

## Climate change and mental health: an exploratory case study from Rigolet, Nunatsiavut, Canada

Ashlee Cunsolo Willox · Sherilee L. Harper ·  
James D. Ford · Victoria L. Edge · Karen Landman ·  
Karen Houle · Sarah Blake · Charlotte Wolfrey

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**Abstract** As the impacts from anthropogenic climate change are increasing globally, people are experiencing dramatic shifts in weather, temperature, wildlife and vegetation patterns, and water and food quality and availability. These changes impact human health and well-being, and resultantly, climate change has been identified as the biggest global health threat of the 21st Century. Recently, research is beginning to indicate that changes in climate, and the subsequent disruption to the social, economic, and environmental determinants of health, may cause increased incidences and prevalence of mental health issues, emotional responses, and large-scale sociopsychological changes. Through a multi-year, community-led, exploratory case study conducted in Rigolet, Nunatsiavut, Labrador, Canada, this research qualitatively explores the impacts of climate change on mental health and well-being in an Inuit context. Drawing from 67 in-depth interviews conducted between January 2010 and October 2010 with community members and local and regional health professionals, participants reported that changes in weather, snow and ice stability and extent, and wildlife and vegetation patterns attributed to climate change were negatively impacting mental health and well-being due to disruptions in land-based activities and a loss of place-based solace and cultural identity. Participants reported that changes in climate and environment increased family stress, enhanced the possibility of increased drug and alcohol usage, amplified previous traumas and mental health stressors, and were implicated in increased potential for suicide ideation. While a preliminary case study, these exploratory findings indicate that climate change is becoming an additional mental health stressor for resource-dependent communities and provide a baseline for further research.

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A. Cunsolo Willox (✉)  
Cape Breton University, Sydney, Nova Scotia, Canada  
e-mail: ashlee\_cunsolowilox@cbu.ca

S. L. Harper · V. L. Edge · K. Landman · K. Houle  
University of Guelph, Guelph, Ontario, Canada

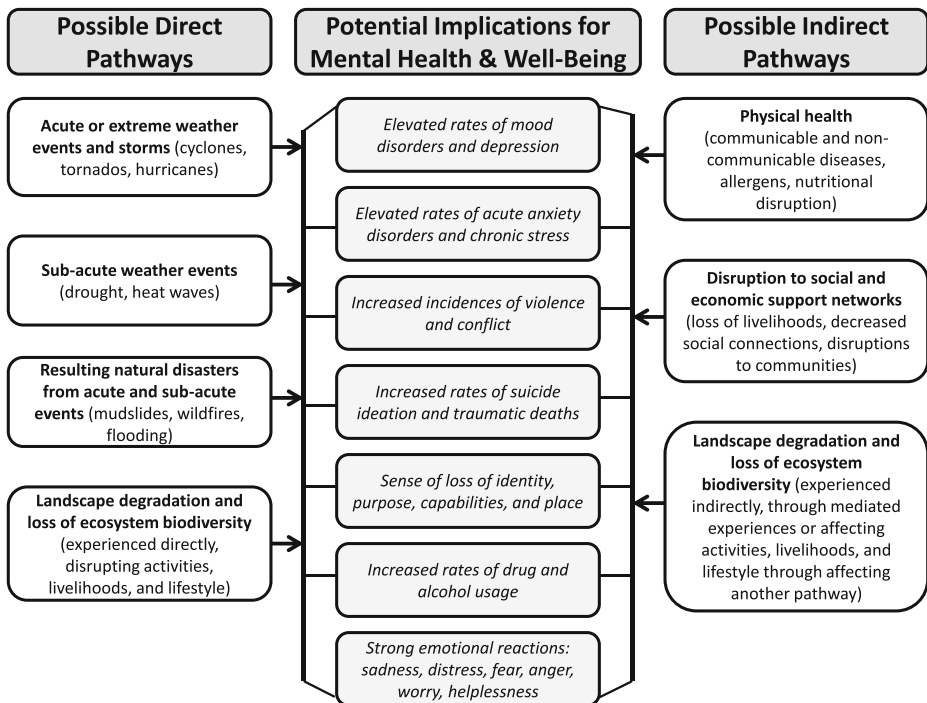
J. D. Ford  
McGill University, Montreal, Quebec, Canada

S. Blake · C. Wolfrey  
Rigolet Inuit Community Government, Rigolet, Nunatsiavut, Labrador, Canada

## 1 Introduction

Anthropogenic climate change and variability have become an increasing international concern, as peoples globally are experiencing dramatic shifts in climate and environment (Füssel 2009; IPCC 2007a, b). These changes are currently being experienced most acutely in the Polar Regions, and by Northern residents such as the Canadian Inuit, with evidence documenting increased seasonal temperatures, dramatic decreases in sea ice thickness and extent, decreased multi-year pack ice, warming permafrost, rising sea levels, fluctuations in weather patterns, changes in flora and fauna patterns in the regions (Ford et al. 2010b, 2012; Füssel 2009; IPCC 2007a, b; Prowse et al. 2009a, b). Records have indicated a 5 °C increase in annual atmospheric temperature throughout the 20th Century, with an annual temperature increase of approximately 1 °C per decade in the North (IPCC 2007b). In September 2012, sea ice extent declined by almost 50 % when compared to the 1979–2000 average, representing the lowest coverage on record (NSIDC 2012).

