

ORIGINAL RESEARCH

Exploring oral health and hygiene practices in the Algonquin community of Rapid Lake, Quebec

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ABSTRACT

Introduction: Early childhood caries (ECC), a disease characterized by tooth decay in the primary teeth of children, has become particularly burdensome in Aboriginal communities in Canada. Prevalence estimates of ECC range between 50% and 100%. Most concerning are the severe cases of ECC that require treatment with restorative surgery under general anesthesia. These surgeries often displace children and families from their local communities to specialty hospitals for treatment; further, they are very costly to dental insurance payers such as the government. This study used community-based participatory research (CBPR) to explore oral health and hygiene practices in the Algonquin community of Rapid Lake, Quebec. A key goal of the study was to create a culturally adapted activity to promote children's oral health and hygiene practices.

Methods: Focused ethnography was used to explore oral health beliefs and practices, and factors related to child oral health promotion with community members. Participants included children, parents, educators, healthcare workers, youth workers and elders. Semi-structured interviews were conducted with key informants. Following, two focus group interviews were conducted: one with parents and one with school children. All data were audio-recorded, transcribed and analyzed iteratively using thematic analysis. Preliminary findings were then used to develop oral health promoting activities for children in the community. These activities were designed in collaboration with community workers.

Results: Three main themes emerged from the analysis: (1) a gap existed between oral health knowledge and oral health behaviors; (2) challenges for oral health promotion included attitudes and beliefs, access, and priorities; and (3) parents needed to be further integrated into health promotion strategies. Key outcomes included: (1) the development of Eagles & Otters, a game designed to increase children's oral health knowledge; (2) an activity sheet to promote child oral health behaviors in the home; and (3) increased capacity in oral health promotion in local youth, community research partners and the student researcher.



Conclusions: The findings of this study highlight the importance of both local and broader systemic interventions to promote children's oral health. At the local level, child oral health and hygiene was promoted through the development of activities designed to increase children's oral health knowledge and behaviors both at school and in the home where parents were directly implicated. Systemic level interventions are needed to address factors related to the social determinants of health, including cultural traditions, economic security, food security, and housing status. These factors contribute to overall health and enable the necessary conditions to promote and sustain oral health.

Key words: aboriginal health, community, early childhood caries, oral health, oral hygiene, participatory research.

Introduction

There is great disparity between the health status of Aboriginal and non-Aboriginal peoples in Canada. Of particular concern to the pediatric population are alarmingly high rates of early childhood caries (ECC). Early childhood caries is defined by the presence of tooth decay in one or more primary teeth in children younger than 6 years¹. The prevalence of ECC typically ranges between 50% and 100% across Aboriginal communities². Prevalence rates are generally higher in rural communities compared to urban areas².

The development of ECC requires the biologically based triad of host susceptibility: the condition of tooth enamel; a diet containing fermentable carbohydrates such as glucose, fructose and lactose, where prolonged exposure (eg through bottle-feeding) poses a great risk for ECC³; and exposure to cariogenic bacteria such as *Streptococcus mutans*. Hygiene practices are important, especially in overcrowded households where poor hygiene may promote the spread of *S. mutans* amongst household members⁴⁻⁶. Many of these factors are affected by socioeconomic status (SES), which broadly encompasses the greatest risk factor for ECC⁵.

At an individual level, ECC may cause great physical pain and social distress to a child⁷. Early childhood caries may also adversely affect child growth and development leading to caregiver burden and stress^{7,8}. Severe ECC, left untreated, usually requires tooth extraction by surgical intervention

under general anesthesia. Not only does surgical intervention under general anesthesia carry its own set of health risks, but also it may displace children and their caregivers from their communities to distant hospitals⁹. This treatment carries significant financial cost for families and insurance companies for the procedure itself as well as costs related to travel and lodging. Early childhood caries also increases the risk of tooth decay in permanent teeth¹⁰ as well as periodontal and cardiovascular disease in later life¹¹. Given the range and severity of the consequences of ECC, a number of strategies have been developed to prevent the development and recurrence of ECC through oral health promotion and hygiene.

Strategies to prevent ECC in Aboriginal communities

Health Canada implemented the Children's Oral Health Initiative (COHI) in 2004 to help prevent dental disease and promote oral health in Aboriginal children¹². COHI services target mothers during the prenatal period and children younger than 7 years. COHI services are usually offered by a dental hygienist who visits rural communities regularly to provide dental screening and oral health counseling.

