International Journal of Aquatic Research and Education

Volume 8 | Number 4 Article 6

11-1-2014

Using a Public Health Approach to Understand "Skipping" Snowmobiles in Pangnirtung, Nunavut, Canada

Audrey R. Giles
University of Ottawa, agiles@uottawa.ca

Meghan Lynch
University of Toronto

Gwenyth S. Stadig
University of New Brunswick

Michelle Doucette Issaluk
University of Ottawa

Francine Darroch
University of Ottawa

See next page for additional authors

Recommended Citation

Giles, Audrey R.; Lynch, Meghan; Stadig, Gwenyth S.; Doucette Issaluk, Michelle; Darroch, Francine; and Strachan, Shaelyn (2014) "Using a Public Health Approach to Understand "Skipping" Snowmobiles in Pangnirtung, Nunavut, Canada," *International Journal of Aquatic Research and Education*: Vol. 8 : No. 4 , Article 6.
DOI: 10.25035/ijare.08.04.06
Available at: https://scholarworks.bgsu.edu/ijare/vol8/iss4/6

Using a Public Health Approach to Understand “Skipping” Snowmobiles in Pangnirtung, Nunavut, Canada

Authors

Audrey R. Giles, Meghan Lynch, Gwenyth S. Stadig, Michelle Doucette Issaluk, Francine Darroch, and Shaelyn Strachan

International Journal of Aquatic Research and Education, 2014, 8, 351-367
http://dx.doi.org/10.1123/ijare.2014-0044

International Journal of
Aquatic Research and Education
www.IJARE-Journal.com
RESEARCH

Using a Public Health Approach to Understand "Skipping" Snowmobiles in Pangnirtung, Nunavut, Canada

Audrey R. Giles
University of Ottawa

Meghan Lynch
University of Toronto

Gwenyth Stadig
University of New Brunswick

Michelle Doucette Issaluk
University of Ottawa

Francine Darroch
University of Ottawa

Shaelyn Strachan
University of Manitoba

In this paper, we examine the phenomenon of "skipping" a snowmobile—that is, accelerating a snowmobile to speeds that allow the snowmobile and driver to "skip" across open bodies of water found between sheets of ice or ice and the shore. Though common in many northern communities, there is a paucity of literature that examines this risky practice. Given the high rate of unintentional injury among Inuit (Health Canada, 2001), it is particularly important to better understand the reasons why some Inuit engage in this health-risk behavior. Using focus groups and semistructured interviews with residents of Pangnirtung, Nunavut, we sought to understand who was skipping snowmobiles and why. Our results suggest that there are two forms of skipping: instrumental (i.e., necessary for travel on the land, especially while hunting) and recreational (i.e., for enjoyment). It is mainly adult male hunters who engage in instrumental skipping, while male adolescents and young adults are most likely to participate in skipping for recreational purposes. These findings can help to inform strategies that seek to reduce unintentional injuries and fatalities in northern communities, especially among Inuit.

Keywords: aquatic risk management; water safety

Aboriginal (First Nations, Inuit, and Métis) peoples drown at a disproportionately high rate in Canada (Canadian Red Cross, 2006; Health Canada, 2001). Though

Audrey R. Giles, Francine Darroch, and Michelle Doucette Issaluk are with the University of Ottawa, Ottawa, Ontario, Canada. Gwenyth Stadig is with the University of New Brunswick, Fredericton, New Brunswick, Canada. Meghan Lynch is with the University of Toronto, Toronto, Ontario, Canada. Shaelyn Strachan is with the University of Manitoba, Winnipeg, Manitoba, Canada. Address author correspondence to Audrey Giles at agiles@uottawa.ca.

Aboriginal groups account for approximately 3.8% of the Canadian population (Statistics Canada, 2010), they represent 26% of all snowmobile-related drownings, 10% of drownings during aquatic activities, and 9% of all boating-related drownings (Health Canada, 2001). Drowning rates are even higher in the Canadian North, which includes the Yukon, Nunavut, and the Northwest Territories (NWT; Canadian Red Cross, 2006). Despite substantial reductions in recent years in the drowning rate throughout the Territories, it remains 5–10 times the national average (Waldram et al., 2006).

In recent years, northern media (e.g., George, 2007; Halifax, 2003; Hunsley, 2005; *Northern News Services*, 2012; *Nunatsiaq News*, 2006a, 2006b; Windeyer, 2006) have reported stories pertaining to drowning deaths and accidents due to "skipping" snowmobiles across open water throughout Nunavut. Skipping refers to the practice of accelerating a snowmobile to speeds that allow the snowmobile and driver to skip (sometimes called "skim") across open bodies of water that exist between sheets of ice or between ice and the shore. To our knowledge, there is no academic literature that addresses skipping as a health-risk behavior or skipping practices in communities in the Canadian North. This study aims to address this gap through an investigation of skipping practices in Pangnirtung, Nunavut. Our results show that there are two forms of skipping: instrumental (i.e., necessary for travel on the land) and recreational (i.e., done for enjoyment). It is mainly adult male hunters who engage in instrumental skipping, while male adolescents and young adults are most likely to participate in skipping for recreational purposes. These findings can help to inform strategies that seek to reduce unintentional injuries and fatalities in northern communities, especially among Inuit.

Review of Literature

To situate our findings, we begin with an overview of the extant literature on health-risk behaviors, specifically as they relate to age, sex, and Aboriginal status.

The term health-risk refers to any threat to one's immediate or future health or wellbeing (Schulenberg & Maggs, 1999) and can include a range of activities such as abusing alcohol and drugs, having unsafe sex, or engaging in antisocial activities (Coleman & Hagell, 2007). Health-risk behaviors, which greatly impact rates of morbidity and mortality (Mokdad et al., 2003), are not evenly distributed throughout populations. As we outline below, rates are particularly high in youth, male, and Aboriginal populations.

