

**Young Canadians and Climate Change: Vulnerability, Adaptive Capacity,  
Education, and Agency**

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## Abstract

Canada's climate is warming at twice the global rate and its population is already experiencing several adverse effects of climate change. Canadian children and youth are among the most vulnerable to climatic changes due to physiological and developmental factors, yet their vulnerability, adaptation, and adaptive capacity are largely undocumented in the climate change literature. Several factors, including health, socioeconomic, and sociocultural factors, contribute to the vulnerability of Canadian children and youth to climate change. Although health factors of vulnerability and the health impacts of climate change on these groups have been documented in the published and grey literatures to a certain extent, information on the socioeconomic and sociocultural factors contributing to their vulnerability remains scarce. As a signatory to the Paris Agreement and the Convention on the Rights of the Child, Canada has binding obligations to reduce its carbon emissions, plan and implement adaptation measures for its citizens, including children and youth, and to provide the latter with a healthy environment in which to grow up. Although children and youth have contributed very little to anthropogenic climate change and are not decision-makers in policy processes, they are disproportionately affected by the climate inaction of previous generations because their lives will be increasingly impacted. Furthermore, young people worldwide, including marginalized children and youth (e.g., those who live in poverty and/or are Indigenous, racialized, immigrants, disabled, etc.) were largely excluded from consideration as a group in global climate change mitigation and adaptation decision-making processes until their groundswell of activist leadership, beginning in 2018. Despite, or perhaps in response to this marginalization, young people across Canada are taking a stand against climate inaction and playing leadership roles in climate action activism in this country. Their perceptions, experiences, and contributions, however, remain noticeably and regrettably scarce in the published climate change literature. This paper discusses implications for education, research, and policy.

## Foreword

This Major Paper addresses the following three components of my Area of Concentration, as outlined in my Plan of Study:

1. Vulnerability of Canadian children and youth to climate change
2. Adaptive capacity and Education, and
3. Equity, Engagement, and Agency

Furthermore, this Major Paper meets my learning objectives in the following ways:

- It succinctly explains vulnerability, including the various factors (e.g., behavioural, physiological, socioeconomic, and sociocultural factors) that contribute to the vulnerability of Canadian children and youth, including disadvantaged and marginalized children and youth, to climatic changes and extreme weather events.
- It outlines some of the impacts of climate change on young Canadians and summarizes key ways to reduce their vulnerability.
- It explores the concept of *adaptive capacity* as it pertains to humans, and more specifically, children and youth.
- It explores the role of climate change education and participation in enhancing the adaptive capacity of children and young people.
- It carefully presents ethical, legitimate, and useful knowledge, explains the concepts of *intergenerational justice* and *climate justice*, and explores examples of Canadian youth-led initiatives/efforts which advocate for and advance these principles. In addition, it provides a brief overview of recent climate change litigation in Canada.
- It investigates the concept of *agency* and outlines ways to enhance the agency of Canadian children and youth. It provides a brief overview of the youth climate action movement in Canada.

- It explores appropriate ways of teaching children about climate change and examines the role of climate change education in supporting youth agency/action on climate change
- It contributes to the climate change literature and aims to inform public policy, address current research gaps in the areas of child/youth vulnerability, adaptive capacity and resilience, climate change education, and child/youth agency. It advocates for equity, justice, and inclusion for children and youth in Canada and globally.

## Dedication

This Major Paper is dedicated to my children, Noah, Scott, and Liam. You are the inspiration and motivation for this paper and all that I do. I hope this research will help to inform and improve health, climate, and education policies in Canada and, consequently contribute to your and every Canadian child's equitable and effective adaptation to climate change. Being your mother is my greatest joy, honour, and privilege, and it is my hope that you will grow up in a climate just and sustainable world.

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# Chapter I: Introduction, Design, and Methodology

## Introduction

*We do not inherit the Earth from our  
Ancestors, we borrow it from our  
Children*

Native American Proverb

Canada's climate is warming at twice the global rate and its population is already experiencing several adverse effects of climate change, including more extreme heat, increased precipitation and seasonal flooding, rising sea levels, more intense and prolonged drought, and increased wildfire occurrence (Buka & Shea, 2019; Bush & Lemmen, 2019). As climate change accelerates, Canadians will likely face more frequent and intense extreme hot temperatures, more severe heat waves, increased drought and wildfire risks, more intense rainfalls, and increased flood risks. Moreover, climate change will impact the health, wellbeing, livelihoods, food security, and cultural identity of Canadians and exacerbate existing health, social, and economic inequities.

On October 6, 2016, Canada ratified the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) committing to reduce national greenhouse gas (GHG) emissions with the goal of limiting global temperature increases to *well below* 2°C. To date, however, national policies have fallen far short of realistically working toward this goal. On April 22, 2021 Prime Minister Justin Trudeau announced that Canada will reduce its GHG emissions by 40 to 45 per cent below 2005 levels by 2030 – a plan some have deemed inadequate and weak. As of 2019, Canada had the second highest greenhouse gas emissions per capita among G20 nations (Rabson, 2019). According to United Nations Secretary-General António Guterres, the world is “racing toward the threshold of catastrophe,” noting global temperature has already risen 1.2 degrees Celsius and “dangerous greenhouse gases are at levels not seen in 3 million years” (Guterres, 2021, as cited in UN, 2021, n.p.).