Increasingly, it is also being recognized that climatic and environmental change and variability may potentially pose challenges for mental health and well-being, with research beginning to indicate that mental health issues possibly linked to changes and variability in climate are emerging globally through both direct and indirect impacts (Berry et al 2010, 2011; Cunsolo Willox et al 2012, 2013; Speldevinde et al. 2009) (Fig. 1). According to the American Psychological Association Task Force on the Interface between Psychology and Climate Change (Swim et al. 2010), these climate-change-related mental health impacts are



**Fig. 1** A list of the direct and indirect impacts of climate change and variability on mental health and well-being (Berry et al. 2010, 2011; Doherty and Clayton 2011; Fritze et al. 2008; Rigby et al. 2011; Swim et al. 2010, 2011)

anticipated to be profound, cumulative, and widespread (Swim et al. 2010), and experienced first and most acutely by those with pre-existing mental illnesses or issues, marginalized populations, communities who rely most closely on the local ecosystems, and areas most susceptible to climatic changes and variability (Berry 2009; Doherty and Clayton 2011; Fritze et al. 2008; Swim et al. 2010, 2011).

To date, there has been very little research conducted in this area, with most of the work emerging from Northern Australia in relationship to long-term drought (Berry et al. 2010, 2011; Dean and Stain 2010; Polain et al. 2011; Rigby et al. 2011). Yet, Inuit throughout Canada's North are currently experiencing rapid changes in their environment and are beginning to identify emerging mental health challenges related to alterations in snow, ice, seasonal temperatures, and wildlife and vegetation (Cunsolo Willox et al. 2012, 2013). In order to begin to address this gap in research, and drawing upon a community case study from the Inuit community of Rigolet, Nunatsiavut, Labrador, Canada, which gathered data from residents and regional health professionals, this article identifies and examines some of the ways in which climate change and variability impacted the mental health and well-being of Inuit from Rigolet, as self-reported by research participants. This research stands as a preliminary scoping study exploring the connections between climate change and mental health from the lived experiences of people in one community in Northern Labrador; as such, it offers potential insights and baseline data to support further research on the impacts of climate change on mental health for Inuit populations not only in Canada, but also throughout the Circumpolar North.

## 2 Research context: Canada's Inuit populations

Inuit have been living in Canada's Northern regions for thousands of years, practicing a nomadic and subsistence-based lifestyle intimately connected to the natural environment for food and shelter (Inuit Tapiriit Kanatami 2012). In the 1700s, European traders, whalers, and missionaries arrived in Northern Canada, and began a period of regular contact with the Inuit. Since this contact period, Inuit communities throughout Canada have experienced rapid socio-cultural transformation, with the largest transitions occurring over the last 60 years. While not all of these changes have been negative, many have, including: forced community resettlement and mandatory relocation from traditional homelands; sedentarization; land dispossession; a history of residential school attendance and the removal of children from their communities; loss of language; and systematic spiritual and cultural assimilation from the presence of missionaries (Kirmayer et al. 2000; Procter et al. 2012; Richmond 2009; Richmond and Ross 2009).

Today, there are approximately 55,000 Inuit in Canada, representing 4 % of Canada's Aboriginal population, and with approximately 50 % of the population under the age of 25 (Statistics Canada 2007). The majority of Inuit live in 53 communities spread throughout the four Inuit regions of Canada: the Inuvialuit Settlement Region, Nunavut, Nunavik, and Nunatsiavut. These communities are diverse in geography, language dialects, values, perspectives, and traditional practices, yet continue to foster vibrant and rich cultural practices and rely on the land for sustenance, livelihoods, cultural identity, and well-being (Kirmayer et al. 2000).