Health-Risk Behavior and Age

While there is no universally accepted definition for the period of adolescence, in humans, it is generally agreed to range from 10–18 years of age (Boyer, 2006). Risk taking and novelty seeking behaviors are hallmarks of typical adolescent behavior (Kelley et al., 2004). But while the majority of adolescents participate in some degree of risk behavior, most adolescents do not participate in risk taking behavior past high school (Coleman & Hagell, 2007). Adolescence is "characterized by greater impulsivity and sensation seeking" (Husted et al., 2006, p. 210) and lack of introspection (Gibbons et al., 2008), which are due in part to biological immaturity of certain neural circuits in adolescents (Dahl, 2004; Husted et al.,

2006). Despite the fact that Michaud (2006) argued that adolescent risk behaviors should be classified as normal adolescent exploratory behavior, it is important to note that others have reported morbidity and mortality rates increase 200% during adolescence and even minimal participation in risk taking behavior yields negative health outcomes in youth (Dahl, 2004; Husted et al., 2006). Between adolescence and adulthood, however, risk taking declines due, at least in part, to "changes in the brain's cognitive control system–changes which improve individuals' capacity for self-regulation" (Steinberg, 2008, p. 78).

Health-Risk Behavior and Sex

According to Flynn et al. (1994), in general, "Men tend to judge risks as smaller and less problematic than do women" (p. 1101). Jakobsen & Karlsson (1996) found that qualitative research approaches can yield important information about what women and men perceive as risky. These authors found that women

> . . . were more oriented toward home and family, mainly perceiving risks as threats to their family and other persons with whom they had close relations, and to their home . . . Accident risks, health risks, and risk of death were often mentioned [by women]. Men's concerns were to a higher degree related to their working life. (p. 806)

Lower perception of risk is linked to increased risk-taking behaviors. In their meta-analysis of 150 studies that examined the risk-taking tendencies of males and females, Byrnes et al. (1999) found that male participants were more likely to take risks than female participants. The authors noted, however, that sex differences in risk taking varied by age and context; thus, male risk taking "does not seem to manifest itself in a simple or constant way across ages or contexts." Their analyses showed that men and boys "took more risks even when it was clear that it was a bad idea to take a risk" (p. 378). In contrast, for women and girls, "they seemed to be disinclined to take risks even in fairly innocuous situations or when it was a good idea to take a risk (e.g., intellectual risk taking on practice SATs)" (Byrnes et al., 1999, p. 378). Thus, there appear to be sex-based differences in risk perception and health-risk behaviors. While sex-based differences exercise an impact on health risk behavior, culture is also related.

Inuit and Unintentional Injury

According to hospitalization and mortality data, which are typically used to measure rates of severe injuries, Aboriginal peoples in Canada are at increased risk of unintentional injury than non-Aboriginal peoples (Gilbert et al., 2006; Harrop, Rollin, Ghali, & McArthur, 2007; Karmali et al., 2005). According to the Paul & Sobol (2011), in 2006 in Nunavut, the potential years of life lost due to unintentional injury was almost three times the Canadian rate (1766.0 per 100,000 vs. 605.3 per 100,000; Inuit vs. non-Inuit were not reported). Inuit youths' rates of unintended injury are of particular concern. The rate of unintentional injury hospitalizations among children and youth (0–19 years old) in high Inuit areas is more than twice that of non-Aboriginal areas (Oliver & Kohen, 2012). The age-standardized hospitalization rates due to unintentional injury for children and youth is 83.0 per 10,000 person

years in high Inuit areas versus 37.1 per 10,000 person years in non-Aboriginal areas (Oliver & Kohen, 2012). Inuit males (0–19 years old) are at much greater risk of unintentional injury than their female counterparts, with unintentional injury rates of 103.2 per 10,000 person years for males compared with 61.6 per 10,000 person years among females. Specific to water-related injuries and death, the rate of drowning among children and youth in high Inuit areas was three times greater than the rate in non-Aboriginal areas (1.7 vs. 0.6 per 10,000 person year; Oliver & Kohen, 2012).

Snowmobiling injury. Inuit in northern communities have the highest rates of unintentional injury and fatality, with snowmobile contributing in large part to these figures (Health Canada, 2001). Our attempt to obtain snowmobile injury statistics for Inuit in Nunavut was unsuccessful due to the territory's small population. As a result, it was necessary for us to collapse data from the Northwest Territories and Nunavut (for both Aboriginal and non-Aboriginal individuals) to obtain a large enough number of cases for the Canadian Institute of Health Information (CIHI) to report. According to data provided by CIHI, between April 1, 2004 and March 31, 2010, there were a total of 256 reportable snowmobile-related injuries in the NWT and Nunavut (Table 1).

It is important to note that these data are restricted to individuals who were hospitalized in the Northwest Territories and Nunavut or residents of these territories with a valid health card number from the NWT or Nunavut who were hospitalized elsewhere in Canada (e.g., injured person flown to Ottawa). Of the reportable cases, 82.8% (n = 197) of all documented snowmobile-related injuries occurred among males.

Males 10–19 years of age accounted for 15.1% of all snowmobile-related injuries. Among females, the most injuries occurred among women 10–19 years of age; they accounted for 39% (n = 16) of all documented injuries among females. Close to 30% (29.0%) of all snowmobile-related injuries occurred among individuals 20–29 years of age. Moreover, 61.3% of all injuries occurred among individuals between

Table 1 Breakdown by Age Group and Sex

Age group	Female no. of cases	Male no. of cases	Overall no. of cases
< 10	N/R	5	5
10–19	16	36	52
20–29	14	55	69
30–39	11	42	53
40–49	N/R	24	24
50–59	N/R	18	18
60–69	N/R	12	12
70–79	N/R	5	5
80+	0	N/R	0
Overall	41	197	238

Note. 18 cases were omitted from the totals due to nonreportable values. N/R = Nonreportable due to small cell sizes (< 5 cases).

the ages of 20–49. These statistics mirror nationwide data from 2009, where CIHI reported that 752 out of 1,126, or about two thirds, of serious snowmobile injuries occurred in adults ages 20–49 years. While the NWT and Nunavut data do not separate out Aboriginal vs. non-Aboriginal hospitalizations, they nevertheless help us to decipher patterns in snowmobile-related injury in Canada's north.

Given that skipping snowmobiles exposes the participant to both water-related injuries and snowmobile-related injuries and that Inuit, especially males, are particularly vulnerable to both, this health-risk behavior is especially concerning for Pangnirtung residents. Understanding who participates in such health-risk behavior and why is important for determining ways in which to reduce injuries and fatalities.