In addition to COHI, several community-based interventions have been designed for Aboriginal women during the antenatal period to help prevent ECC. One such intervention took place in an Ontario First Nations community¹³. This program distributed oral health information brochures in English and Oji-Cree along with toothbrushes and tippee cups to mothers with infants between 6 months and 12 months,



and offered guided grocery shopping sessions with nutritionists. Health workers also provided oral hygiene information, such as toothbrushing technique, during visits with children and throughout local media. An evaluative study revealed outcomes such as increased knowledge about child oral health; unfortunately, night-time use of baby bottles persisted¹³.

Another community-based intervention in a First Nations community in British Columbia specifically sought to decrease bottle-feeding with sugary beverages¹⁴. Whereas willow cradles had been traditionally used to soothe crying children, this tradition was replaced by bottle-feeding. Local mothers and health workers collaborated with researchers to create and distribute willow cradles to parents to soothe their children. Community advertising about ECC prevention and individual counselling with a community nurse were also part of the intervention. Findings included slight improvement in child oral health, fewer reports of night-time bottle-feeding and greater community awareness about ECC risks.

Oral hygiene teaching alone was not enough to decrease the pervasive and harmful practice of night-time bottle-feeding in the former study¹³; in the latter study, an intervention targeting local beliefs resulted in decreased night-time bottle-feeding and also directly implicated local community members in improving their children's health in a culturally appropriate manner¹⁴. The present study builds on these findings by exploring a wider range of oral health beliefs pertaining to school-age children.

One school- and community-based intervention, the Brighter Smiles Initiative, was designed to reduce ECC and took place in the First Nations community of Hartley Bay, British Columbia¹⁵. This intervention was developed in collaboration with university dentistry faculty members, community elders and community health workers and targeted children, pre-kindergarten to grade 12, and their parents. Supervised toothbrushing sessions and weekly fluoride washes with incentive for participation based on draws for prizes were main elements of intervention. Presentations about nutrition, oral health, and related topics were also offered to children at

the local school. Key outcomes at 3 years included increased dental visits for preventative dental care as well as increased community capacity, especially of community health workers to organize other prevention programs at school^{15,16}.

Although the Brighter Smiles initiative was successful in improving the oral health of school-age children^{15,16}, community beliefs about oral health were not explored in this study. Exploration of such beliefs can lead to better understanding of common practices harmful to children's health and can ultimately help in designing culturally adapted interventions to reduce harmful practices.

The Algonquin community of Rapid Lake, Quebec

As in many other rural Aboriginal communities, ECC is of concern in the Algonquin community of Rapid Lake, a semi-isolated community located in the Outaouais region of western Quebec. Examination by a dental hygienist in 2011 revealed high rates of ECC, with greater than 50% of the children in the community having had surgery for ECC. The McGill Ingram School of Nursing (ISoN) has collaborated with this community to conduct community-based research over the past 6 years¹⁷⁻¹⁹. The community requested collaboration with the McGill ISoN to design a culturally adapted activity to promote oral health in school-aged children in their community.

Rapid Lake is the home to the Algonquin of Barriere Lake, a community of 680 registered community members, over half of whom live in Rapid Lake. Community services include a daycare, an elementary school that also teaches Algonquin language, and a youth center offering activities after school, staffed by a youth coordinator and two youth workers. Health services are provided at the Kitiganik Health Clinic, which is funded by Health Canada. At the time of the study, the clinic was staffed by four nurses, a community health representative (CHR), a local maternal child worker, a drug and alcohol counselor as well as several support staff. The clinic hosted a dentist part-time, and a hygienist a few days per month as part of the COHI program already described.



Methods

This research project was conducted between September and December 2012 as part of the student researcher's requirements for a Masters of Nursing degree. The purpose of the project was to learn about local beliefs and practices regarding oral health and to use this knowledge to design and implement a culturally adapted activity to promote oral health among school-age children in the community. A community-based participatory research (CBPR) design was used given its link to positive outcomes for community oral health promotion^{10,14}. For instance, the CBPR framework takes into account the power imbalances that have resulted from a long and devastating history of colonialism and forced assimilation. This power differential is today reinforced by ongoing government disputes with Aboriginal peoples regarding rights to self-government, land, and economic resources. The main tenets of CBPR include developing community strengths and resources; supporting co-learning and empowerment, taking social inequalities into account; using knowledge and action for the benefit of all partners; disseminating findings to all partners; and long-term committed relationships²⁰.

