainability	health and lifestyle (prediabetes) -Increased community acceptance and community support of research -Health advocacy -Tailored interventions to community needs -High retention rate of participants (greater shifts in behaviour among individuals resulting in greater KT)	-Engaging local social capital: youth as equal partners -Building strong relationships: close connection between youth, community facilitators and participants in the communities
Miles et al., John Hopkins University Press, 2018	Qualitative process evaluation on encouraging healthy nutrition practices among Native Hawaiian mothers, children and families	Program/project context: Building the Beloved Community Target population demographics	Training community members as facilitators, group sessions, using poetry to connect group, sharing food: power to build community, relational, catalyzed shared reflections/ experiences	Has not explicitly mentioned KT not policy changes but described facilitator perspective on program resulting in community and individual change: -Community participation -Greater awareness and impact of relationships to food -Sense of change: commitment to making healthier personal choices, reclaiming lost values -Strengthening sense of community and support		-Community champions: respected people in the study bridge project to people -Inter community links -Cultural safety: community self-empowerment by honouring the values/suggestions of community health, creating community spaces where sharing and learning are easy, affordable, and fun
Ninomiya et al., Elsevier, 2022	Systematic review on promising and wise practices for KT in Indigenous health research	Indigenous communities in research in Canada Programs contexts	Meaningful involvement of stakeholders (meeting with leadership including Elders, knowledge keepers, grandparents, health authorities, service providers and hiring local researchers*), multimedia tools with oral/visual components and embedding	KT evaluation methods: documented observations, questionnaires/surveys, interviews, focus groups, qualitative and quantitative methods with pre/post measures, case studies,	Impact on health and wellness outcomes: capacity building (increase or change in knowledges and awareness by community members, change in behaviours or actions, changes in	Results from systematic review hypothesize the following: -Researcher/funders/journals accountability (ie. researcher accountability through building kinship and social networks at community events)

			<p>community events to facilitate discussion/change (feasts), following Indigenous research principles* (OCAP, participatory approaches*), local protocols, learning about the community the history and culture, iterative feedback and evaluation*, integrating traditional knowledges* and using local Indigenous languages. Indigenous PIs, advisors, mentors, trainees*, planning time and funding for engagement before research*</p> <p><u>*Highlighted as effective</u></p>	<p>reflexive notes, document review, realist evaluation</p> <p>Rare evaluation of KT using community defined measures of success or rigorous methodology and often not evaluated because not required</p>	<p>health care practices), sustainable new programs and increased self-determination and self-governance</p> <p>Shared knowledge reflecting local protocols, conditions, history, culture, languages and worldviews of community</p>	<p>-Messaging reflective of local and relevant values, practices and strengths</p> <p>-Cultural safety</p> <p>-Prioritizing KT in studies</p> <p>-Reciprocity: giving back to community by responding to community articulated needs</p> <p>-Implementing KT in context</p>
Smylie et al., Health Promotion Practice, 2009	Qualitative study on the similarities and differences in the pathways of health knowledge in 3 Indigenous communities	<p>Target population and demographics</p> <p>Community context (socio-political, geographic): Community structure impacting health information dissemination, local effects of colonization</p> <p>Inuit community: cohesion (close community connection) allow messages to travel quickly despite different geographic community of origin, all Inuit considered part of larger Inuit community</p>	<p>Visiting community and meeting with community representatives, community research agreements (OCAP, community expectations, governance and benefits, dissemination), suggested community researchers' members for hiring, participatory research principles (co-interpretation and analysis of data), sharing preliminary findings in focus groups, distributing community reports</p>	<p>Inuit community: face-to-face interactions, storytelling, Elders in decision-making</p> <p>Pikawakanagan First Nation community: traditional knowledge, effect of colonization and medical pluralism, preference for individual consultations for privacy and stigma</p> <p>Métis community: uncomfortable with</p>	<p>Has not explicitly detailed as outcomes but assumed as outcomes considering objective was to examine process for health KT within community</p> <p>-Community-context specific approaches to KT</p> <p>-Policy toolkit for Indigenous KT activities</p> <p>-Capacity building</p>	<p>Data generated on mechanisms of:</p> <p>-Cultural safety: culturally appropriate language and symbols, valuing experiential knowledges</p> <p>-Community ownership: community generated understandings of health messages and dissemination through family and community networks</p>

		Métis community: dispersed community structure resulting in absence of cohesive community information network (migration to urban centers), exclusion from federal policy interfered with ancestral ties to First Nations peoples shaping Métis identity		mainstream, First Nations and Inuit health care services. Desire for Métis-specific health programs and resources that do not exist currently.		
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Appendix B. Interview Guide for community partners