Conceptual Framework

Our research is guided by the assumption that most injuries are predictable and preventable (Safe Kids Canada, 2006). There are three categories of injury prevention: primary prevention, which focuses on the prevention of new injuries; secondary prevention, which focuses on the reduction of the severity of injuries; and tertiary prevention, which focuses on reducing the "frequency and severity of disability after an injury" (World Health Organization, p. 12). For the purposes of this paper, we will focus on only primary and secondary prevention. There are several different approaches to injury prevention; we situate our research within public health approaches. Public health approaches to injury prevention have resulted in a focus on not just the individual who is injured, but also the environmental context in which an injury occurred (Peden et al., 2008). Further, such approaches consider the potential for multiple causes of injury. As such, public health approaches are particularly useful for providing a holistic understanding of injury.

Mercy et al. (1993) developed a public health approach to injury prevention, though their work focused specifically on violence prevention. Since then, their approach has been refined by various authors. Here, we follow the World Health Organization's (WHO; 2008) recent articulation of the public health approach in the context of injury prevention. A public health approach to injury prevention can be divided into four steps: (1) surveillance, where researchers identify the problem, who participates in potentially injurious behaviors, and in what situation such behaviors occur; (2) risk factor identification, where the factors that increase the chances of a person being injured are identified; (3) an examination of the development and evaluation of interventions to identify what has worked in the past takes place; (4) the final stage includes the implementation of an injury prevention intervention (Peden et al., 2008). Step four is beyond the scope of our current research. In this paper, we focus on the first three steps.

We undertook research in Pangnirtung, Nunavut, to gain a deeper understanding of individuals' skipping practices and motivations for such behaviors and to respond to challenges posed by collapsing data from multiple northern communities.

Method

This paper emerged from a larger project that focused on a confluence of issues pertaining to water safety, traditional knowledge, and climate change in Pangnirtung, Nunavut, which is located on southeast Baffin Island (66° 05' N, 65° 45' W). Pang-

nirtung has a population of 1325, of which 1240 identify as Inuit (Statistics Canada 2010). Increasingly, Research Ethics Boards are recognizing the appropriateness of disclosing the names of participants who desire recognition for their contributions to academic work. As such, participants whose names appear do so with permission.

During the summer of 2008, the second author spent four months in the community. She used snowball sampling, a form of purposive sampling, to identify potential participants. That summer, she conducted semistructured interviews with seven male and nine female residents who ranged in age from 5–84. We employed interpreters to assist with interviews with unilingual Inuktitut speakers. All participants self-identified as Inuit. Through these interviews, we became aware of community members' concerns about individuals skipping snowmobiles. On subsequent visits to the community, we continued to collect data pertaining to this issue.

In November of 2008, the first, second, and sixth authors returned to Pangnirtung, where we conducted eight more semistructured interviews with three female Elders and two male Elders, and two young male adults and one young female adult. We also held three focus groups: One with three men and four women who ranged in age from their early 20s to mid-40s; one with four female and one male high school (secondary) students; and one with two boys and two girls who ranged in age from 11–14. In sum, 40 individuals (17 women and 23 men) participated in the data collection.

Following thematic analysis (Braun & Clarke, 2006), the first, second, and fifth authors read through all of the verbatim interview and focus group transcripts. We began with deductive coding, which involved examining the data based on codes related to the literature and the research question. As our study focused on a health-risk behavior, we used codes pertaining to who engaged in the behavior (sex, age), why they engaged in the behavior, with whom they engaged in the behavior (social environment), and where they engaged in the behavior (physical environment). We collapsed these codes into themes. In February of 2009, the first, second, and fourth authors returned to Pangnirtung to verify the initial findings of the thematic analysis (described below) with the interview and focus group participants.

Results

Below, we report the themes that emerged from our data. Specifically, we found that there were two kinds of skipping in which Pangnirtungmiut engaged: instrumental and recreational. We detail how each of these two themes was distinguished by a unique pattern of risk factors for participants related to age, sex, physical, and social environments for participation.

Risk Factors for Instrumental Skipping

Overall, there was a great deal of consensus among participants concerning risk factors for instrumental skipping.

Age. Participants unanimously described those who engaged in instrumental skipping as adults and Elders. According to one participant, "[Elders] do a small skip when they are out hunting." Another noted that Elders skip when "they have to cross the open ice . . . but they have no choice."

Sex. All participants who reported participating in instrumental skipping were male, with the exception of one female Elder, Elisapee Ishuluaq, who shared that she had skipped while hunting with her late husband.

Physical environment. Skipping is a necessary Inuit hunting practice in Pangnirtung, Nunavut. Elder hunter Levi Evic explained that during the winter there are occasions when the ice moves away from the main land and there is a need to cross over the water by snowmobile. Elder Mosesee Nakashuk noted that instrumental skipping is only done when the hunter has to skip to remain safe (i.e., to reach safety): "It wasn't just by choice for fun; I had to do it." Evic also reported that there is a great deal of risk-assessment that must happen to safely cross one snowmobile over the water:

> When the . . . gap [between pieces of ice] is narrow, it's usually just easy to cross with a snowmobile...We usually have to consider if this gap is too wide . . . to cross over, just considering the risk. If it's too risky, then it's common knowledge not to . . . try to cross over it, so [there's] awareness [of] if we should cross that gap.

Members of an adult focus group in Pangnirtung concurred. Elder Elisapee Ishulutaq stated, "[skipping's] dangerous and it shouldn't be used for recreational thing." In short, instrumental skipping is a last resort and used when needed to remain safe.

Social environment. As instrumental skipping occurs while hunting, the social environment typically consists of several other, typically male, hunters (anonymous).