Conceptual frameworks

Two conceptual frameworks were used to guide this study's understanding of oral health in Rapid Lake: Aboriginal understandings of health, and components of the PRECEDE-PROCEED framework. The first framework, Aboriginal understandings of health, was used to ground the study's design, analysis and interpretation in understandings of Aboriginal worldviews, particularly the local culture of Rapid Lake. According to this framework, the health of Aboriginal children is linked to culturally based practices that promote the use of Indigenous languages; oral teachings from elders about traditional life; interrelationships between the land, tribes, families, and ancestors; and holistic views of well-being and health based on spiritual, emotional, mental and physical dimensions^{21,22}.

The second conceptual framework was adapted from the PRECEDE-PROCEED framework. PRECEDE refers to Predisposing, Reinforcing and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation²³. Watson et al. used this model in a community-based oral health program in a low socioeconomic community, for which they identified *predisposing constructs* (eg knowledge, attitudes, and beliefs about oral health and caries), *reinforcing constructs* (eg support from family and healthcare providers), and *enabling constructs* related to access to dental care (eg language spoken, insurance coverage) to play a role in the oral health of participants²⁴. This model was used to help conceptualize factors affecting oral health in the current study, especially during the design of the interview guide.

Project design

Focused ethnography was used in this project, a methodology adapted from cultural anthropology and based upon a constructivist framework that assumes multiple realities are co-created through interactions amongst participants and between researchers and participants²⁵. Focused ethnography is a type of ethnography that lends itself to a relatively short timeframe and answers questions more specific than may be the case in traditional ethnography²⁶.

This project consisted of four phases (Fig1). Participant observation was a key method of data collection throughout each phase, for which data were recorded through a series of detailed field notes after interaction with participants. The goal of phase 1 was to learn about child oral health and hygiene practices from a range of community members. Six key informants were recruited for individual semi-structured interviews based upon an interview guide (Appendix I). Purposive sampling ensured a range of participants²⁷: three participants were Algonquin community members and three were non-Algonquin workers from the Kitiganik Health Clinic; two of the six participants were men and overall age range was 22–58 years. Together, the six participants represented various community positions including healthcare worker ($n=3$), school staff ($n=1$), mother with



infants ($n=1$), and elder ($n=1$). Given the influential role of elders in the community and their knowledge of traditional practices, a local elder was sought to participate in the study, in accordance with an Indigenous school health promotion framework²².

Following this, two convenience samples²⁷ were recruited: children between 9 and 11 years from Cycle 3 (grades 3–5) at Rapid Lake School ($n=7$), and their parents ($n=8$). The goal of working with children of this age was to facilitate dialog about oral health as well as to promote oral health with children who could later act as role models for younger children. A focus group was organized at the day center for parent participants, the goal of which was to generate discussion amongst participants and explore oral health beliefs in general. The focus group used an interview guide similar to the one used during interviews with community members. A group interview was then organized with the child participants at the youth center based on further adaptation to the interview guide (Appendix II). The group interview was more structured than the focus group, because its goal was to inquire about specific topics, knowledge, and behaviors and thus was more about information gathering than a group conversation. The local youth coordinator and youth workers helped facilitate the interview and all further activities with the child participants.

The goal of phase 2 was to build and pilot test an activity to promote oral health amongst local children. Two activities were created, each tested with child participants from phase 1 and their peers in Cycle 3 ($n=14$). Written and verbal feedback about the activities was sought from child participants.

The goal of phase 3 was to revise the activities based on participant feedback and observations. The re-designed activities were retested in the Cycle 3 class ($n=14$) and feedback was again gathered.

The goal of phase 4 was to disseminate findings among community members (children and adults) through an

interactive presentation. Anonymous written feedback was requested from all attendees.

Data analysis

Interview data were audio-recorded and then transcribed for thematic content analysis; participant-observation data were recorded via fieldnotes. During phase 1, data was analyzed sequentially: transcripts and field notes from the first interview were read and coded for emergent concepts, the codes were then used for subsequent interviews, with additional new codes added as they emerged. This process was repeated for all key informant interviews, after which codes were grouped into broader concepts. This analysis was then used to build the focus group interview guide. Transcripts and field notes from the focus group were analyzed in a similar manner, building upon the codes and concepts derived from previous data; a similar process was used for the group interview with children.

Preliminary findings were shared with on-site co-researchers and community members working with youth. Discussion amongst co-researchers (including off-site supervisors) resulted in the organization of concepts into categories, subcategories, and overarching themes. Feedback from participants and community members pertaining to the activities and the community presentation were compiled and analyzed for convergence and divergence with previously identified concepts and themes.

Methodological rigor was ensured through three key processes: reflexivity, triangulation, and transferability²⁶. The student researcher sought to be reflexive by documenting personal thoughts, feelings, and concerns, and corresponding regularly with McGill supervisors. Data and investigator triangulation were ensured by seeking multiple data sources, using several methods of inquiry, and by including multiple investigators. Contextual descriptions of the setting and participants in Rapid Lake were sought to facilitate assessment of transferability of results to other rural Aboriginal communities²⁷.