## Children and Youth's Vulnerability to Climate Change

Canadian children and youth are vulnerable<sup>1</sup> to climatic changes due to biological, behavioural, socioeconomic, and sociocultural factors, as well as their dependence on caregivers. For example, Inuit children and youth living in the Canadian Arctic – where “increased seasonal temperatures, rising sea levels, warming permafrost, and reduced sea ice quality, stability, and extent” (MacDonald *et al*, 2013, p. 360) have been documented – are particularly vulnerable to climate change. Their susceptibility and vulnerability to climatic changes is attributable to their geographic location, close relationship to the land, traditional livelihoods, reliance on subsistence (IPCC, 2014) and natural resources, and history of colonization (Ford, 2012; MacDonald *et al*, 2013). Other Indigenous children and youth, whose cultural practices, traditions, and ways of life are closely tied to the land, as well as non-Indigenous children and youth who are marginalized and disenfranchised are similarly vulnerable.

Discussions on the vulnerability, adaptation, and adaptive capacity of Canadian children and youth are largely absent in the climate change literature to date. Similarly, their experiences, perceptions, and observations regarding climate change remain noticeably absent in the published literature. Although children and youth have contributed very little to anthropogenic climate change and are not decision-makers in policy processes, they will bear the brunt of the impacts of climate change over their lifetime. According to the World Health Organization (WHO) close to 90% of the burden of disease attributable to climate change occurs in children under the age of five (Smith *et al*, 1999; Sheffield & Landrigan, 2011; Salas *et al*, 2019; Perera *et al*, 2019).

Although all children are vulnerable to climate change, they experience different levels of vulnerability based on their socioeconomic and sociocultural circumstances. More specifically, children’s immature physiological systems and susceptibility and greater exposure to health hazards interact with environmental, economic, social, and cultural factors to further increase vulnerability. For instance, low-income, Black, racialized, and Indigenous children and youth are more vulnerable to and disproportionately affected by climate change due to existing health and income inequities, which may include lack of resources and access to proper sanitation and safe drinking water, environmental racism, etc.

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<sup>1</sup> Although I acknowledge the potential problematic connotations and interpretations of the word "vulnerability", I felt it was important to remain consistent with the terminology used by the Intergovernmental Panel on Climate Change. In the context of this Major Paper, the word vulnerability does *not* refer to powerlessness or victimhood; rather, it refers to the biological and socioeconomic/sociocultural characteristics of children and youth that place them at increased risk.

To date, research on the vulnerability of young Canadians has focused primarily on Inuit children and youth. Very little is known about the impacts of climate change on other Indigenous, non-Indigenous, immigrant, refugee, low-income, Black, racialized, and disabled children and youth in Canada. For instance, how might climate change further impact Aamjiwnaang First Nation children and young people who live near Sarnia’s “Chemical Valley” (Canada’s largest petrochemical complex), or Indigenous and African Nova Scotian children and youth living on reserves and rural communities near polluting industries (Waldron, 2018), or First Nations and non-Indigenous children and youth living in coastal communities in Canada? Given their particular vulnerability and the fact that children and young people will experience impacts of climate change longer than current adult generations, addressing their vulnerability and enhancing their adaptive capacity is essential to ensure their survival and equitable adaptation.

## Who are Canadian Children and Youth and How will Climate Change Impact their Lives?

While the United Nations defines *youth* as persons aged 15 to 24, Statistics Canada uses the age range of 15 to 29. This paper adopts the latter definition, given its focus on Canada. As of 2019, children aged 0 to 14 made up 16% of Canada’s population (Statistics Canada, 2019). In 2020, Canadian youth represented about one-quarter of the country's population (Arim *et al*, 2020). Together, children and youth comprise “a large and important group within the Canadian population” (Statistics Canada, 2018a; Arim *et al*, 2020, p. 3). Canadian children and youth are ethnoculturally diverse and demographic projections predict a significant increase in ethnocultural diversity by 2031 (Statistics Canada, 2018b). “In 2016, close to 2.2 million children under the age of 15 living in private households were foreign-born (first generation) or had at least one foreign-born parent (second generation). This corresponds to 37.5% of the total population of Canadian children” (Statistics Canada, 2017). As noted above, diversity indicators can be a factor in climate vulnerability.

According to the Canadian Paediatric Society, as climate change accelerates, Canadian children will become increasingly affected by climate change-related health hazards (Buka & Shea, 2019). The limited literature I found on this topic, despite its importance, motivated me to assemble this study. This Major Paper is framed by the following research questions:

1. What factors contribute to the vulnerability of Canadian children and youth to climate change?
2. How can education and other factors enhance and promote the adaptive capacity of children and youth?
3. To what extent is Canada's education system enhancing students' climate knowledge and constructive climate change engagement?
4. What contributes to constructive climate change engagement and young people's sense of agency?

## Research Design and Methodology

Given existing research gaps in the climate change literature and the multidimensional nature of climate change, this paper provides an interdisciplinary review of the published literature on the climate vulnerability, adaptive capacity, and agency of children and youth, with a special focus on Canadians. In a second step, I then review existing research on climate change education and policy in Canada and critically analyze educational and pedagogical approaches to climate change education. Finally, I use justice-oriented pedagogical and education theories to consider the role of education in general, and of climate change education more specifically, in enhancing the adaptive capacity and sense of agency of children and youth. I explore children and youth's perceptions of climate change and review youth climate activism in Canada. Throughout this paper, I rely on theoretical frames including *intergenerational justice* and *climate justice* and engage with the ethical dimensions of climate change.

The paper's methodology thus includes literature review, policy analysis, pedagogical and education research methods such as social learning and social theory, participatory and action-focused education methods based on transformative learning theory, place-based and land education theory, and critical social change analysis drawing on the work of Paulo Freire. My conclusions, and the education policy and pedagogical recommendations at the end of the paper, are grounded in this mixed-methods research design.