Risk Factors for Recreational Skipping

Age. Participants indicated that those most likely to skip snowmobiles for recreation in Pangnirtung ranged in age from 15 years to late 20s. When asked directly, youth focus group participants unanimously agreed that skippers were "16, 15, or maybe early 20s" (youth focus group). According to young adult Henry Mike, people between "15 to 25 to 30 [skip]; grown-ups between 40 to 60 won't do that." All Elders who were interviewed noted that younger people are those who skip snowmobiles for recreational purposes. Young adult Jamie Qappik agreed that it is "mostly young people [who skip]." Participants in the adult focus group had similar beliefs and indicated that people ages 15–20 years were most likely to skip snowmobiles for recreational purposes. They further noted that the people who skip typically have less financial responsibility for the snowmobile and "don't think about how expensive the machine is." One anonymous adult focus group participant noted that the financial responsibility was the primary reason why he does not skip anymore, as he now financially supports himself and his family and could not justify potentially incurring the loss of an expensive machine. Elder Inusiq Nashalik argued that "older people tr[y] to let the younger people know about the dangers of skipping, but . . . there are . . . some people who don't listen and can't take things seriously." Focus group participants stated that numerous people had suffered injuries, including broken bones, and had lost their snowmobiles due to skipping. Skipping's popularity in Pangnirtung is perhaps best illustrated by one

adult focus group participant who noted, "there must be 10,000 skidoos down there [under the water]."

Sex. Participants indicated that male Pangnirtungmiut are most likely to skip snowmobiles in a recreational manner. Sim Akpalialuk noted, it is "just a macho thing–just a male thing." Young adult Henry Mike indicated, "I never noticed a girl [skipping]." Young adult Jamie Qappik concurred: "It's mostly boys, I think. Maybe some girls are interested in [skipping], but I've never really seen them." Further, young adult Emily Karpik reported, "The guys take more risks when it comes to snowmobiling . . . but sometimes they'll have their girlfriends or their friends . . . girls come along with them, but I say the drivers would probably be mostly the boys."

Thus, despite the fact that females have access to snowmobiles (Sim Akpalialuk), participants reported that girls and women either do not skip snowmobiles recreationally at all or at least do so very infrequently in Pangnirtung. In the youth focus group, all male participants disclosed personal involvement in recreational skipping, while none of the females did. The female youth focus group participants shared that they believe that girls do not skip because it is dangerous, they are scared, and "girls could get hypothermia and drown." Members of the adult focus group brought forth similar comments and indicated that women do not skip because it is frightening and is "not their thing." Some female participants did note, however, that they were impressed with males who skip. One noted, "It's awesome!"

Despite disapproval from Elders like Ishulutaq, in recent years, skipping has become a recreational activity of sorts. According to young adult Jamie Qappik, "a long time ago, it was all [done for] hunting . . . But right now, some [residents] just . . . skip water for fun." Young adult Henry Mike reported that many people currently skip their skidoos for enjoyment, despite being instructed by Elders only to engage in the activity in an emergency. Adult Sim Akpalialuk went so far as to call skipping a "new sport" in Pangnirtung, despite the fact that, "[skipping] is not something that we would endorse . . . using [Inuit] traditional values."

Physical environment. Youth focus group participants explained that skipping usually is done in groups at the ice floe edge, which is a "10 to 15 min drive away from this community," out of sight of parents and Elders (Henry Mike).

Social environment. Participants indicated that skipping typically takes place in a social setting with several people watching. Jamie Qappik stated that the people that skip at the floe edge are "trying to show off or something to their friends." Henry Mike further explained that when he skipped, he had not planned on doing so that day, but when he saw friends doing it he felt compelled to do it as well. Mike further noted that he had the right machine to do it: "We were driving an MXZ, which is a racing one."

Presenting oneself in a favorable light to members of one's peer group was another factor in the social environment that increased the likelihood that a person would skip. The majority of the youth and adult focus group participants expressed positive thoughts when they were asked to recall the first time they were exposed to someone skipping. One adult male participant shared that he thought it was "so cool!" When Henry Mike was first exposed to skipping, he wanted to try it to demonstrate that he "had the balls to do it." Elder Pauloosie Nakashuk believes young people skip to "show-off for other people." Such behavior did seem to impress

others, as participants in the youth focus group unanimously stated that "pretty cool people are skippers" and indicated three "big skippers" in town are treated as though they are celebrities. Adult Sim Akpalialuk noted,

> It's acceptable because it is a sport of some sort and it's something that a lot of young kids, I guess, [take] pride in because [though] this is something that many people would do in this world, very few are able to do this. It's not because it's doable . . . it's more because it takes guts.

According to members of the adult focus group, people skip because of the "adrenaline rush" they get from the activity. Sim Akpalialuk stated, "it draws a lot of adrenaline." Henry Mike shared that when he skips, "the adrenaline rush is crazy . . . it makes you start thinking what if you fall . . . And, like, what if you die and something like that? It gives you a pretty good adrenaline rush."

Participants indicated that the media, particularly from the Canadian South, has also influenced skipping practices. For instance, adult focus group participants shared that Pangnirtung youth see skipping on TV, DVDs, and the internet and that "TV definitely influences people to do it more." Elder Inusiq Nashalik stated that "[skipping's] all from…the white people . . . like, for instance, through the television." Jamie Qappik had not seen skipping on the internet, but had seen it on TV and argued that participation in skipping could be increased from "watching it from the internet or from the TV." According to some participants, Pangnirtung youths' increased exposure to the internet and southern media has increased their skipping behavior.

There was, however, some disagreement among participants regarding how much influence the internet and TV has had. For instance, young adult Emily Karpik did not believe that the internet and TV increased skipping. Henry Mike concurred with Karpik's perspective: "YouTube has not influenced [skipping] because people have been skipping [since] before [there was internet in Pangnirtung]." Thus, despite increased exposure to skipping through various forms of media, there are conflicting views on its impact on actual behavior.

Discussion

Our data suggest that skipping is a behavior that is quite common in Pangnirtung, yet used for two distinct purposes: instrumental skipping, where individuals skip their snowmobiles to avoid even riskier situations encountered while hunting, and skipping for recreation, where individuals deliberately set out to expose themselves to risk. The risk factors for these two forms of skipping also vary. Below, we use the public health approach to injury prevention, the broader literature on health-risk behaviors, and past and current injury prevention strategies aimed at snowmobiling more broadly and skipping in particular to suggest ways in which potential skipping-related injuries can be prevented or the severity decreased.