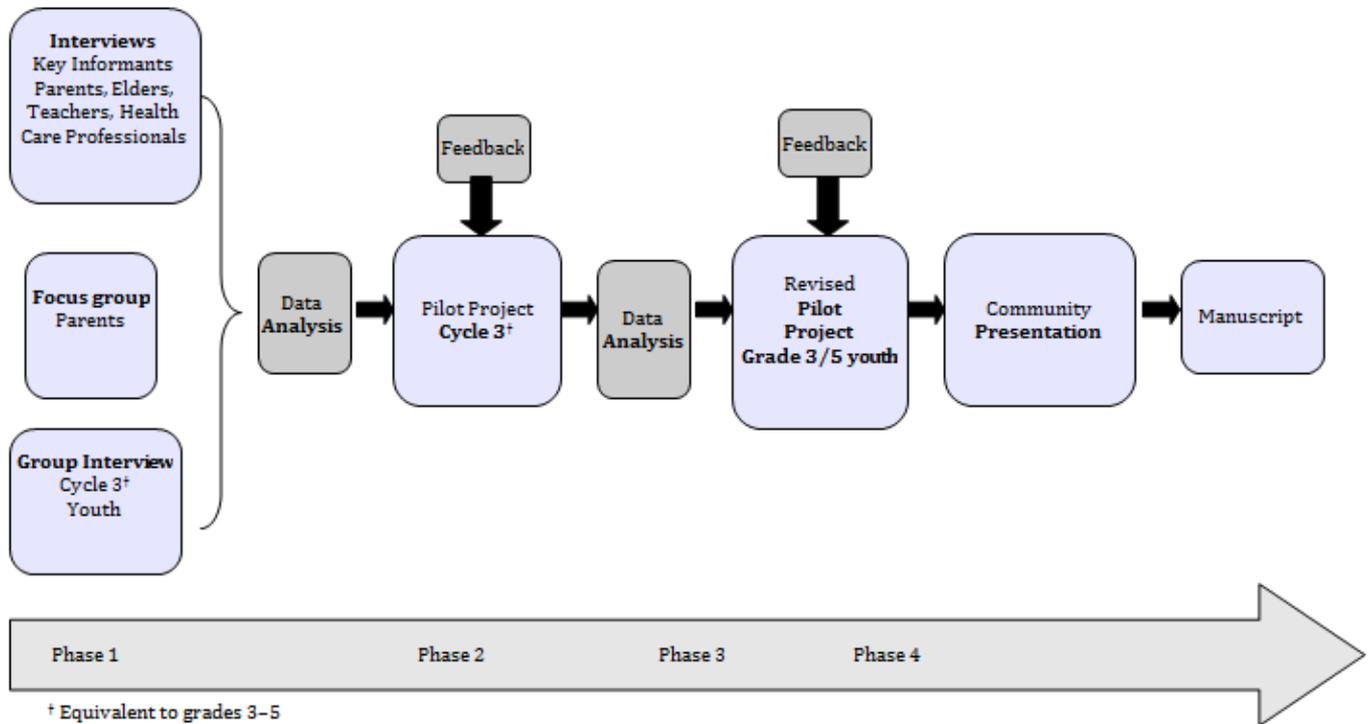


Figure 1: Schematic overview of study design

Ethics approval

Ethical approval was obtained from the McGill Institutional Review Board (IRB) prior to commencement of the project (IRB Assurance Number FWA 00004545). The project followed guidelines for research pertaining to Aboriginal peoples outlined in the Tri-Council policy statement: 'Ethical conduct for research involving humans'²⁸. The student researcher's entry into the community was facilitated by the long-standing partnership between the McGill Ingram School of Nursing and the Rapid Lake community. Project approval was sought from staff at Kitiganik Clinic and the local CHR prior to project commencement. The local youth coordinator was an active project collaborator throughout all phases of the research and thus has been included as an author.

Results

This analysis identified three main themes, which together illustrate the state of child oral health in Rapid Lake as well as influencing factors and the importance of parental involvement in promoting child oral health.

Theme 1: The gap between oral health knowledge and practice

According to local community health workers, oral health knowledge in the community has increased in the 3 years since the dentist and hygienist began providing monthly services in Rapid Lake. For example, participants in the focus group attributed poor oral health in infants to bottle-feeding sugary beverages instead of breast-feeding, a message often



expressed by the dental hygienist during maternal/child workshops in the community. Yet, despite this knowledge, parents were often observed giving their infants and children bottles of juice or sugary water to drink. In some extreme cases, staff at the health clinic observed children awaiting surgical intervention for decayed teeth drinking sugary beverages by bottle, despite extensive oral hygiene teaching to the family. Thus, although parents were aware of causes of tooth decay and the harm associated with bottle-feeding sugary beverages, this practice continued.