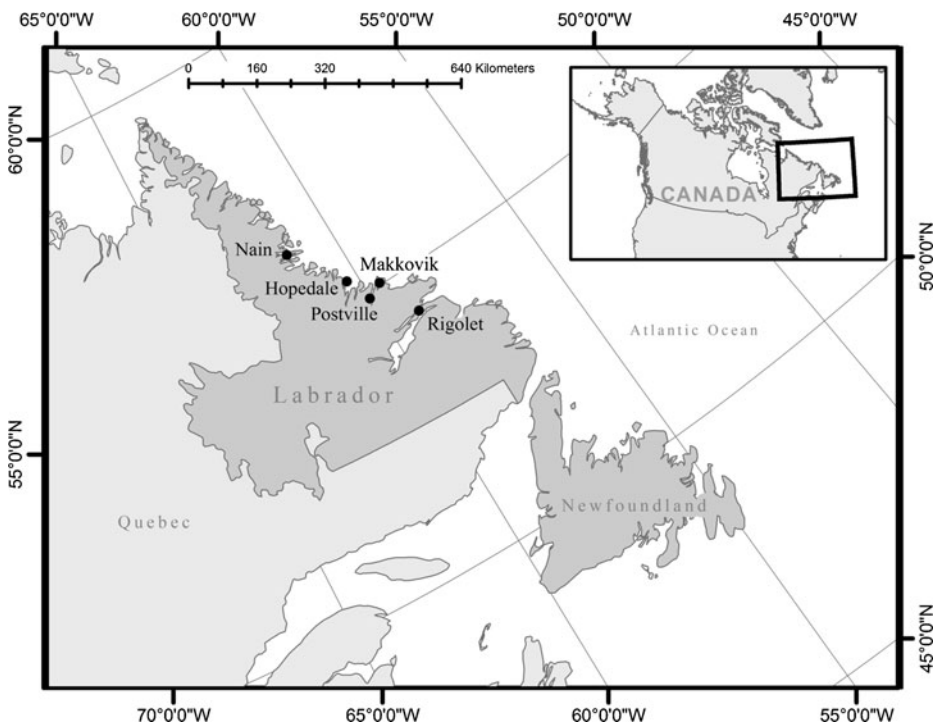
### 2.1 Study location: Rigolet, Nunatsiavut, Labrador, Canada

The region of Nunatsiavut in Labrador, Canada was established in 2005 from the Labrador Inuit Land Claims Agreement. Rigolet (54°N, 58°W), the centre for this research, is the southern-most Inuit community in the world and one of five communities in Nunatsiavut,

along with Nain, Hopedale, Postville, and Makkovik (Fig. 2). At the time of this study, Rigolet had a population of 259, 95 % of whom identify as Aboriginal. The population is comprised of approximately equal numbers of men and women, with 40 % of the population under the age of 25 (Statistics Canada 2007). The first language spoken in the community is English (Statistics Canada 2007). The Rigolet dialect of Inuitut is considered endangered, as there are only three known speakers left. Rigolet is working to reinvigorate the language among the youth populations through school curriculums and extra-curricular learning opportunities.

There are no roads connecting the town to other areas. Travel is via ferry and boat during the summer months, snowmobile on snow and ice throughout the winter months, and airplane travel throughout the entire year. Each of these forms of transportation is weather dependent, and access to these communities—whether for travel, supplies, or medical needs—is often disrupted due to poor weather conditions, such as fog, high winds, and storms.

The land and land-centred activities such as hunting, fishing, trapping, foraging, and travelling to family cabins are considered by the residents in Rigolet to be integral to Inuit culture, identity, and spirituality, and the majority of people continue to spend considerable time harvesting. These activities are also highly weather dependent, and rely on the presence of stable, thick, and extensive ice and snow conditions throughout 7 to 8 months of the year. As with other Inuit communities across Canada, Rigolet is a highly-adaptable, resilient, and vibrant community, focused on community cohesion and health, cultural protection and promotion, and finding ways to actively adapt to changes in climate and environment through community-led research initiatives and adaptation strategies.



**Fig. 2** A map of the Nunatsiavut region of Northern Labrador, Canada, and the five communities within: Nain, Hopedale, Postville, Makkovik, and Rigolet

## 2.2 Inuit mental health

For the purposes of this article, mental health is understood to “cover a broad territory that includes well-being, everyday problems in living associated with bodily symptoms of stress and anxiety, mild depression, and seasonal fluctuations in mood and energy, as well as more severe psychiatric disorders, such as major depression, bipolar disorder, schizophrenia, and other psychotic disorders” (Kirmayer and Valaskakis 2007, xiv; c.f. Kirmayer et al. 2009b, 14). Inuit identity, conceptions of the self, and mental wellness is directly and intimately linked to the environment, and to the ability to hunt, trap, fish, forage, and travel on the land and continue to practice cultural traditions related to being ‘on the land’ (Kirmayer et al. 2009a; Stairs and Wenzel 1992). This understanding of the importance of land and land-based activities to mental health highlights the connections between individuals and place and to the resources and lifestyle that the land provides for well-being and for strong mental health (Kirmayer et al. 2009a). Going ‘on the land’ and participating in land-based activities such as hunting and travelling to cabin, is, therefore, key to Inuit mental health (Kirmayer et al. 2009a).