## Chapter Overview

Chapter II of this paper provides a review of the published (both academic and 'grey' and online/media) literature on the vulnerability of children and youth to climate change, with a special focus on young Canadians. Health risks for children include direct and indirect effects of natural hazards and extreme weather events, decreased air and water quality, and increased infections (Buka & Shea, 2019). Chapter II outlines biological, socioeconomic, and sociocultural factors contributing to the vulnerability of young Canadians and considers how these factors interact to exacerbate vulnerability. In addition, this chapter explores the concepts of *intergenerational justice* and *climate justice* and discusses ways to reduce the vulnerability of children and youth while placing particular emphasis on ethical and justice considerations.

Chapter III examines the concept of *adaptive capacity* as it pertains to children and youth and considers the roles of education and participation in enhancing the adaptive capacity of young Canadians. Despite the country's commitment to enhance climate change education, training, and public awareness and participation under the Paris Agreement, Canada's education policies do not reflect or adequately advance this commitment. A national review of climate change education policy in Canada showed that provincial and territorial education policies demonstrate "shallow engagement with climate change, an overwhelming focus on energy efficiency upgrades in schools, and a lack of holistic responses to climate change" (Bieler *et al*, 2017, p. 63). A national survey found that climate change is predominantly taught through science-related subjects despite the fact that most educators believe climate change education to be the role of all teachers (Field *et al*, 2019). Additionally, the survey revealed that Canadian educators would like more professional development on climate change education and that most Canadians and educators believe the education system should be doing more to educate students about climate change (Field *et al*, 2019).

Some scholars argue that in order to tackle climate change and prepare responsible and environmentally conscious global citizens, educational shifts/reforms are required. Orr (2004) argues that "we continue to educate the young for the most part as if there were no planetary emergency", while "much of the current debate about educational standards and reforms [...] is driven by the belief that we must prepare the young only to compete effectively in the global economy" (p. 2). However, "education is an essential element of a coordinated response to climate change because of the transformative role that teachers and educational institutions can play in preparing students for climate-altered futures" (Field *et al*, 2019, p. 21). Chapter III offers various examples of educational approaches to enhance children and youth's knowledge of

climate change, constructive climate change engagement, adaptive capacity, and sense of agency. In addition, this chapter discusses the importance of hope in climate change education.

Evidence of growing *eco-anxiety* and *climate-anxiety* in children and youth further affirms the need for education to empower young people and strengthen their sense of agency. As discussed in Chapter IV, which moves beyond education to focus on youth engagement and climate activism, engagement is thought to contribute to people's mental health and can be used as a strategy to address climate anxiety (Clayton, 2020). Education is essential in empowering young people, decreasing feelings of climate anxiety, powerlessness, and hopelessness, and facilitating, motivating, and supporting young people's agency, activism, participation, and political engagement. Furthermore, education can play an important role in preparing children and youth to become engaged citizens and to meaningfully participate in political processes, climate change research, and constructive climate change activism. However, research shows that many Canadian "provinces neglect to choose standards that go beyond scientific literacy and would actually lead to increased concern or action for climate change in their student populations" (Wynes & Nicholas, 2019, p. 14). In addition, research suggests that scientific literacy alone is insufficient to spur and sustain students' political engagement and action on climate change (Trott, 2020; Hargis & McKenzie, 2021).

Chapter IV of this paper describes various opportunities for children and youth to become involved in climate change research and decision-making processes, including within and outside of formal institutions of education. Historically, young people globally, especially marginalized, and disenfranchised children and youth (e.g., those who are disadvantaged, Indigenous, racialized, immigrants, refugees, disabled, etc.) have been largely excluded from consideration as a group in global climate change mitigation and adaptation decision-making processes. In addition, the climate change narrative often represents children and young people as 'victims', rather than as capable agents of change. However, young people have unique perspectives on climate change, are effective climate change communicators, and are "arguably best equipped to navigate the ideologically fraught topic of climate change with older generations in ways that inspire action" (Lawson *et al*, 2018, abstract).

Chapter IV highlights a number of ways in which young Canadians are engaging in climate activism and inspiring action on climate change. For instance, Canadian children and youth are turning to Canada's legal system to assert their right to grow up in a healthy environment

through various climate justice lawsuits against the federal and provincial governments. In addition, children and youth in Canada and globally are taking leadership in the fight against climate change, rising together to oppose government inaction on climate change and demand climate, social, and systemic justice.

In the final chapter, the paper concludes by discussing the results of the interdisciplinary review, returning to the research questions, offering recommendations to the health and education sectors, and elaborating on future research needs. The purpose and goal of this paper are to identify and highlight existing research needs in Canada, provide an overview of Canadian children and youth's vulnerability to climate change, explore the role of education and participation in enhancing young people's adaptive capacity, and review the literature on the agency of young people, with a special focus on Canadians. In addition, this paper provides a timely review of educational and pedagogical approaches to climate change education with the aim of contributing to this developing field. Lastly, this paper offers policy recommendations for addressing the vulnerability of Canadian children and youth, enhancing their adaptive capacity and education, and promoting their equitable participation in climate change research, policy, and practice. Finally, this paper promotes views and policy responses that align with intergenerational and climate justice principles and protect the health, education, and interests of Canadian children and youth, now and into the future.