In addition, when child participants of the group interview were asked about the causes of tooth decay, they unanimously answered 'candy' and other foods and drinks that are high in sugar content. They also agreed that brushing their teeth after eating sugary foods would help to prevent cavities. Yet, when asked about how often they ate candy and how often they brushed their teeth, it became clear that candy is popular while toothbrushing is not. When children were asked if they would brush their teeth at home that evening, only about half said they would.

Although oral health knowledge has increased in many areas, important misconceptions about oral health remain unchallenged. For example, few child participants associated juice with tooth decay, despite its acidity and high sugar content. Also, a few parents mentioned that brown sugar is a healthier food and beverage additive than white sugar.

Theme 2: Challenges for oral health promotion

Challenges for oral health promotion in Rapid Lake can be broadly classified into attitudes and beliefs, access, and priorities.

Attitudes and beliefs: A common childrearing practice in Rapid Lake that challenges oral health promotion is the practice of feeding babies sugar water in a bottle. While exploring beliefs related to this practice, a healthcare worker noted that some parents believe that sugar water helps babies sleep soundly. Further, one young mother reported that some parents in the community believe that their infants will

simply not drink sugar-free liquids. Another belief that challenges oral health promotion is local understandings of baby teeth: since primary teeth fall out, explained one mother, parents believe it is not important to take care of them. Also, parent participants described 'laziness' as an important challenge to oral health promotion. During the focus group, almost all parents used this term to describe local barriers to oral hygiene practices. For example, they attributed laziness to parents not brushing their children's teeth, or their own teeth. When asked to elaborate, a wide range of nuances emerged. For example, one parent exemplified laziness as 'being hung over from drinking or using drugs' while another talked about laziness related to being 'sick with diabetes'. Some parents described being lazy as 'just because', and a mother who worked at the school said that she felt 'lazy' in the evenings after work.

Access issues: Participants identified a number of issues related to access to the resources needed to promote oral health. For example, parents discussed the challenges of buying healthy foods in the community. As told by one parent:

There are no stores, grocery stores, in the reserve. And when your baby is hungry and you have no milk, powdered juice is fast. It's not because you don't know [that powdered juice is bad for oral health].

Indeed, the closest grocery store and health supply store are located at least 45 minutes away from Rapid Lake by car. While makeshift convenience stores open from time to time in the community, they have limited healthy options, focusing instead on chips, pop (soft drink) and candy. There are no stores with health supplies in Rapid Lake, and so children without a toothbrush often wait for the hygienist to bring supplies. While some supplies are available at the health clinic and school, they are limited. Two child participants reported that they cannot brush their teeth at home because they do not have toothbrushes.

In addition, many community members have limited income and this challenges their access to healthy foods and health



supplies. Many homes in Rapid Lake lack the basic infrastructure to store healthy food. According to one community worker, non-perishable items like 'powdered juice, peanut butter, jelly and bread, cornflakes [with powdered milk or water] with sugar' are popular because many homes lack the plumbing and electricity required to power a freezer or fridge. For one mother, these poor living conditions combine with the realities of overcrowding to seriously limit oral hygiene practices. In her words: 'Here [there is] one small bathroom for 12 people in the same house. A small bathroom and you put 12 toothbrushes, where?'

Finally, impeded access to oral health professionals was seen as a barrier to oral health. Most months during the project, a dentist visited the community for 1 day per month. Those who missed the visit would have to wait until the following month or travel hours to an adjacent city to see a dentist. As of 2013, no dentist was visiting the community.

A hierarchy of priorities: Community members identified a number of key priorities that superseded oral health. These priorities included addressing drug and alcohol use, physical and sexual abuse, and unemployment. Such challenges had already led to social services removing some children from homes and placing them in foster care. Such disruption was seen to fundamentally challenge the overall health and stability of the community. An elder spoke about the ongoing land struggles that directly threaten the health and wellbeing of the Algonquin; land provides a sacred ground for cultural wellness and healing. According to this elder, oral health cannot be seen in isolation from cultural and community health and wellness.