Mental health in Canada’s Inuit communities is also mediated by many complex and overlapping factors: the strength and availability of social support networks; economic stability; physical health; kinship bonds; cultural practices; previous historical events; access to mental health resources; ability to participate in hunting, fishing, foraging, trapping, and travelling for sustenance and livelihoods; availability of housing; access to education; quality of early life; sense of belonging and self-worth; food security; adaptability and resilience; and previous mental health challenges (Kirmayer et al. 2009a). In addition, experiences with forced relocation from homelands, residential schooling, loss of cultural activities and traditions, decreased socio-political power and status, and higher-than-average suicide and addictions levels when compared to non-Inuit Canadian averages, all combine to increase mental health risk factors and susceptibility within communities (Kirmayer et al. 2009a, b; Lehti et al. 2009). Despite these challenges, and the associated endemic mental health issues, Inuit across Canada have continued to demonstrate strength and resilience of culture, community, and spirit (Kirmayer et al. 2009a, b, 2011).

## 3 Study background and methods

In 2009, the Rigolet Inuit Community Government was awarded funding to conduct a multi-year, community-based, and community-directed research project dedicated to examining the impacts of climate change on Inuit health and well-being. The *Changing Climate, Changing Health, Changing Stories* research team was led by the Rigolet Inuit Community Government and was comprised of Inuit and non-Inuit researchers, from social and health sciences backgrounds, and engaged local, regional, and federal stakeholders and decision-makers throughout the research process (please see Harper et al. 2012 for a detailed description of the *Changing Climate* project, underlying philosophies, and team composition). Community engagement and active participation were considered essential throughout all stages of the research process, including publication (Harper et al. 2012). A case study approach (Stake 2005) was selected for this research, given this framework’s ability to deeply analyze topics or themes in a locally-appropriate manner and for its ability to access place-based knowledge and wisdom—an attribute that has been identified as particularly important for climate change research (Ford et al. 2010a).

### 3.1 Data-gathering methods

Data for this article were drawn from 67 in-depth interviews (40 females, 27 males) with individuals from all ages (9 to over 80 years old) and a variety of backgrounds (hunters, trappers, teachers, craftspersons, youth, Elders, parents, grandparents, business owners, and government officials). Participants were primarily from Rigolet ( $n=61$ ), but interviews were also conducted with community-based health workers and Nunatsiavut Government health professionals ( $n=6$ ) to gain a broader regional perspective, specifically from a mental health perspective. This research was advertised extensively by the community research assistants through open houses and information nights, posters, mailbox flyers, and radio announcements. Research activities were also advertised by members of the community government and an on-going presence in the community by the local research members and regular visits by the non-Inuit team members.<sup>1</sup>

A random sample was not attempted; rather, the research team interviewed as many people as possible to ensure a wide-ranging sample of voices, experiences, and perspectives. In many cases, people were invited to participate based on their experiences with hunting, trapping, or travelling on the land, or due to their positions within the region as health professionals; that said, interviews were open to any interested individuals in the community.

To gather data during different seasons, interviews were conducted over a 10-month period during four main data-gathering points: January/February, March, August, and September/October 2010 (with pretesting in November 2009). The interviews averaged 60 min in duration, and consisted of a base of 40 semi-structured, open-ended questions, conducted in a free-flowing conversational format to allow for participant elaboration, the personalization of answers, and emergent themes (Kvale 1996). These questions were created to gain an understanding of community observations and perceptions of changes in weather patterns, snow, ice, wildlife, and vegetation, fluctuations in seasonal temperatures, the socio-economic and socio-cultural impacts of these changes, and the participant-identified effects of these changes on health and well-being.

Through participant request, all interviews were conducted in English, which is the first language of people in Rigolet (Statistics Canada 2007), although an Inuttitut translator was always available. The community member interviews were conducted in person. Five of the six health professional interviews were conducted over the phone. All interviews were audio recorded, with consent, and professionally transcribed. Transcriptions were checked against the digital recordings for accuracy by the research team. This research was approved by Health Canada's Research Ethics Board, the Nunatsiavut Government Research Advisory Committee, and the University of Guelph Research Ethics Board.

<sup>1</sup> Since the research team of the *Changing Climate, Changing Health, Changing Stories* project was combined equally of Inuit and non-Inuit members, there was constant researcher presence in the community from 2009 until 2012. The non-Inuit members of the research team have been working in Rigolet from 2006 onwards, and have a combined total of almost 30 years working with Inuit populations. The non-Inuit researchers regularly travelled to Rigolet, ensuring visits to the community about every 2 to 4 months. During these visits, the non-Inuit researchers not only conducted interviews, but also integrated into and participated in community activities: hunting, fishing, berry-picking, cabin travel, community dinners, recreational activities, and on-going learning activities such as trapping, country food preparation, fur skinning and preparation, sewing, and Inuit culture and history. The non-Inuit researchers continue to be actively involved in community-based research in Rigolet and Nunatsiavut, and continue to participate in daily activities in the community and learn from their Inuit colleagues who are also continuing to lead and direct community-based research projects in the region.