Community Engagement

- General questions:
 - What are ways to support community engagement in [COMMUNITY]?
 - What are ways to support the community's ability to mobilize to address a problem?
 - What are the best ways to disseminate information in the community?
- Quality
 - What do you think about the kind of community engagement that FEHNCY engaged in?
 - What are the best ways to engage with the community, from your perspective?
 - What are the best ways to engage youth?
- Quantity
 - What are your thoughts on the amount of community engagement that is needed in [COMMUNITY] to have improved participation in FEHNCY?
 - Can you provide an example of excellent community engagement from a previous program/initiative in your community? How can FEHNCY adapt these strategies?
- Partnering with community
 - In your perspective, how did the FEHNCY study do in terms of building relationships with people in the community?
 - How could FEHNCY improve these relationships?
 - What do you see as the importance of these relationships?
 - Can you tell me about a time when you felt your input was valued and welcomed? How often would you say you had events like this?
 - Can you tell me about a time when you felt your input was not acted upon? How often would you say this happened?
 - What could FEHNCY do to more effectively partner with the community?
 - How can effective community partnerships support knowledge translation / transfer of results into action?
 - How do strong community/research partnerships support survey participation in [COMMUNITY]? Could you give me an example of how strong community partnerships encouraged someone to participate in the survey?
 - Could you talk about the extent of community ownership of the study? How can FEHNCY improve?
 - What would you be interested in a community survey?

Community context

- How do you think the COVID-19 pandemic impacted community engagement in [COMMUNITY]?
- Considering the need to shift to online community engagement, what were effective ways to promote online engagement that FEHNCY could consider?
- What do you think are aspects of the community context that could impact community engagement?
- How can FEHNCY better partner with activities/groups/initiatives in [COMMUNITY]?

Cultural safety

- What does cultural safety mean to you?
- We want to make sure that the FEHNCY study values Indigenous knowledge (systems), in your perspective, what are ways to show that the FEHNCY study values Indigenous knowledge systems on par with western science?
- In what ways is FEHNCY like other scientific research projects with First Nations communities? In what ways is FEHNCY different?
- What are your thoughts on the opening ceremony event(s) in [COMMUNITY]? How can the activities be improved to demonstrate valuing of Indigenous culture, knowledge, and traditions?
- How can FEHNCY appropriately show respect and reciprocity for biosamples (blood, hair, urine) that children give as participants in the survey?
- What is your perspective of the Teiakonekwensatsikhetare (Our Blood Is Sweet) wampum bundle?
- How can Indigenous/traditional ceremonies play a role in valuing Indigenous knowledge systems?
- What do you think have been the impacts of efforts to value Indigenous knowledge systems?
- What are ways FEHNCY can support knowledge translation / transforming FEHNCY results into action? At community level? At provincial level? At the national level?

Food

- What is the role of traditional foods in community engagement?
 - What does it mean for researchers to show respect for traditional knowledge and traditional foods?
- What are your thoughts on FEHNCY including community specific foods on surveys?
 - How were you and your community involved in this process?
 - How does it affect community participation with FEHNCY?
 - In what ways does this affect community engagement?
- If the COVID-19 pandemic was not ongoing, when is it most meaningful to have traditional foods as part of FEHNCY?
 - In what places or situations is it appropriate? (example: during ceremony vs. youth engagement games)
 - How often would be most ideal? (example: monthly vs. key events/seasons/time)
 - What kind of foods would be most meaningful for engaging the community?
 - Can you describe how these foods could support community engagement/participation?
- What is the role of sharing food in engaging the community?
 - What are your thoughts on including food sharing in FEHNCY Community Engagement and Mobilization during COVID-19?
 - What was your experience in the lack of food sharing in FEHNCY Community Engagement and Mobilization during COVID-19?
- Can you describe the role of food in connecting communities?
 - How can food encourage conversations around food and nutrition?

- In what ways can food create spaces for people to discuss research findings?
 - How can it promote shared action?
- What are traditional ways for sharing culture and food between First Nations communities?
 - What are ways FEHNCY can include these approaches to support cultural exchanges between First Nations communities?
 - How can sharing community specific foods with FEHNCY help build connections between different First Nations tribes?
 - What is the role of these cross cultural connections in promoting community engagement with FEHNCY?
- What is the role of food in building partnerships between researchers and First Nations communities?
- How can incorporating traditional foods into events support building partnerships between researchers and community?
 - Between researchers and community partners
 - Between researchers and community members
 - How can it be different or similar depending on who traditional food events are shared with?
- How did running virtual, hybrid and/or in-person community engagement activities affect food sharing opportunities?
 - How does this change community participation?
- What are ways to support going from evidence to action? (knowledge to wisdom)
 - In what ways can food be involved in the process of applying knowledge?
- How does the community integrate evidence into their everyday practices?
 - What is the role of food in helping communities turn knowledge into action?
- How can evidence be integrated into policies/programs?
 - How can food bring people together to promote policies/programs based on evidence?