Theme 3: The importance of parents in health promotion strategies

There are multiple local strategies in place to promote children's oral hygiene practices. These strategies are largely based on the COHI dental hygienist's work along with clinic staff and teachers. Parents also play a crucial role in oral health promotion, a point made clear by community workers

and parents alike during interviews and the focus group. The problem, as expressed by one parent participant, is that many parents do not feel themselves to be strong role models in this respect. For example, parents who were residential school survivors did not learn about oral hygiene as children and consequently have poor oral health. It was suggested that access to oral health education workshops for parents would help to promote oral hygiene for the entire family.

From this analysis, two key outcomes were inspired and enacted: the development of activities to promote oral health among local children, and the increased capacity of community members and researchers to address local health.

The first outcome was the development of a life-sized Eagles & Otters board game (approximately 180 × 270 cm) built using Snakes & Ladders as a model (Appendix III). An eagle was chosen by community members as a symbol of flying high and therefore moving up on the game board and an otter was chosen for being playful and sliding down the game board. Both animals are found locally in Rapid Lake and have significance in local culture. The game included question squares linked to cards with questions based on areas of learning that emerged from interviews. While playing the game and answering oral health related questions, children engaged in active debate with their teammates; they played repeatedly, improving their scores as they played. Teachers requested the game be adapted to include questions about other health concerns (eg overall hygiene).

The second activity was designed to move beyond health knowledge to healthy oral hygiene practices. It involved a toothbrushing calendar and a checklist to be filled out at home (Appendix IV). Each completed activity sheet would be returned to the school for a small prize. The children were actively engaged and eager to win a prize.

After each activity was developed and implemented, the student researcher organized a final event at the local community center. All participants and collaborators were invited to attend. The presentation included interactive educational material from SipSmart, a program designed for



use in classrooms by Quebec Heart & Stroke Foundation²⁹. The material included an exhibit with eggs soaked in various sugary beverages displaying the negative effects of sugar and acid on the shell of an egg, which was likened to tooth enamel. Attendees of all ages were engaged throughout the presentation, asking questions and responding to questions posed, reinforcing knowledge acquired. Prizes were distributed and all child attendees received dental supplies.

A final outcome of this study was increased capacity of community members to address local health needs. For example, the youth coordinator, teachers and school nurse were eager to further develop the activities created to promote oral health and overall health. The dental hygienist and the student researcher both gained hands-on experience implementing culturally adapted health interventions. Additionally, children and parents acquired new knowledge to share with others and apply at home in the promotion of oral health.

Discussion

This project used community-based participatory research (CBPR) to explore oral health and hygiene practices with community members in Rapid Lake. CBPR made it possible to build upon the long-term relationship between Rapid Lake and McGill's Ingram School of Nursing as well as to draw on community strengths and resources to improve children's oral health knowledge and practices.

The authors found that general knowledge of oral hygiene was considerable among parent and child participants; this finding is particularly important given that knowledge has been identified as one of several predisposing constructs affecting oral health behaviors²⁴. Yet it was also found that knowledge alone was not sufficient to motivate changes in oral health practices. For example, while parents were aware that feeding infants with sugary beverages causes tooth decay, many continued this practice. One reason cited for feeding infants sugary beverages was limited access to milk and healthy alternatives. The practice of breastfeeding could help

ameliorate these access issues; however, rates of breastfeeding in Rapid Lake are low³⁰. Importantly, a recent study in the community focused on identifying and alleviating barriers to breastfeeding³⁰.

Another reason cited for feeding infants and children sugary beverages was the belief that it would soothe them. This finding is similar to that of a study mentioned above that established infant feeding as a comfort practice among First Nations people¹⁴. Beliefs have been identified as another key predisposing construct²⁴; greater understanding of these beliefs can lead to successful culturally based interventions. For example, the use of willow cradles as an alternative comforting practice resulted in a decrease of bottle-feeding¹⁴. A similar infant comforting practice could be explored for use in Rapid Lake where the practice of wrapping a baby in a birch bark cradleboard was traditionally used in the community to soothe infants.

The notion that 'laziness' is a common barrier to oral health can be explored through the concept of motivation. For example, a prior study examining oral health outcomes in patients with diabetes linked laziness to lack of motivation³¹. Further, interventions based on motivational interviewing targeting an individual's motivation to change have been used with parents to increase child oral hygiene practices^{32,33}. These interventions involved counselors working with parents to increase their motivation to adopt health practices, for example by using a non-confrontational style to point out discrepancies between parent-stated health goals and their behaviors. This type of support from healthcare workers could represent a reinforcing construct for oral health behaviors²⁴.