## Chapter II: Vulnerability

### Vulnerability to Climate Change

There is irrefutable evidence of climate change in Canada. The country's climate has warmed, and temperature has increased in all regions of the country (Cohen *et al*, 2019). Between 1948 and 2016, the average (mean) annual temperature in Canada increased by 1.7 °C, "about double the global rate", while in northern Canada, the average annual temperature has risen by 2.3 °C, "about triple the global rate" (Government of Canada, 2019a, n.p.). Canadians are already experiencing several adverse effects of climate change, including floods, droughts, heat waves, wildfires, and rising sea levels (Buka & Shea, 2019; Bush, & Lemmen, 2019; Environment and Climate Change Canada, 2021a). These effects are expected to intensify (Bush & Lemmen, 2019; Prairie Climate Centre, 2019) and negatively affect the health, lives, wellbeing, livelihoods, food security, and cultural identity of Canadians (Buka & Shea, 2019; Prairie Climate Centre, 2019; Ford, 2012; MacDonald *et al*, 2013). For children, moreover, the impacts of rapid climate change are heightened. Several factors contribute to the vulnerability of children and young people to climate change, including physiological, developmental, behavioural, socioeconomic, and sociocultural factors. Socioeconomically disadvantaged and Indigenous children and youth are especially at risk (Buka & Shea, 2019).

The Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change defines *vulnerability* as "the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (Annex II: Glossary, p. 128). According to Séguin *et al* (2008), "sensitivity of individuals and populations can be influenced by a range of important determinants of health, such as socio-economic status, biology and genetic endowment, availability of health services, gender and personal health practices" (p. 373). Rayner and Malone (2001) argue that "vulnerability is a composite concept, incorporating environmental, social, economic, political, cultural, and psychological factors, in describing the capacity for damage" (p. 177).

While Canadian children and young people are intersectionally vulnerable to climate change (like children and youth worldwide) and disproportionately affected by it, their vulnerability, perceptions, experiences, adaptive capacity, and adaptation are largely undocumented in the



published literature. In fact, “the capacity of individuals, governments and communities in Canada to adapt to the health risks associated with current climate variability and future climate change has rarely been subjected to rigorous analysis” (Séguin *et al*, 2008, p. 372).

## Health Risks and Impacts

Climate change has serious implications for the health of children and young people due to biological and behavioural factors influencing their vulnerability (Ahdoot & Pacheco, 2015; Séguin *et al*, 2008). According to Buka and Shea (2019), children’s “rapid growth and developmental, physiologically dynamic systems, and risk exposure over a longer life course combine to increase vulnerability to environmental hazards” (n.p.). Children breathe faster and eat and drink more for their body size in comparison to adults. In addition, children tend to place objects in their mouths and spend more time outdoors, playing low to the ground and in wooded areas. These characteristics increase their vulnerability to climatic changes. For example, children are an at-risk group for Lyme disease, a tick-borne infection caused by the bite of infected black-legged (*Ixodes*) ticks (Onyett, 2014; Ogden, 2020) because they tend to play in areas where black-legged ticks are found.

According to the Canadian Paediatric Society, “peak incidence for Lyme disease is among children five to nine years of age” (Onyett, 2014). Due in part to climate change, “geographical distribution of *Ixodes* ticks is expanding in Canada and an increasing number of cases of Lyme disease are being reported” (Onyett, 2014). Although Lyme disease is the most common vector-borne infection in Canada (Onyett), other vector-borne diseases (e.g., West Nile virus and Rocky Mountain spotted fever) may become more prevalent as precipitation and temperature patterns change, thereby affecting the distribution of vectors of these diseases.

Other impacts of climate change and severe weather events on Canadian children and young people (including Indigenous children and youth) have been documented, albeit to a very limited extent, in the published and grey literatures. The lack of literature on the impacts of climate change on Canadian children and youth’s health and wellbeing, can perhaps be attributed to the following reasons. It may come from a general misconception that children in developed nations are well equipped, both socially and financially, to deal with climatic changes and extreme weather events. This, of course does not reflect the circumstances of all Canadian children and youth, nor does it take into account the unique *biological* vulnerability of children. Secondly, less

than half of all Canadians believe climate change will harm them personally (Yale Program on Climate Change Communication, 2019). If Canadians do not believe they or their children will be directly and personally affected by climate change, they are less likely to advocate for research in this area. Having said that, 83% of Canadians, age 18 and over, believe our planet is warming (Yale Program on Climate Change Communication, 2019), while a recent national climate change education survey found that most Canadians (including children) perceive climate change to be a risk and believe climate change has intensified extreme weather events, such as droughts, wildfires, and flooding (Field *et al*, 2019). However, only 51% of respondents expressed feeling well informed about climate change (Field *et al*, 2019). Hence, the need for expanded research on the impacts of climate change on Canadian children and youth. To date, documented impacts include air pollution (Buka & Shea, 2019), storm-related impacts (Buka & Shea, 2019), heat waves (Séguin *et al*, 2008; Ebi *et al*, 2016; Prairie Climate Centre, 2019) wildfires (Awosoga *et al*, 2018; Kulig *et al*, 2018; Kulig & Dabravolskaj, 2020), and food insecurity in Indigenous communities (Bradette-Laplante *et al*, 2020; Inuit Tapiriit Kanatami, 2018; Ford, 2012; MacDonald *et al*, 2013).