### 3.2 Data analysis

The interviews were analyzed descriptively using a rigorous, immersive, constant comparative, multi-step process (Mays and Pope 1995; Patton 2002), consisting of several iterative steps. First, all transcripts were read and re-read to discover major themes, community concerns, and overall findings. Second, the interviews were re-read again while simultaneously listening to the audio recording to note nuances and emotions in voice. Third, a list of key codes and themes was created from across all the transcripts and discussed with members of the research team to ensure accuracy and authenticity. During this process, the list of codes and themes was honed to create a final list of codes and themes. Fourth, the transcripts were coded according to this list. Finally, a list of preliminary findings and quotations were shared with the research team and with local and regional health professionals to further ensure accuracy, authenticity, and relevancy to the research context.

It is important to note that these themes of climate-related mental health challenges were entirely emergent from the study, as this research was not initially structured to explicitly examine the relationships between climate change and mental health specifically, and questions were not directly framed around mental health; rather, some of the most prominent themes that emerged from participant responses to the impacts of observed and perceived climate change and variability on their lifestyle, livelihoods, sense of identity, and overall well-being were all related to community-defined mental health issues. These themes and ideas around mental health were consistently checked and re-checked with the community research representatives, community stakeholders, and Nunatsiavut health workers to ensure that understanding and mobilization of these themes were resonant with community understanding of mental health and reflected community terminology used to describe mental health issues.

## 4 Results

### 4.1 The land and mental health

For all the interview participants, the land was at the heart of what it meant to be Inuit and was deeply connected to individual and community identity, and mental well-being. As one participant explained,

I think for the Inuit, going out on the land is just as much a part of our life as breathing. Really, we are so close to the land. We are land people. So if we don't get out then, for our mental well-being, it's like taking part of your arm away. ...It's like you are not fulfilled. There is just really something missing. I think we take great pride in being able to go on the land and just feel that energy when you get out on the land. For some people, it's just like taking medicine.

Participants reported that hunting, fishing, trapping, and travelling to cabin not only provide sustenance and livelihoods, but also a deep sense of mental and emotional solace. Participants used many descriptors, such as “profound,” “spiritual,” “in your blood,” and “just a part of you,” to describe their connections to the land. As a regular hunter and forager explained,

For some reason, we just need to be out on the land. And the more I'm learning in mental health and wellness about it, the more I understand that I think it has a lot to do with the energy that you feel when you are outdoors, when you are out on land, when



you are away. It is just a really good energy. ...it's a way of life for us to be out on the land and to do things and to feel, you know, that you are part of Mother Nature. It's just the same as bathing every day. It feels good.

The majority of participants also identified that being out on the land, and experiencing strong and regular connections to land activities, were essential to mental and emotional health and well-being. As a female health worker shared,

for some people going out on the land is just as good as sitting down in a counselling session, no need for words, you just, the air and the land takes a lot of your feelings away and replaces the negative energy with the positive energy, nature.

When participants were not able to be out on the land, many described feeling a “deep longing” because they “craved” being out there and felt like a “caged animal” if they could not travel and spend time on the land due to lack of snow and ice. As one mental health professional explained, when clients have not been out on the land regularly, they “start saying they can feel that they’ve got to get out. It’s a physical pull,” and when they do not get out, “they feel limited, restricted, and longing to be out there to feel...their true potential or true self.”

Many participants shared that after being out on the land, they simply felt mentally stronger, and were better able to deal with stress and difficult. As one community counsellor explained, when people return from spending time on the land, “they walk different and they hold themselves higher and they are smiling. It’s just wonderful to see.”

#### 4.2 Climate change and mental health and well-being

In recent years, however, participants reported that access to land and land-based activities were disrupted due to changes in sea ice, snow, and seasonal temperature, as well as wildlife migration patterns due to warming temperatures. Most participants identified that an inability to travel regularly on the land to hunt, fish, trap, and visit cabins due to changing climatic conditions as being incredibly “devastating,” “depressing,” “frustrating,” “sad,” “scary,” “worrisome,” and “extremely stressful.” These strong emotional responses led to four interconnected pathways through which climate change was considered by participants to be impacting mental health and well-being: increased family stress; observed increases in drug and alcohol usage; reported potential for increases in suicide ideation; and the amplification of previous traumas.

##### 4.2.1 Increased family stress

For participants in this study, an inability to go out on the land also meant more time spent at home inside with many family members in confined spaces. This combination of emotional responses and being “stuck” in the home led to reports of increased family stress for many of the research participants in their own homes and the homes of others. As one young adult explained, people “felt like they were getting in each other’s way more, in a way that they previously hadn’t experienced.” As another mother described, “people are starting to get on each other’s nerves.” According to a health workers, when people experience more familial stress from not being able to get out on the land, there is also a wide-reaching mental health impact, as “the whole dynamic changes in the communities,” and people start to carry this stress into other aspects of their lives.



#### 4.2.2 Reports of potential increases in drug and alcohol usage

Connected to an increase in home-based and familial stress and the increased time spent in the communities and not on the land, several participants self-identified that they themselves, or their family members or friends, were consuming more alcohol or drugs due to a sense of boredom of not being out on the land, lack of purpose, or loss of identity. These self-reports were echoed by the community health workers. As one health professional explained: “I think [with climate change] there’s more drinking, for one thing. ...If they’re in town, then there’s more alcohol abuse.” As another health worker further echoed,

I find that when you can’t get out so much, or you don’t have the opportunity to get out, you tend to do more things. Some people use addictions more, whatever that may be. It may be drinking, or drugging...that’s increasing.