Importantly, laziness may itself point to deeper issues than just motivation. Persons with low SES have been found to interpret mental health problems as personality traits such as laziness³⁴. The promotion of mental wellness may be relevant for persons in the community complaining of laziness given that, in general, approximately 30% of First Nations persons have experienced depression, sadness or feeling blue for



extended periods³⁵. Addressing mental wellness may help to promote overall health in Rapid Lake.

Access to the resources needed to promote oral health was an important issue brought up by the study participants, a factor that may be considered as enabling oral health behaviors. Access to healthy foods and health supplies such as toothbrushes is limited because of geographic isolation and limited income; access to junk foods, by comparison, is quite easy. According to Sherman et al., promoting consumption of traditional foods such as moose, beaver and partridge – foods accessed directly from the land instead of from a grocery store – may help improve overall health¹⁸. Restricted access to stores could be mitigated by the local health clinic carrying toothbrushes and toothpaste in larger quantities. Further, community-based initiatives that distribute healthy meals to families, as well as community gardens, could help address issues of access while promoting food security at the local level³⁶. Broader interventions aimed at improving access to grocery stores and health supply stores, as well as interventions to increase economic opportunities and ensure adequate housing, are essential components to the promotion of oral health³⁷.

The final theme identified a need for parental involvement in oral health initiatives. In particular, facilitating opportunities for parents to learn about oral health through outreach programs was suggested as a way to promote parents' own oral health as well as their children's. This could be facilitated through a newly developed parent–teacher association which aims to foster collaboration between parents and teachers. This type of support could help reinforce oral health behaviors and increase parental capacity. Other barriers to oral health included lack of role models and priorities that supersede oral health. A lack of positive role models may be particularly relevant for families in which parents are residential school survivors. Moving forward a generation, these parents may face challenges with caring for their own children given their own experience and lack of role models²¹. Outreach using incentive gifts, positive phone calls and newsletters may help improve engagement³⁸.

Following the tenets of CBPR, the activities created through this study drew directly from local culture and experience. The Eagles & Otters game incorporated an Aboriginal worldview that linked health with the local cultural environment^{21,22}. In Rapid Lake, connecting with the land is associated with general health and wellbeing¹⁷. Incorporating animals native to the land as symbols in the game promoted discussion and awareness amongst the children about the significance of these animals in local culture. The children demonstrated enhanced knowledge of oral health after playing the game, and showed a keen desire to engage in health-promoting activities; this enthusiasm concurs with findings from prior studies in the community^{17,18}. Similarly, the activity sheet with prize rewards was based upon local experience using prizes to motivate behavior change. This strategy had previously been found successful during an influenza vaccination campaign at the local clinic, resulting in the highest number of 'flu vaccinations in recent memory.

As with any study, there are limitations to be considered in interpreting the findings. First, while participants were community members chosen for their ability to speak about oral health experiences, their views do not necessarily represent those of the entire community. Second, because of a concurrent study in the community, it was not possible to work more directly with the maternal–child program. Prenatal women and their infants postpartum were therefore not directly involved in this study. Finally, the student researcher spent only 4 months in the community, which limited the level of rapport that could be established with research participants. Notwithstanding these limitations, this study has several strengths. Using CBPR, the authors were able to build upon a 5-year collaboration with Rapid Lake to promote oral health among local children as well as to develop capacity-building with parents, local community workers and the nursing student.

Conclusions

Through community-based participatory research, this study explored oral health and hygiene beliefs and practices among



children in Rapid Lake and developed culturally based activities for healthy engagement. The findings demonstrate that children can be actively engaged in oral health promoting activities, and that parents, essential to children's oral hygiene and health, need and seek outreach initiatives to help enhance their own capacity with their children. Systemic factors that affect oral health in the community, such as access to healthy foods and health supplies, stem from geographic isolation and limited income. While local interventions, such as the distribution of healthy meals or stocking the local clinics with toothbrushes, may help address some of these challenges, broader interventions addressing substance abuse, crowded housing, and land resources remain essential to enable the necessary conditions to promote and sustain oral health and overall community wellness.

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Appendix I: Sample questions for interviews with key informants and parents in focus groups

What does health and well-being mean to you?

Probe: Are Algonquin ideas about health different than other Aboriginal communities? Non-Aboriginal communities?

What is the current state of oral health in Rapid Lake?

In adults?

In children?

Probe: Would you consider it good? Fair? Poor? Why?

How has oral health status changed over time?

Probe: If it has changed, why? If not, why?

How are oral health and general health related?

Are primary teeth important? How & Why?

What are causes of good and bad oral health in children?

Probes: Foods, sugar? Hygiene – including tooth brushing? With fluoride? Dental visits? Family/peer oral health?

What are the barriers to better oral health?