Understanding Skipping in the Arctic Context

The results from our research are interesting in that they show that the same risky behavior (i.e., skipping) can be both adaptive and maladaptive. According to Byrnes et al. (1999), risk taking is maladaptive whenever the "benefits of some activity

are far less likely to occur than the potential hazards. It is adaptive whenever the converse is true. In other words, people do not successfully adapt to their surroundings by avoiding all the risks they face" (p. 368). These authors further stressed that successful adaptation to one's surroundings occurs by engaging in some risks while avoiding others. Given the challenges of hunting and traveling in arctic environments, advising Pangnirtungmiut to avoid skipping altogether is unwise. As participants pointed out, it is sometimes necessary to skip while snowmobiling to avoid an even riskier situation, such as being stranded out on the ice or having to take an even riskier route. Such behavior differs markedly from deliberately seeking out recreational skipping opportunities, where one puts oneself in harm's way in such a way as to increase the health-risk to which one is exposed.

Risk Factors

Following the public health approach (WHO, 2008), we identified several key risk factors for participation in instrumental and recreational skipping. For instrumental skipping we identified the following risk factors: being an adult, male hunter and being in a physical environment where skipping was a necessary part of safe travel. Recreational skipping risk factors differed slightly: being an adolescent or young adult, being male, being in a physical environment with ice that allows for skipping, and being in a social environment with peers who endorse skipping all increased the likelihood of participating in this behavior.

Reports that older adolescents and young adults are the most likely to participate in recreational skipping align with existing literature on health-risk behavior and other motor vehicles. In a systematic review of existing evidence, Munro et al. (1995) found that rates of death and serious injury among car and motorcycle users increase and peak in the early 20s. Snowmobiling injury data from CIHI concerning residents of Nunavut and the NWT show that those in the 20–29 age range are most likely to sustain an unintentional injury that requires hospitalization. Injuries taper off for individuals who are 50 years of age and older. These data may suggest that individuals from different age groups are becoming injured under different circumstances (e.g., younger people may be injured in recreation-related circumstances, while older individuals may be injured in situations related to hunting); more detailed reporting of injuries would be required to ascertain this information.

Importantly, however, the CIHI data we obtained need to be treated with caution because they are from such an enormous geographic area. For example, Bell, Schuurman, Hameed, & Caron (2011) cautioned injuries can be far more concentrated than widespread. In fact, Bell et al.'s (2011) study of reserves in British Columbia revealed that two of the 487 reserves represented 20% of all injury morbidity events and 30% of all mortality events. Further, they found that "[f]ewer than 30% of all reserves . . . exhibited significantly higher incidence rates than the neighbouring non-reserve areas" (p. 398). Based on these findings, more detailed analyses that examine health-risk behaviors in specific Inuit communities are warranted.

By skipping for recreation or for instrumental reasons, especially when with peers, Inuit males are behaving in ways that are consistent with the literature on health-risk behaviors. Similarly, by reporting that they generally do not participate in skipping, Inuit females are also behaving in a manner that is consistent with

the literature. While it might seem intuitive or even self-evident that Inuit should behave in a manner consistent with their non-Inuit peers, the high rates of unintentional injury that require hospitalization in this population suggest that there may be important differences that still require attention. For example, they may be participating in such activities with higher frequency, they may be participating in multiple health-risk activities (Paxton 2005), they may be in riskier situations, and/or farther away from point of definitive care.

The social environment was reported to be a very compelling factor for engaging in recreational skipping, but did not seem to play a prominent role in instrumental skipping. Participants' reports that recreational skipping is "so cool," that well-known skippers are treated "like celebrities," that media give attention to skipping, and that one engages in skipping with peers, demonstrate that certain aspects of one's social environment can be risk factors for skipping, which is supported by research on other adolescent health-risk behaviors. According to Brechwald & Prinstein (2011) review of the literature over the past decade, researchers have consistently asserted that adolescents' attitudes and behaviors are remarkably similar to their friends' behaviors and attitudes. This phenomenon is characterized by the reciprocal relationship between peer selection (youth choose friends with like-minded attitudes and behaviors) and socialization (friends become more similar in attitudes and behaviors over time). Many studies that have focused on health-risk behaviors have concluded that adolescents engage in high status behavior that matches the social norms of a desired group to contribute to a favorable self-identity; this behavior is often reinforced by peers (Brechwald & Prinstein, 2011). Importantly, Gibbons et al. (2008) found that health is more of a social phenomenon for adolescents than adults, as youth "health-relevant behaviors are more likely to involve risk…*and* these behaviors are much more likely to take place in groups or social settings" (p. 50; emphasis in original). Thus, findings with non-Inuit adolescents that suggest that social constructs, such as peer influence, play significant roles in adolescents' engagement in health-risk behavior appear to also apply to Inuit adolescents and also young adults in Pangnirtung.

As we have a clear idea of who is participating in skipping and under what circumstances, we now turn our attention to the third stage of the public health approach: examining ways in which recreational skipping can be prevented and the ways in which those who continue to participate in recreational and instrumental skipping could reduce the potential harm of involvement in this activity.

Injury Prevention

According to the Canadian Collaborating Centre for Injury Prevention, "injury prevention means making positive choices about minimizing risk at all levels of society while maintaining healthy, active and safe communities and lifestyles" (para 13). Recent approaches to injury prevention have emphasized taking a broad approach to examining the injury event by focusing on the risk factors surrounding it instead of simply preaching caution or behavior change to individuals. Injury prevention typically focuses on the "three Es": *education* to change behavior choices, *enforcement* through the use of legal requirements, and *engineering*, which refers to environmental modification to "create safer surroundings and products"

(Christoffel & Gallager, 2006, p. 154). Here, we examine these three components in terms of snowmobiling more broadly and skipping in particular.

Education

The Canadian Council Snowmobile Organizations (CCSO; 2011) has argued that there is a link between raising safety awareness among snowmobilers and decreasing fatalities. The International Snowmobile Manufacturers' Association's "Safe Riders" program is a popular initiative that is focused on reducing snowmobiling injuries. The program promotes safe, responsible snowmobiling through a safety education campaign that includes a website, DVD, posters, decals, and public service announcements. Importantly, however, while the Safe Riders program does caution against taking snowmobiles on thin ice, it does not specifically warn against skipping. Educating snowmobilers about not only skipping's potential dangers, but also ways in which to enhance safety (such as ensuring the driver is aware of the speed at which s/he must safely travel for his/her given weight to remain afloat) could reduce potential harms.