Physiological characteristics and developmental factors increase children and young peoples' vulnerability to air pollution, "which is predominantly a cause of climate change rather than an effect" (Rees & Anthony, 2015, p. 44). Ambient or outdoor air pollution is attributable to anthropogenic activities such as fuel combustion, heat and power generation, and industrial activities (World Health Organization, n.d., n.p.). Pollutants such as particulate matter (PM), polycyclic aromatic hydrocarbons (PAH), ozone (O<sub>3</sub>), nitrogen dioxide (NO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), and carbon dioxide (CO<sub>2</sub>) negatively and disproportionately affect children's health (Perera *et al*, 2019; World Health Organization, n.d., n.p.). More specifically, air pollution from fossil fuel combustion adversely affects birth outcomes and cognitive and behavioral development and may lead to respiratory conditions, such as childhood asthma (Perera *et al*, 2019).

As Buka and Shea (2019) explain "increasing air pollution levels include climate change-related particulates from wildfires, smoke, and airborne dust as well as ground-level ozone, pollens, and spores" (n.p.). As Rees and Anthony (2015) indicate, "increasing temperatures compound the direct toxicity of fossil-fuel pollutants such as ozone, an important trigger of childhood asthma" (p. 44). According to the Harvard T.H. Chan School of Public Health, "thousands of children under the age of 5 die prematurely each year from lower respiratory infections caused by air

pollution from burning fossil fuels” (n.p.). Climate change and increasing temperatures also lead to “an increase in plant growth and pollen production, resulting in higher levels of natural allergens, and consequently an increase in the incidence and severity of asthma and other respiratory conditions in children” (Rees & Anthony, 2015, p. 44). This is especially salient in the context of the Coronavirus disease (COVID-19) pandemic and the virus’ serious implications for those with asthma.

Given the fact that children’s mean breathing rate up until age 12 is about twice as rapid as that of adults, they inhale proportionately more polluted air than adults, especially since they tend to spend more time outdoors engaging in physical activity (Rees & Anthony, 2015). Young children and children living in polluted metropolitan areas, and areas prone to wildfires, are especially vulnerable to climate change and increasing air pollution. According to a report by the Prairie Climate Centre (2019), “wildfire risks will intensify as climate change makes summers longer and drier, leading to more health impacts for Canadians” (p. 8).

Children and young people are affected by extreme weather events (e.g., extreme heat and heavy rain events) in several ways. According to the Ontario Climate Change and Health Vulnerability and Adaptation Assessment Guidelines, infants and young children are “particularly vulnerable populations to extreme heat events” (Ebi *et al*, 2016, p. A31). Their increased vulnerability is a result of physiological characteristics and their dependence on adults. According to Ebi *et al* (2016), their vulnerability can be attributed to the following factors: “increased body heat production during physical activity, faster heat gain from the environment if air temperature is greater than skin temperature owing to greater surface-area-to-body-weight ratio, inability to increase cardiac output, reduced sweating, and dependence on caregiver to recognize heat impacts and take recommended actions” (p. A32).

According to a recent report by the University of Winnipeg, heat waves are projected to increase in frequency and duration in Canada (Prairie Climate Centre, 2019). Eighty percent of Canada’s population lives in urban areas (Climate Atlas of Canada), where the effects of heat waves are most severe due to the urban ‘heat island effect’, which “happens because the closely packed buildings and paved surfaces that make up our cities amplify and trap heat” (Prairie Climate Centre, 2019, p. 2). Disadvantaged Canadian children and youth who live in densely populated urban neighbourhoods are amongst the most at risk for extreme heat-related health impacts, as “managing the effects of heat is largely dictated by a person’s ability to access resources. For

example, people without adequate housing, air-conditioning, or sufficient supplies of drinking water will have difficulty dealing with the heat” (Prairie Climate Centre, 2019, p. 4). Similarly, children and youth living in historically mild climates (e.g., British Columbia) may be especially affected by extreme heat.

In 2021, British Columbia experienced a historical heat wave “caused by a significant atmospheric blocking pattern where a massive dome of hot air, reaching high into the atmosphere, remain[ed] stagnant over western North America” (Environment and Climate Change Canada, 2021a). Several B.C. communities registered temperatures above 40 degrees, including Lytton, B.C., where temperatures reached 47.9 C – the hottest temperature ever recorded in Canada. Prior to the heat wave only about 40% of the province had air conditioning in their homes (Demarco, 2021, n.p.). In the days leading up to the heat wave, the demand for fans and air conditioners increased astronomically, causing prices to skyrocket and supplies to dwindle and disappear (Nesbit, 2021, n.p.). This would have inevitably affected the ability of certain sectors of the population to acquire fans and air conditioners to keep cool.

Between June 25 and July 1, 2021, 808 deaths were recorded across the province – although officials have yet to confirm how many of these deaths were directly attributed to heat (Weichel, 2021, n.p.). Additionally, extreme temperatures in the province have sparked several wildfires. According to B.C. Wildfire Service information officer Taylor Colman, “the province has seen 987 wildfires this year with more than 1,540 square kilometres of land charred, and of that about 1,500 square kilometres is still burning” (as cited in Alam, 2021, n.p.). Normally, B.C. “would have seen about 490 fires on average at this time of the year with about 500 square kilometres burned” (Alam, 2021, n.p.). In addition, large parts of B.C. are now facing drought conditions” (Alam, 2021, n.p.). According to an analysis by the World Weather Attribution (2021), the Pacific Northwest 2021 heat wave “was virtually impossible without human-caused climate change” (p. 1). In addition, the analysis concludes that:

[...] in a world with 2°C of global warming (0.8°C warmer than today which at current emission levels would be reached as early as the 2040s), this event would have been another degree hotter. An event like this – currently estimated to occur only once every 1000 years, would occur roughly every 5 to 10 years in that future world with 2°C of global warming (p. 2).