This potential increase in reported alcohol and drug use differs than when people can regularly travel to their cabins. As a community counsellor explained,

people tend to not drink at all when they’re out on the land...I think that certainly being stuck in the community, and the climate changes, impacts on the amount of alcohol consumed. And then it just snowballs from there into more violent incidents and spousal abuse and suicides, all of those kinds of things.<sup>2</sup>

#### 4.2.3 Reports of potential increases in suicide ideation

Several participants identified that since the observed changes in climate and environment and the subsequent ability to participate in land activities led to feelings of loss of self-worth and value, and when combined with other stressors from previous traumas or life circumstances, there was the potential for increased feelings of suicide ideation for themselves, their family members, or their friends. This potential link was supported by the health workers, although all the health professionals emphasized that making a definitive connection between suicide and climate change and variability was not yet possible, and that there were myriad and complex factors involved. That said, the health workers explained that they have observed connections between counselling needs and increased suicide issues during periods of bad weather or during fall freeze-up and spring thaw, which “are always the most vulnerable time in our communities for suicides, for violent statistics going up.” As one health professional explained, during the winter of 2009–2010 (a winter with particularly warm temperatures and little ice freeze up), there was

a huge increase in the number of clients coming out of the communities for counselling services, now that I can say, a significant increase. So for whatever reason, whether it’s related to climate change and them not being able to do things that normally would help their emotional wellness, or whether it’s because we’ve also had a fair bit of death this year...there has been a huge increase.

<sup>2</sup> It is important to note that these results are not stating that changes in climate cause addiction; rather, they are highlighting that some participants have directly linked an inability to go out on the land due to changing environmental and climatic conditions with an increase in drug and alcohol usage while in town and linked to having nothing to do, or a sense of loss of purpose, self-value, or identity.

As the interviewees discussed, observed climate change and climate variability is prolonging these in-between periods, leading the counsellors and many community members to predict a continued escalation of climate-related mental health issues, including potential increases in suicide ideation, in the coming years.<sup>3</sup>

#### 4.2.4 *The magnification of current and previous trauma*

Some participants indicated that changes in climate and environment were also compounding other personal, intergenerational, and collective mental health issues. As one young adult and regular hunter explained,

a lot of trauma that you face—whether it be rape or residential schools or child abuse or anything like that—usually if you are able to find some sense of worth in yourself and value you are able to start unconsciously healing from those wounds or you are able to get enough confidence in yourself to really address them. So if for some reason you are not able to do something that makes you feel good and capable and productive and closer to your family and at peace and less stressed...your capability to deal with things that trouble you is also [diminished]. ...If you take away an internal capability and what makes you feel productive, then those tragedies or that past is still there, and then they're magnified because they come more to the surface because you're not feeling that personal strength. I think if you take away those [land] activities and people feel less capable, less able to provide, and less healthy about themselves, then those [mental and emotional] impacts will either come more to the forefront and have to be dealt with or they may just be built upon. ...I think that those effects [from trauma of residential schools and assimilation] will be felt further if climate change affects [land] activity.

Resonating with this, one health worker explained,

when people are unable to spend time on the land, they have more time to dwell on the negative, to remember things like residential schools experiences when they felt really trapped and unable to leave. Those kinds of feelings certainly come back, or that's what I've been told by lots of people. So yeah, I have no doubt that if these [climate change] trends continue, there will certainly be a large impact on mental health.

#### 4.3 Community-reported mental health coping strategies

It is important to note that none of the participants identified any positive mental health effects from changing climatic and environmental conditions; yet, several participants did discuss ideas that could assist with coping with the changes. Many participants indicated that more time on the land would increase mental health and well-being while simultaneously building resilience to the observed climatic changes. Other participants stressed the importance of supporting opportunities for individuals and communities to develop coping mechanisms that are not reliant upon spending time on the land. As one health worker explained,

<sup>3</sup> Again, these results are not stating that climate change causes suicide; rather, they are highlighting the ways in which participants feel that changes in climate, and the resulting inability to get out on the land and the loss of solace, comfort, purpose, and self-worth, may lead to a potential increase in suicide ideation in the community.

we need to be careful that we teach people some transitioning skills, so that the healing that takes place there or the skills they learn are transferrable back to the community. Because you know, we often hear ‘on the land programming, on the land programming,’ and it’s fine while people are on the land, but as soon as they’re back to town, they’re drinking or whatever they have access to. So yes, I agree wholeheartedly that the more on the land programming that we could do, the better, but we also need to be careful that we’re transitioning people and teaching them the skills so that they’re transferable when they go back to the community.