While most provinces and territories have active snowmobile safety education websites that are hosted by provincial and territorial snowmobile associations and governments, we could not locate such a site for Nunavut. The nearest equivalent that we could identify was a one page document called "Outdoor Travel Tips" produced by the Government of Nunavut (n.d.) that addresses safe travel on the land more broadly and how to avoid and survive an emergency. While, certainly, most of the safety education information that appears on other territories' and provinces' websites (e.g., wear a helmet and survival suit, carry a first aid kit, avoid traveling alone, do not mix alcohol with snowmobiling) is applicable to Nunavummiut, having such information available in Inuktitut dialects might increase uptake (Kreuter et al., 2003). By specifically addressing health-risk behaviors such as skipping that are popular among Inuit, and particularly males, we might be better able to address the disproportionately high rate of unintentional injury that this population faces.

Enforcement

Currently, no uniform code of provincial or territorial law governs the use of snowmobiles by children and youth. In fact, in Nunavut, many regulations pertaining to snowmobiling are left up to each municipality's discretion. Nevertheless, a number of committees and organizations have all made similar recommendations for the creation and enforcement of certain regulations to prevent snowmobiling injuries. The Canadian Pediatric Society (CPS; 2012) has promoted the need to develop and enforce legislation relating to snowmobile safety and has advised that such legislation should be accompanied by public education programs. In addition to legislation, the CPS stated the need to not permit children under the age of 16 to drive snowmobiles or for snowmobile advertisements to be directed at audiences under 16 years of age. This recommendation—to not have youth under the age of 16 drive snowmobiles—is due to children and youth's lack of strength to safely maneuver these vehicles (Safe Kids Canada, 2010). While manufacturers have created child-sized snowmobiles, pediatric injury experts warn against the use of them

(Safe Kids Canada, 2010). These recommendations are in contrast to programs, such as the one by the Government of Ontario, where those are who twelve years of age and older can take an examination to obtain a snowmobiling license that allow individuals who do not yet have a driver's license to operate a snowmobile. Nevertheless, the CPS identified a lack of evidence to support the effectiveness of an operator safety certification, and it noted there is no research on its influence on snowmobile-related injuries suffered by people under the age of 16 years.

In Pangnirtung, a driver's license is not required to operate a snowmobile, but you must be age 16 to drive one. In Whitehorse, Yukon, a new bylaw (#2012 to 01) appears to engage with many of the aforementioned recommendations. The snowmobile bylaw requires snowmobile operators to be at least 16 years old, successfully complete a test to earn a Safe Snowmobiler Card, have a driver's license, insurance and registration, and wear a helmet (City of Whitehorse, 2013).

Though it may promote snowmobile safety in general, legislation in the form of Nunavut's Motor Vehicle Act or Whitehorse's snowmobile bylaw does not directly address skipping. Other jurisdictions have taken a much more direct approach to attempting to prevent skipping. In Wisconsin, for example, "[s]nowmobiles modified in any way to aid in over the water transportation are considered boats and must abide by all boating regulations. This would include the prohibition from operating at faster than slow-no-wake speed with 100 feet of shore. Water skipping events are exempt from these restrictions; however a local Water Exhibition permit is required" (Wisconsin Department of Natural Resources, 2011, p. 23). In Iowa, driving snowmobiles on the surface of any public water is a crime (though this does not apply on rivers and streams between Nov. 1—April 1; Iowa Department of Natural Resources, 2012). As such, there is a wide variety of enforcement options available for attempting to reduce injuries related to skipping.

Engineering

The final approach to injury prevention, engineering, has yielded some interesting efforts to reduce snowmobile injuries, fatalities, and the loss of snowmobiles themselves. John Weinel (2002), for example, has obtained a United States patent (#6347970) for a "deployable recovery system for snowmobile and rider." If the system detects that the snowmobile is submerging in water, a bladder will rapidly inflate: "the float acts as a recovery device for retrieving the snowmobile and a rescue device for the rider to climb up on" (Patent Lens, 2012, para. 2). The engineering of helmets (Soininen & Hantula, 1992) and survival suits (Hayward, 1984; Hayward & Eckerson, 1984) can also make important contributions to injury prevention.

Recommendations

Based on the above findings and the extant literature, it is clear that there are ways in which skipping-related injury prevention can be promoted. Importantly, their examination of adolescents' health-risk behaviors in California, Mistry et al. (2009) argued that injury prevention efforts need to be specifically tailored to address gender and ethnicity. In other words, the one size fits all approach to injury prevention will be met with limited success. Further, it is important to contextual-

ize injury prevention within the broader sociohistorical context in which Inuit live. Giles, Brooks Cleator, McGuire-Adams, and Darroch (2014) argued that Aboriginal peoples in Canada are at greater risk of aquatic-based injury due to the failure to attend to the social determinants of Aboriginal peoples' health (e.g., colonialism, lack of investment in education, poor access to health care, poverty, etc.). Without addressing the broader determinants of health in concert with the suggestions we make below, it is unlikely that meaningful change will occur.

To effectively reduce skipping in Pangnirtung, Nunavut, we have several suggestions:

- Ensure that the Government of Nunavut and/or the Nunavut Snowmobiling Association has a presence on the internet so that it can communicate relevant information to residents.
- Ensure that information is available in Inuktitut dialects.
- Educate residents of the risks associated with recreational and instrumental skipping and the ways in which these risks can be reduced.
- Ensure that educational materials feature those who are most likely to participate in the health-risk behavior (e.g., Inuit male adolescents and young adults).
- Consider revising the enforcement or enactment of snowmobile-related regulations, especially pertaining to age and training.
- Ensure that snowmobilers are familiar with basic water safety survival skills.
- Support the advancement of snowmobile engineering.
- Encourage women to discourage men's participation in unsafe snowmobiling practices.
- Use a community-based approach to develop snowmobile safety/antirecreational skipping messages.
- Make safety equipment readily available in areas known to be popular for skipping.