As previously mentioned, infants and young children are particularly vulnerable to extreme heat due to physiological and developmental characteristics. Children are susceptible to heat-related

illness and other indirect consequences of extreme heat, including falls from windows and balconies. Similarly, drought conditions can adversely impact children's health. For instance, low water levels in reservoirs can impact "the effectiveness of chlorine disinfection to remove or inactivate viruses" as is currently the case in the Regional District of Central Kootenay in British Columbia (Alam, 2021, n.p.), leading to poor water quality and boil water notices.

Flooding also has major ramifications for children, especially Indigenous children living on First Nations reserves where water quality is poor. For a number of reasons, including inequity and environmental racism, (Waldron, 2018) "many Indigenous communities in Canada live with high-risk drinking water systems and drinking water advisories and experience health status and water quality below that of the general population" (Bradford *et al*, 2016, p. 1). As of May 21, 2021, 52 long-term drinking water advisories remain in effect in 33 communities across Canada (Government of Canada, 2021). According to Chakraborty *et al* (2020, p. 3), in Canada "flooding is recognized as the most common and significant environmental hazard to major cities and urban residential neighbourhoods over the past two decades (Burn & Whitfield, 2016 and Buttle *et al*, 2016)".

As Buka and Shea (2019) explain, heavy rains and flooding increase contamination of water sources (n.p.). For Inuit populations whose subsistence and cultural practices are closely tied to the environment, "even subtle environmental changes caused by climatic changes could increase the risk of waterborne disease amongst Inuit peoples and compound existing concerns with current drinking water quality and availability" (Harper *et al*, 2011, p. 94). According to the Canadian Paediatric Society, "increasingly contaminated water sources, for drinking and recreation, spread water-borne infections such as *S. typhi*, *Giardia*, *E. coli*, *Cryptosporidium*, and amebiasis when heavy rains or flooding overwhelm sewage treatment facilities" (Buka & Shea, 2019, n.p.). In addition, "warmer seasons facilitate food contamination, increasing risk for gastrointestinal infections. In Canada, children under 4 years old are more likely than adults to be reported with an infection from *Campylobacter*, *Giardia*, *Salmonella* or *Shigella* species" (Buka & Shea, 2019, n.p.).

### *Mental Health Consequences*

Climate change has serious ramifications for the mental health and psychological wellbeing of children and youth. According to Burke *et al* (2018), "the direct and flow-on effects of climate

change place children at risk of mental health consequences including PTSD, depression, anxiety, phobias, sleep disorders, attachment disorders, and substance abuse. These in turn can lead to problems with emotion regulation, cognition, learning, behavior, language development, and academic performance” (abstract). In developed nations, such as Canada, children “in disadvantaged circumstances [...] will be worst affected” (Burke *et al*, 2018, p. 35) by the psychological effects of climate change given the many socioeconomic challenges they already face.

Globally, an increasing number of children and youth are developing negative psychological and emotional responses to climate change, including worry, fear, stress, hopelessness, anger, grief, and ‘climate anxiety’ (Clayton, 2020; Wu *et al*, 2020). Although “climate anxiety appears to be particularly prevalent among younger adults” and “is more common among those who care more about environmental issues (Clayton & Karazsia, 2020; Searle & Gow, 2010) or who have experienced some impacts of climate change (Reser *et al.*, 2012)”, “given the reach of communications technology, almost everyone could be affected by climate anxiety regardless of their own personal vulnerability or relative safety” (Clayton, 2020, pp. 2-3). Citing Bartlett (2008), Clayton points out that children and young people are uniquely vulnerable to mental health consequences of climate change for several reasons. First, children tend to “have stronger responses to extreme weather events, such as PTSD, depression, sleep disorders, etc., partly due to their greater dependence on adult family members and social support networks that might be disrupted by the event” (Clayton, 2020, p. 2). In addition, given their dependence on parents and caregivers, children may be indirectly affected by climate-related mental health challenges faced by their caregivers. For instance, how are Inuit children and youth affected by their caregivers’ “grief associated with disruptions to environmental knowledge systems and resulting feelings of loss of identity” (Cunsolo & Ellis, 2018, p. 276)? Lastly, developmental differences (Ojala 2012) and children’s ability to regulate and control their own emotions and behaviours may affect their perceptions of and responses to climate change.

In a recent national climate change education survey, 76.3% of student respondents in grades 7 to 12 expressed concern about the impacts of climate change (Field *et al*, 2019, p. 37), while 46% “do not believe that human efforts in mitigation or adaptation will be effective” (p. 18). This disillusionment and skepticism over the effectiveness of human efforts may contribute to anxiety, as “the anxiety that characterizes some people’s response to climate change is structured in part by the way in which society is addressing, or not addressing, the problem”

(Clayton, 2020, p. 5). In order to effectively address individual climate anxiety, Clayton (2020) argues “we must find a way to respond to individual problems without losing sight of the social consequences – to talk about climate anxiety as a psychological experience without implying that the causes, and appropriate responses, are intrapsychic” (p. 5). In other words, “interventions to protect individual mental health are unlikely to be fully effective in the absence of societal, or even global, attention to the issue” (p. 5).