Importantly, while all the interviewees discussed the negative mental health impacts of a changing climate, many people explained that it was important to resist giving in to the negative emotions, and consciously develop coping strategies and resources to support mental strength and resilience and were confident that their community could adapt to the changing environmental contexts. Many people echoed the statement of one young adult: “There is nothing else [we can do], we can’t dwell on it. Then we would be all suicidal. You just have to do the best you can with what change is coming.”

#### 4.4 Increased burden on health workers and the health system

Finally, the health workers interviewed identified an increase in individuals using mental health services who reported seeking assistance because of fluctuations in weather patterns, and snow and ice conditions, and the resulting experiences mentioned above. This increased need for counselling and health services connected to observed climate change had a dual effect for health staff: first, they found themselves more over-worked and unable to find time away from their jobs because in small communities people know where they live and contacted them after hours. As one woman explained, the increased need for counselling and health services

cause me stress and anxiety on a personal level. If I can’t get out and I’m stuck here then I don’t get a break from my job. If I stay in town when I’m off, they’re coming to my door at home. .... And if they’re not coming to the door, they’re phoning. And it don’t matter if it’s 24/7, they’re still calling.

Second, staff also reported to be personally and directly affected by the inability to travel on the land and find the comfort, solace, and healing required to rejuvenate and relax. As one health worker explained,

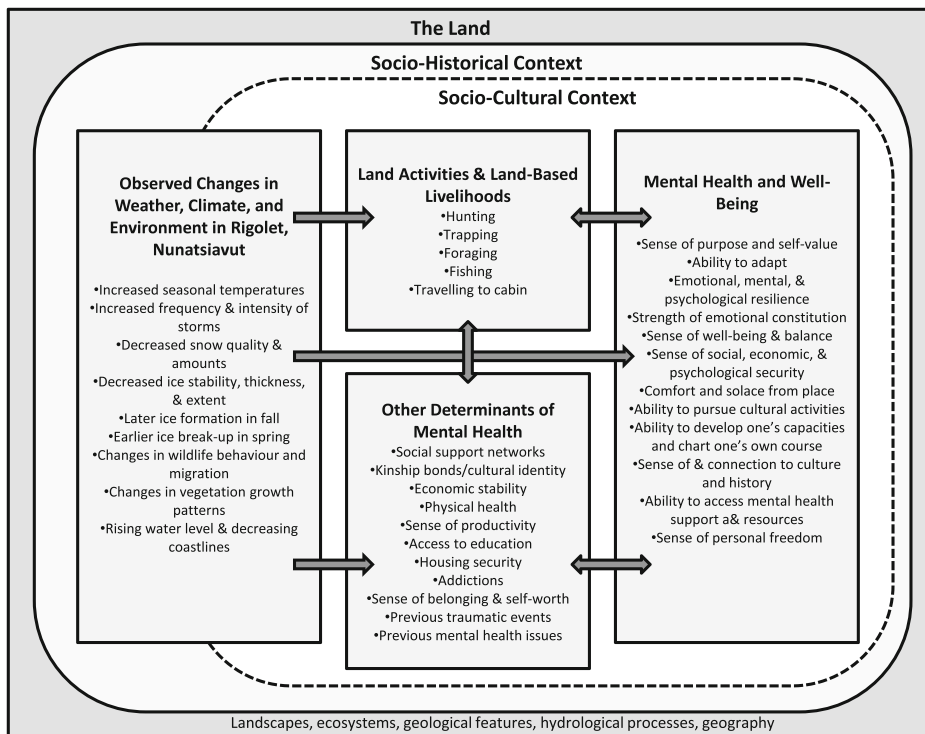
if I wasn’t able to [travel on the land], I don’t think I would be able to maintain working in the field I’m working in with the demands it has, because it keeps me grounded and it helps me stay balanced. And I see the same effect with a lot of people without the access, that they’re losing a key part of their culture that helps them to maintain balance and connection. Not just with each other, but with their environment and everything else.

## 5 Discussion

This research demonstrates that the mental health and well-being of individuals in Rigolet was, in part, directly influenced by the land and the environment, and by the ability of people to regularly and reliably access the land to practice cultural and livelihood activities. Since the land is essential to mental health and well-being, even subtle alterations in the climate

and environment can have dramatic impacts on the mental health and well-being of residents through direct impacts and by disrupting other underlying determinants of mental health. For example, participants reported that the emotions associated with current shifts in climate and environment are also re-surfacing—in many cases, magnifying—a sense of powerlessness and loss of control associated with past traumas. Additionally, with a decreased opportunity to seek solace and healing through land activities, these other personal issues can become even more difficult to manage. In this way, changes in climate and the resulting disruptions to land-based activities interact with the underlying determinants of mental health and simultaneously directly affect mental health through impacts (Fig. 3). The role of climate change as a magnifier of underlying mental health vulnerabilities is also consistent with studies in the general human dimensions of climate change (c.f. Ford et al. 2008, 2010b).