Conclusions

An important nuance revealed in our study by examining skipping through a public health lens is that in some cases, skipping snowmobiles is a health-risk (such as in recreational skipping), whereas in other cases, it is an injury prevention technique (such as in instrumental skipping). Further, it is possible that skills developed through recreational skipping could have a protective influence on adolescent Inuit males who hunt as adults. As a result, simply promoting a blanket reduction in skipping may have the paradoxical effect of putting Pangnirtungmiut and others who skip at enhanced risk of injury.

Current approaches to snowmobile safety, such as the Safe Riders Program and Whitehorse's Snowmobile Act, do not address the risks to which many northern residents are exposed/to which northern residents deliberately expose themselves while skipping nor the reasons for why they do so. As a result of our findings, we argue that ensuring that injury prevention campaigns address not only the three Es (education, enforcement, and engineering), but also the complex yet important roles that age, sex, location, and social environment play in influencing skipping behavior will make an important contribution to better addressing skipping in the northern context.

References

Bell, N., Schuurman, N., Hameed, M.S., & Caron, N. (2011). Are we homogenising risk factors for public health surveillance? Variability in severe injuries on First Nations reserves in British Columbia, 2001-5. *Injury Prevention, 17,* 394–400. PubMed doi:10.1136/ip.2010.030866

Brechwald, W.A., & Prinstein, M.J. (2011). (2011). Beyond homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence, 21*(1), 166–179. PubMed doi:10.1111/j.1532-7795.2010.00721.x

Boyer, T.W. (2006). The development of risk-taking: A multi-perspective review. *Developmental Review, 26,* 291–345. doi:10.1016/j.dr.2006.05.002

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3,* 77–101. doi:10.1191/1478088706qp063oa

Byrnes, J.P., Miller, D.C., & Schafer, W.D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin, 125,* 367–383. doi:10.1037/0033-2909.125.3.367

Canadian Council of Snowmobile Organizations. (2011). Safe Riders! You make snowmobiling safe. Retrieved from http://www.ccso-ccom.ca/saferidr.html

Canadian Paediatric Society. (2012). Are We Doing Enough? Retrieved from http://www.cps.ca/english/advocacy/StatusReport2012.pdf

Canadian Red Cross. (2006) Drownings and other water-related injuries in Canada: 10 years *of research*. Ottawa, Canada: Author. City of Whitehorse. (2012). *Snowmobile bylaw #2012-01*. Retrieved from http://www.city.whitehorse.yk.ca

Christoffel, T., & Gallager, S.S. (2006). *Injury prevention and public health: Practical knowledge, skills and strategies* (2nd ed.). Sudbury, MA: Jones and Bartlett.

City of Whitehorse. (2013). BYLAW 2012-01 A bylaw to regulate the control, use and operation of snowmobiles on motorized multiple use trails and in other areas of the City of Whitehorse. Whitehorse, Canada: City of Whitehorse.

Coleman, J., & Hagell, A. (2007). *Adolescence, risk and resilience: against the odds*. Hoboken, NJ: J. Wiley & Sons.

Dahl, R.E. (2004). Adolescent brain development: A period of vulnerabilities and opportunities. Keynote address. *Annals of the New York Academy of Sciences, 1021,* 1–22. PubMed doi:10.1196/annals.1308.001

Flynn, J., Slovic, P., & Mertz, C.K. (1994). Gender, race, and perception of environmental health risks. *Risk Analysis, 14*(6), 1101–1108. PubMed doi:10.1111/j.1539-6924.1994.tb00082.x

George, J. (2007, July 13). Kugluktuk man drowns in watercross race. *Nunatsiaq News*. Retrieved from http://www.nunatsiaqonline.ca/archives/2007/707/70713/news/nunavut/70713_313.html

Gibbons, F.X., Gerrand, M., Reimer, R.A., & Pomery, E.A. (2008). Unintentional behavior: A subrational approach to health risk. In D. de Ridder & J. de Wit (Eds.), *Self-regulation in health behavior* (pp. 45–70). West Sussex, England: John Wiley & Sons. doi:10.1002/9780470713150.ch3

Gilbert, M., Dawar, M., & Armour, R. (2006). Fire-related deaths among Aboriginal people in British Columbia, 1991-2001. *Canadian Journal of Public Health, 97,* 300–304. PubMed

Giles, A.R., Brooks Cleator, L., McGuire-Adams, T., & Darroch, F.C. (2014).Drowning in the social determinants of health: Understanding policy's role in high rates of drowning in Aboriginal communities in Canada. *Aboriginal Policy Studies, 3,* 198–213. doi:10.5663/aps.v311-2.21706

Government of Nunavut. (n. d.). *Outdoor travel tips*. Retrieved from http://cgs.gov.nu.ca/PDF/Outdoor%20Travel%20Tips.pdf

Halifax, T. (2003, May 19).Brains on ice. *Inuvik Drum.* Retrieved from http://www.nnsl.com/frames/newspapers/2003-05/may19_03edit.html

Harrop, A.R., Rollin, B.F., Ghali, W.A., & McArthur, C. (2007). Injury mortality rates in native and non-native children: A population-based study. *Public Health Reports, 122*(3), 339–346. PubMed

Hayward, J.S. (1984). Thermal protection performance of survival suits in ice-water. *Aviation, Space, and Environmental Medicine, 55*(3), 212–215. PubMed

Health Canada. (2001). *Unintentional and Intentional Injury Profile for Aboriginal People in Canada, 1990-1999*. Ottawa, Canada: Health Canada.

Hunsley, C. (2005, May 23). Stupid stunts. *Northern News Services*. Retrieved from http://www.nnsl.com/frames/newspapers/2005-05/may23_05ss.html

Husted, D.S., Gold, M.S., Pineda, K.F., Ferguson, M.A., Yang, M.C.K., & Shapira, N.A. (2006). Is speeding a form of gambling in adolescents? *Journal of Gambling Studies, 22*(2), 209–219. PubMed doi:10.1007/s10899-006-9011-y

Iowa Department of Natural Resources. (2012). *Iowa snowmobile reference guide*. Des Moines, IA: Author.