In Canada, the past decade has “seen unprecedented seasonal flooding in cities, such as Calgary, Montreal, Thunder Bay, and Toronto. More intense and prolonged drought conditions in the prairies have made wildfires more frequent and difficult to control, while rising sea levels and coastal instability are eroding usable landmass” (Buka & Shea, 2019, n.p.). Children and youth living in these and other flood-, drought-, and wildfire-prone areas in Canada, as well as the Canadian Arctic, are vulnerable to mental health consequences of climate change which, as mentioned above, may affect young people directly, indirectly, gradually, or vicariously, and in the short and long-term (Burke *et al*, 2018). As Clayton (2020) explains, “for some people, the negative emotions relating to climate change are likely to be intense enough to contribute to mental illness” (p. 3) while “long-term and/or permanent effects of early experiences of trauma [...] can impair children’s ability to regulate their own emotions and can lead to learning or behavioral problems” (Burke *et al*, 2018, p. 2).

A recent national synthesis entitled *Climate Science 2050: Advancing Science and Knowledge on Climate Change* emphasizes the need to “understand mental health and psycho-social impacts of acute climate impacts and longer-term impacts on mental health and well-being, including impacts to children and youth [and] knowledge of affirmative mental health outcomes” (Environment and Climate Change Canada, 2020, p. 56). Furthermore, research is needed to understand the ways in which climate change is further affecting populations (and young people in particular) who already suffer high levels of mental illness, including involuntary migrants (Burke *et al*, 2018) and Indigenous children in Canada.

### Socioeconomic and Sociocultural Factors Influencing Vulnerability

The impacts of climate change are unevenly distributed and disproportionately impact marginalized and disadvantaged populations (IPCC, 2014). This is articulated in the Fifth

Assessment Report of the United Nations Intergovernmental Panel on Climate Change, which states that:

People who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses. This heightened vulnerability is rarely due to a single cause. Rather, it is the product of intersecting social processes that result in inequalities in socioeconomic status and income, as well as in exposure. Such social processes include, for example, discrimination on the basis of gender, class, ethnicity, age, and (dis)ability (Summary for Policymakers, p. 6).

Considering Canadian children and youth are not a homogenous group, climatic changes and extreme weather events will affect them in different ways and degrees of severity. In addition to biological and behavioural factors, children and youth's 'health outcomes and health status' (Hayes *et al*, 2019) are influenced by Social and Ecological Determinants of Health. Social Determinants of Health (SDoH) include "employment, education, income, housing and working conditions, physical environments, social supports, access to healthcare, culture, gender, and childhood experiences", while Ecological Determinants of Health (EDoH) include "environmental factors—such as climate change and atmospheric changes; ecotoxicity and pollution; and resource, ecosystem, and species depletion" (Hayes *et al*, 2019, p. 2).

The socioeconomic and sociocultural circumstances of children and young people may exacerbate their vulnerability and undermine their capacity to cope with, adjust, and adapt to climate change. For instance, "children are dependent on the socioeconomic position and resources of their family and community. Low-income children and children of color are more likely to experience existing health inequities that place them at greater risk for adverse impacts of climate change" (Public Health Institute/Center for Climate Change and Health, 2016, p. 1). Moreover, "children on the edge, like families on the edge, have fewer assets to draw on in every sense of the word" (Bartlett, 2008, p. 502). This consequently affects and limits their ability to cope with environmental hazards and climatic changes.

According to Chakraborty *et al* (2020), "the socioeconomic status of Canadians is unevenly distributed within and among communities" and "these socioeconomic differentiations affect Canadians differently" (p. 10). The *social vulnerability* of Canadian children and youth—their "characteristics" and "situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard" (Wisner *et al*, 2004, as cited in Chakraborty *et al*



2020, p. 1)—remains largely undocumented in the published literature to date. Furthermore, the social vulnerability of vulnerable subgroups within this group is not understood.

As Chakraborty *et al* (2020) explain, “the social aspects of vulnerability are often considered to identify and understand whether some groups of people or communities are more sensitive and susceptible to the impacts of natural hazards” (p. 2). Thus, in order to construct “a knowledge base that can enable more targeted solutions and strategies for effective mitigation” and adaptation, as well as increase “future social capacity and resilience (Tapsell *et al*, 2010)” (p. 2), it is necessary to identify which subgroups (and communities) of Canadian children and youth are more sensitive and susceptible, not only to the impacts of natural hazards, but also to climatic changes.

According to Statistics Canada (2017a), “nearly 1.2 million Canadian children younger than 18 (17.0%) lived in a low-income household in 2015” (n.p.). Unfortunately, Indigenous children are overrepresented in rates of poverty. According to the 2016 Census, “among Indigenous Peoples, status First Nation children living both on reserve and off-reserve experience the highest poverty rates of 53% and 41% respectively. Across Canada, 32% of non-status First Nations children were living in poverty as were 25% of Inuit children and 22% of Metis children” (as cited in Campaign 2000, p. 7). Additionally, “children of former or current landed immigrants or permanent residents had a poverty rate of 35%” while “racialized children had a poverty rate of 22%” (2016 Census as cited in Campaign 2000, p. 7).

According to Statistics Canada (2017b), “in 2016, close to 2.2 million children under the age of 15 living in private households were foreign-born (first generation) or had at least one foreign-born parent (second generation)” (n.p.). On their website, the Canadian Paediatric Society (2020) states that, “children and youth new to Canada do not enjoy the same sustained high standard of health as their Canadian-born peers” (Immigrant and Refugee Health, n.p.). In addition, immigrant and refugee children are vulnerable to health disparities, as documented by Lane *et al* (2018). “Whether children arrive in Canada as refugees or immigrants, many appear to be vulnerable to health disparities because of their families’ social and economic conditions related to poverty and social marginalization, combined with poor access to the inter-related systems of health, economic, and social resources” (Lane *et al*, 2018, p. 1051). Similarly, “Inuit communities experience greater disparities in health outcomes compared to the non-Aboriginal Canadian populations, from lower life expectancies, to higher incidences of infectious disease,

diabetes, obesity, and respiratory illnesses, to higher occurrences of alcohol and drug usage, to higher occurrences of mental illness, suicide, and suicidal tendencies” (Cunsolo Willox *et al*, 2013, p. 15).