Probes: e.g. food and nutrition (candy, soda pop); hygiene (lack of toothbrushes?); health care (dentists?)

What strategies could be used to promote oral health in children? At school? At home?

Probes: Songs? Games and contests? Supervised tooth-brushing? More healthy foods/less junk food? Peer or adult role models?



Appendix II: Sample questions for group interview with children

What are teeth?

Probes: How do they grow? What are primary teeth? What are adult teeth? Are teeth important to you? To your parents or grandparents? Why or why not?

Do you like your teeth? What do you like or not like about them?

Probe: Do your teeth ever hurt? Why?

How do you know if they are healthy or not?

Are primary teeth important? Are adult teeth important?

Why? How? Is there a person you know who has nice teeth? What do you like about their teeth?

Probe: Why do you think their teeth are so 'nice' – what makes them 'nice'? Do you think they do something to make their teeth look nice? Are nice teeth the same as healthy teeth? Is there a person you know who has teeth that are not nice/healthy? Why?

Do you know adults with missing teeth? When you grow up will you have missing teeth? Does this matter to you?

How do you think we can keep our teeth nice/healthy?

Probe: Brushing our teeth? Visiting the dentist? Eating healthy food?

Do you brush your teeth? When do you brush your teeth? At school? At home? What time of the day do you brush your teeth?

Do you like to eat candy or drink pop? How often? How does this affect your teeth?

Have you ever seen a dentist? If yes, what did they do? What did they say?

Can you help us take good care of your teeth? What could we do together that would help you take care of your teeth?

Probe: A contest with prizes for brushing your teeth? Making a song or video about keeping taking care of your teeth? Having friends who like to take care of their teeth? Having family that likes to take care of their teeth?

Appendix III: Eagles & Otters game

Eagle & Otter game rules

- 1) Make teams small and equal, if possible (e.g. for 16 kids, make 4 teams of 4)
- 2) Each team makes a line
- 3) The first person in Team 1 rolls the dice
 - a. If they roll 1 or 6, they move onto the board onto the number they rolled (1 or 6)
 - b. If they roll 2,3,4,5 they move to the back of the line of their team
- 4) The first person in Team 2 rolls the dice
 - a. If they roll 1 or 6, they move onto the board onto the number they rolled (1 or 6)
 - b. If they roll 2,3,4,5 they move to back of the line of their team
- 5) Repeat for the remaining teams
- 6) Rotate back to Team 1: the next person in line rolls the dice
 - a. If they roll 1 or 6, they move onto the board, onto the number they rolled (1 or 6)
 - b. If they roll 2,3,4,5: If one of their teammates is on the board, they can advance their teammate. Their teammate moves however many steps forward the number on the dice says. If there is more than one teammate on the board, THINK FIRST! Which one might slide down or fly up? The turn is then over and they move to the back of the line.
- 7) If you land on a square and someone is on it, you bump them off the board (the other person leaves the board and moves to the back of their line)
- 8) If you land on the tip of an otter, you slide down. If you land on an otter (but midway through the lines of otters, you do not slide down)
- 9) If you land on an eagle, you fly up
- 10) If you land on a question mark, choose a question. If you get it right, you move forward the number of squares marked on the card. If you get it wrong, you move back the number of steps marked
- 11) The game has 36 squares. You have to land exactly on 36 to win. For example, if you are on square 33 and you roll 4, you move three squares to 36, and then one square back to 35. You have to roll exactly the right number to get to 36



Sample questions & answers

Q: The most important time of the day to brush teeth is the morning.

A: False. It is at bed time. Because there is less saliva in your mouth, so your mouth will be dry, and any food will be left on your teeth and the germs can feed on any sugars left on your teeth overnight! The sugar bugs don't go to sleep at night!!!

Q: Baby teeth are important for adult teeth.

A: True. The baby teeth are important to help you chew, smile, feel good about yourself. Also, if you lose your baby teeth too early your adult teeth can grow in crooked. If you have lots of cavities in your baby teeth you are more likely to have them in your adult teeth.

Q: You can brush your teeth by yourself when you are 5 years old.

A: False. You need help from your parents to help you reach difficult places until you are 8! Ask a grown up to help you brush if you need help.

Appendix IV: Oral health calendar: 1-week example

Child Name: _____ Date: _____

Brush	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Day							
Night							

Colour in the tooth if you brush your teeth

Check box each day in the Week you do something on the list:

Floss Teeth

Drink Water instead of Pop

Eat Fresh/Canned Fruit (no sugar added)

Drink Milk

IF you eat or drink sweets for a special occasion:

Have them with a meal

Brush or Rinse mouth with water after

Use a straw for drinks