It is important to note that while this research does not indicate that climate change causes addictions, Inuit from Rigolet and health professionals from Nunatsiavut indicated in this study that there could be relationships between changing climatic conditions, ability to access land activities, and increased usage of drugs and alcohol as people look for others ways to fill time or cope with the loss of a lifestyle. Similarly, with suicide, this study certainly does not suggest that climate change causes suicide. Yet, health professionals and community members in the North reported that during periods of poor weather, fall freeze-up, and spring melt when people are ‘stuck’ in the communities, there is an increase in mental health needs and spikes in suicide-related issues. Since climate change has the potential to prolong these periods and cause



**Fig. 3** Possible pathways through which climate change and variability has been identified as interacting with and impacting upon mental health within Rigolet, nested within the larger socio-cultural and socio-historical contexts, and embedded within the particular landscapes, ecosystems, and geography of the North Labrador Coast

conditions which may further disrupt and limit land time, there is a concern among health professionals and community members that when combined with the other mental health issues in the community, climate change and the associated loss of getting on the land to heal and practice cultural activities, could be an additional stressor for suicide ideation.

It is also important to note that while climate change may be a new stressor for, and determinant of, mental health in the North, this is not meant to obfuscate the other important mental health priorities and challenges for communities in the North. While climate change is potentially a very serious threat, often the daily struggles to ‘get by’ and other on-going mental health stressors in the communities can take precedence over dealing with the current or potential impacts of climate change. Within a mental health context, then, climate change should not be thought to take priority over other important issues, but rather be understood as another point of consideration and area for further investigation.

### 5.1 Study limitations

This study was exploratory and served to provide a baseline for future research; as such, it is limited in scope, breadth, and generalizability. In addition, since this research is exploratory, the case study did not measure the magnitude, incidence, or prevalence of mental health impacts or gather data on mental health disorders. Furthermore, since this study was narrative based, and although the voices and self-reports were compelling and powerful, there are currently no other sources of data with which to compare these results (i.e. changes in clinic visit numbers/patterns related to specific temperature fluctuations or weather events). Finally, since this research was conducted during a 10 month period, it may not be representative of longer term trends.

Despite these limitations, the results from this study stand as the first published exploratory case study on climate change and mental health in the North, and represent the voices and lived experiences of Inuit currently on the frontline of a rapidly changing climate. The findings from this research also resonate with qualitative and quantitative studies conducted in an Australian context (Berry et al. 2010, 2011; Dean and Stain 2010; Polain et al. 2011; Rigby et al. 2011; Speldewinde et al. 2009), as well as with the theoretical suggestions from the American Psychological Association (Swim et al. 2010; c.f. Doherty and Clayton 2011; Swim et al. 2011); as a result, these results form a strong baseline for moving forward with climate-change-related mental health studies in the Canadian North, as well as globally.

### 5.2 Avenues for further research

Since this area of study is in its infancy, further research and study is required to gain a more complete understanding of the current and possible mental health impacts stemming from a changing climate. For future studies, it will be important for mental health professionals, clinicians, researchers, and communities to come together to engage in this work from a multidisciplinary perspective, as well as to employ locally-accepted mental health terminology and assessment strategies (Swim et al. 2010).

For example, further research is needed into the nuanced relationships among previous mental health stressors, susceptibility to mental health issues, and factors of resilience within the context of a changing climate—research that is stratified by age, gender, and other sub-populations within the communities. More research is also warranted to discover and determine the process of *mental* adaptation and mental adaptive behaviour to climate change, and the ways in which adaptation may influence mental health and well-being

(Doherty and Clayton 2011; Reser and Swim 2011; Swim et al. 2011). While Inuit have been continually adapting to changing conditions for millennia, and understand it as a dynamic process of actively interacting with all the environmental conditions and transforming behavior and activities accordingly (Kirmayer et al. 2011), how this active adaptation process will interact with mental health is not yet known (Cunsolo Willox et al. 2013). Given that climate-change-related mental health impacts are expected to grow in severity, research to support mental health adaptation strategies and planning should be key priorities.

## 6 Conclusion

This study provides a baseline upon which to build further research on the impacts of climate change on mental health in the North and potentially globally. It is clear from the voices of Rigolet Inuit that climate change has impacted mental health through a variety of pathways and mechanisms. Separately, climate change and mental health are both top priorities for Canadian Inuit. The potential overlap and connection between these areas, then, should also be considered an important area for further investigation and action. Indeed, although we know very little about the climatic determinants of mental health in the North or globally, the findings from this case study and the voices of Inuit in Rigolet, Nunatsiavut, Canada highlight the importance of recognizing, studying, and considering the mental health impacts from a changing climate perspective. These results also demonstrate that climatic change can be recognized as potentially another determinant of mental health in of itself—a determinant which is likely to affect people in the North and globally (c.f. Berry et al. 2010; Doherty and Clayton 2011; Swim et al. 2011).

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