Jakobsen, L., & Karlsson, J. C. (1996)."Vardagsuppfattningar inom riskomradet." *Risk och hot i* den svenska vardagen: Alltfrdn Tjernobyl till skuren sds, 9-15.

Karmali, S., Laupland, K., Harrop, A.R., Findlay, C., Kirkpatrick, A., Winston, B., . . . Hameed, M. (2005). Epidemiology of severe trauma among status Aboriginal Canadians: A population-based study. *Canadian Medical Association Journal*, *172*, 1007–1011. doi:10.1503/cmaj.1040432

Kelley, A.E., Schochet, T., & Landry, C.F. (2004). Risk taking and novelty seeking in adolescence: Introduction to part I. *Annals of the New York Academy of Sciences, 1021,* 27–32. PubMed doi:10.1196/annals.1308.003

Kreuter, M.W., Lukwago, S., Bucholtz, D., Clark, E., & Sanders-Thompson, V. (2003). Achieving cultural appropriateness in health promotion programs: targeted and tailored approaches. *Health Education & Behavior, 30*(2), 133–146. PubMed doi:10.1177/1090198102251021

Mercy, J.A., Rosenberg, M.L., Powell, K.E., Broome, C.V., & Roper, W.L. (1993). Public health policy for preventing violence. *Health Affairs, 12,* 7–29. PubMed doi:10.1377/hlthaff.12.4.7

Michaud, P.A. (2006). Adolescents and risks: Why not change our paradigm? *The Journal of Adolescent Health, 38*(5), 481–483. PubMed doi:10.1016/j.jadohealth.2006.03.003

Mistry, R., McCarthy, W.J., Antronette, K., Yancey Lu, Y., & Patel, M. (2009). Resiliance and patterns of health risk behaviors in California adolescents. *Preventive Medicine, 48*(3), 291–297. PubMed doi:10.1016/j.ypmed.2008.12.013

Mokdad, A.H., Ford, E.S., Bowman, B.A., Dietz, W.H., Vinicor, F., Bales, V.S., & Markus, J.S. (2003). Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. *Journal of the American Medical Association, 289,* 76–79 10.1001/jama.289.1.76. PubMed

Munro, J., Coleman, P., Nicholl, J., Harper, R., Kent, G., & Wild, D. (1995). Can we prevent accidental injury to adolescents? A systematic review of the evidence. *Injury Prevention, 1,* 249–255. PubMed doi:10.1136/ip.1.4.249

Northern News Services. (2012, Oct. 22). Briefs. Retrieved from http://www.nnsl.com/frames/newspapers/2012-10/oct22_12briefs.html

Nunatsiaq News. (2006a, June 2). Briefs. *Nunatsiaq News*. Retrieved from http://www.nunatsiaqonline.ca/archives/60602/news/nunavut/briefs.html

Nunatsiaq News. (2006b, June 23). Two drown while water-skipping snowmobiles. *Nunatsiaq News*. Retrieved from http://www.nunatsiaqonline.ca/stories/article/two_drown_while_water-skipping_snowmobiles/

Oliver, L.N., & Kohen, D. (2012). Unintentional injury hospitalizations among children and youth in areas with a high percentage of Aboriginal identity residents: 2001/2002 to 2005/2006. *Health Reports, 23*(3), 7–15. PubMed

Patent Lens. (2012). Deployable recovery system for snowmobile and rider. Retrieved from http://www.patentlens.net/patentlens/patents.html?patnums=US_6347970&language=&patnum=US_6347970&language=en&query=&stemming=&pid=p0

Paul, T.B., & Sobol, I. (2011). *Nunavut report on comparable health indicators*. Iqaluit, Canada: Government of Nunavut.

Paxton, R.J. (2005). Associations between depressed mood and clusters of health risk behaviors: Results from a national sample of high school adolescents. University of South Carolina. ProQuest Dissertations and Theses, Retrieved from http://search.proquest.com/docview/305419674?accountid=14701

Peden, M., Ovegbite, K., Ozanne-Smith, J., Hyder, A.A., Branche, C., Rahman, A.K.M.F., Rivara, F., & Bartolomeos, K. (2008). *World report on child injury prevention.* Geneva, Switzerland: World Health Organization.

Safe Kids Canada. (2006). *Child & youth unintentional injury: 10 years in review 1994-2003*. Toronto, Canada: Author.

Safe Kids Canada. (2010). Snowmobiles. Available at: http://www.safekidscanada.ca/Parents/Safety-Information/Winter-Safety/Snowmobiles/Snowmobiles.aspx

Schulenberg, J., & Maggs, J. (1999). *Health risks and developmental transitions during adolescence*. New York, NY: Cambridge University Press.

Soininen, L., & Hantula, L. (1992). Snowmobile accidents in Lapland. *Arctic Medical Research, 51*(Suppl 7), 64–70. PubMed

Steinberg, L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review, 28,* 78–106. PubMed doi:10.1016/j.dr.2007.08.002

Statistics Canada. (2010). *2006 Census of Canada highlight tables:* Aboriginal identity population by age groups, median age and sex, 2006 counts for both sexes, for Canada, provinces and territories - 20% sample data. Retrieved from: http://www12.statcan.ca/census-recensement/2006/dp-pd/hlt/97-558/pages/page.cfm?Lang=E&Geo=PR&Code=01&Table=1&Data=Count&Sex=1&Age=1&StartRec=1&Sort=5&Display=Page&CSDFilter=250

Waldram, J.B., Herring, A., & Young, T.K. (2006). *Aboriginal health in Canada: historical, cultural, and epidemiological perspectives* (2nd ed.). Toronto: University of Toronto Press.

Weinel, J.T. (2002). U.S. Patent No. 6,347,970. Washington, DC: U.S. Patent and Trademark Office.

Windeyer, C. (2006, June 19). Spring hunts tinged with tragedy. *Northern News Services*. Retrieved from http://www.nnsl.com/frames/newspapers/2006-06/jun19_06ded2.html

Wisconsin Department of Natural Resources. (2011). *Wisconsin snowmobile laws*. Madison, WI: Author.

World Health Organization. (2008). *World report on child injury prevention.* Geneva, Switzerland: Author.