Appendix C. Interview Guide for FEHNCY team members

Community Engagement

- General questions:
 - Can you tell me about your role in the Community Engagement & Mobilization Component activities?
 - What role do you think the Community Engagement & Mobilization activities play within the FEHNCY study?
- Quality
 - What do you think about the kind of community engagement that FEHNCY engaged in?
 - How effective were the community engagement activities in [COMMUNITY] in promoting community involvement in the study?
 - What is your perspective on how the FEHNCY study specifically reached out to youth? How could it be improved?

- What were the most effective community engagement activities? Why do you think they were so effective?
- What was an example of a less effective community engagement activity?
- Quantity
 - What are your thoughts on the amount of community engagement that is optimal in [COMMUNITY] to have improved participation in FEHNCY?
 - To the extent that FEHNCY met community engagement goals in [COMMUNITY], how could FEHNCY improve its outreach to better meet community engagement?
- Partnering with community
 - In your perspective, how did the FEHNCY study do in terms of building relationships with people in the community?
 - How could FEHNCY improve these relationships?
 - What do you see as the importance of these relationships?
 - Can you tell me about a time when you felt community input was valued and welcomed? How typical was this?
 - Can you tell me about a time when you felt FEHNCY could have better responded to community feedback? How often would you say this happened?
 - What could FEHNCY do to more effectively partner with the community?
 - In your perspective, how can effective community partnerships support knowledge translation / transfer of results into action?
 - In your perspective, how do strong community/research partnerships support survey participation in [COMMUNITY]?
 - Could you talk about the extent of community ownership of the study? How can ownership be improved?

Community context

- How do you think the COVID-19 pandemic impacted community engagement in [COMMUNITY]?
- Considering the need to shift to online community engagement, what were effective ways to promote online engagement that FEHNCY could consider?
- What do you think are aspects of the community context impacted community engagement efforts?
- How can FEHNCY better partner with activities/groups/initiatives in [COMMUNITY]? In future FEHNCY communities?

Cultural safety

- What does cultural safety mean to you?
- We want to make sure that the FEHNCY study values Indigenous knowledge (systems), in your perspective, what are ways to show that the FEHNCY study values Indigenous knowledge systems on par with western science?
- In what ways is FEHNCY like other scientific research projects with First Nations communities? In what ways is FEHNCY different?
- How do you consider promoting cultural safety in your component/activities in FEHNCY?
- How can FEHNCY better improve the cultural safety of the study?

Food

- What was your experience participating in food sharing events with different First Nations communities?

- How did running virtual, hybrid and/or in-person community engagement activities affect opportunities for community engagement?
- What can we learn from the lack of food sharing events with First Nations communities due to the COVID-19 pandemic?
 - What is the role of food sharing in engaging researchers in partnerships with First Nations communities?
- How does incorporating the element of food shape relationships?
 - From your perspective, what are your thoughts on the (potential) role of food in community participation of FEHNCY?
 - What is your experience in supporting knowledge translation in Indigenous communities?
- Can you describe experiences with knowledge translation?
- What have you noticed when using food centred approaches in knowledge translation?

Appendix D. Guiding Prompts for modified Talking Circle with community partners

- Can you describe why it is important for FEHNCY community engagement activities to be culturally meaningful?
- What is the role of food in community engagement? How can food support community engagement?
- What does respectful research mean?
- How did FEHNCY do in terms of developing relationships within the community?
- How can FEHNCY promote/improve community participation?
- What are some ways FEHNCY can do a better job in forming relationships in Kanesatake and other First Nations communities?
- What is needed from both researchers and communities to make sure results from research are applied?

Appendix E. Guiding Prompts for focus group discussions with FEHNCY team members

- What were the strengths of the community engagement activities that were put forward by FEHNCY?
- From your experience with FEHNCY, what are the impacts of the strength of community partnerships on community participation?
- In general, what could we have done differently in terms of the Community Engagement and Mobilization Component?
- What would it look like for a research project to respect Indigenous knowledge systems?
- From your perspective, what are the ways you feel like you can be supported in promoting cultural safety within FEHNCY?
- What are activities that would be helpful in increasing the FEHNCY team's capacity to practice cultural safety?
- Tell me a time when you felt like we incorporated cultural safety and how it encouraged community participation?
- From your perspective, what conditions are necessary to support knowledge translation with First Nations communities?
- After the pilot, what does FEHNCY need to do in working with communities to achieve those connections?