Research to date has focused primarily on the socioeconomic and sociocultural factors influencing the vulnerability of Inuit populations in Canada, while factors contributing to the vulnerability of other Indigenous and non-Indigenous children and youth, remain largely undocumented. More specifically, there is a scarcity of information on how their vulnerability may be exacerbated by factors such as poverty, discrimination, and lack of opportunity and social support. “Previous research has documented that socioeconomic status (SES) greatly influences social vulnerability, both directly, via financial resources (e.g., income, wealth, savings) and indirectly, via nonfinancial coping resources (e.g., social support and resilient personality characteristics including education and occupation)” (Chakraborty *et al*, 2020, p. 2). Therefore, populations who experience challenging economic conditions are more vulnerable to adverse effects of climate change.

In Canada, “Black people generally live in more difficult economic conditions than the rest of the Canadian population” (Houle, 2020, p. 31) Moreover, this population faces several challenges including racism, discrimination, higher rates of unemployment, lower annual wages, and low education (Houle, 2020). In addition, Black children experience a higher low-income rate than other children. According to Houle (2020) “nearly one-third of Black children from Black families have low-income status” (p. 28). More specifically, “the low-income rate for Black children is two and a half to three times higher than that observed for other children” (Houle, 2020, p. 28). As Houle (2020) explains, “one of the causes of the relatively elevated low-income rate among Black children is the level of lone parenthood observed in Black families” (p. 29). In *Canada’s Economic Apartheid*, Galabuzi (2006) argues that “historical patterns of racialization and systemic racial discrimination” are “key determinants of access to opportunity and livelihood for racialized group members, as demonstrated by their overrepresentation in low-paying occupations and low-income sectors, underrepresentation in high-income sectors and occupations, and their differential experience with higher unemployment, poverty, and social marginalization” (preface, n.p.).

Black children and youth, unlike other children and youth, are affected by the socioeconomic conditions of their parents and caregivers in several ways. “Several ‘risk factors’ associated with

parents' characteristics or status—such as immigrant status, lone parenthood, unemployment, low education or insufficient earnings—can have negative repercussions on children and youth, in particular because they can lead to low-income status (Lichter and Eggebeen 1994; Thomas 2011)” (Houle, 2020, p. 28). As mentioned above, low-income status and poverty greatly influence a person or group’s vulnerability and negatively impact their ability to cope with, adjust, and adapt to climate change. Therefore, given the aforementioned facts regarding Black children, and the Black population of Canada more generally, one can assume that climate change will disproportionately impact low-income Black children and youth in Canada.

Inuit populations face similar challenges. Globally, socioeconomic and health inequality “lie at the heart of indigenous vulnerability to climate change” (Ford, 2012, p. 1262). In the Canadian Arctic, Inuit populations are vulnerable to climate change due to their close relationship to the land, traditional livelihoods, and reliance on subsistence (IPCC, 2014) and natural resources (Ford, 2012; MacDonald *et al*, 2013). Climate change is affecting the ability of Inuit populations to harvest wildlife and fish due to changes in wildlife distribution and travel conditions (MacDonald *et al*, 2013). Moreover, “climate change is thinning land and sea ice in the North, making traditional routes, and activities such as hunting, increasingly dangerous” (Buka & Shea, 2019, n.p.). Consequently, Inuit populations are becoming increasingly food insecure.

Food insecurity has several implications for Inuit children and youth’s development, nutrition, and cultural identity and wellbeing (Ford, 2012; MacDonald *et al*, 2013). “Among Inuit populations, a high prevalence of food insecurity associated with poverty and high cost of living is expected to increase sensitivity to nutritional deficiency caused by climate change-related stresses on traditional food systems, with women and children identified to be at high risk” (Ford, 2012, p. 1262). Furthermore, “food insecurity impacts [Inuit] children’s cognitive, academic and psychosocial development” as well as their “cultural well-being because of the continued importance of country foods such as seal, whale, and fish harvested from the local environment” (Inuit Tapiriit Kanatami, 2018, p. 16). Loss of cultural traditions and practices has been shown to undermine the adaptive capacity of young Indigenous peoples, as these are considered “protective factors that promote Indigenous youth resilience” (MacDonald *et al*, 2015, p. 487). In addition, as Hrabok *et al* (2020) explain, “loss of sense of self and connection to seasonal rhythms, and lost relevance of generational knowledge and responsible land stewardship, may be key triggers of grief among [...] Inuit” populations (p. 2). This is also relevant to other Indigenous populations in Canada, whose cultural histories and traditions are

closely tied to the natural environment. For instance, in an appeal to the UN Committee on the Rights of the Child (CRC), Haana Edenshaw, a youth Haida Nation member, said: “My rights to my culture and language face great risk due to climate change. It was through access to a healthy environment and elders that I was able to learn my language. It is through fishing and gathering seaweed, clams and spruce roots that I can learn my cultural history” (David Suzuki Foundation, 2020, para. 3).

Although food insecurity is most prevalent among Indigenous and Black households (PROOF Food Insecurity Policy Research), it affects millions of Canadians and is considered a “serious problem in Canada” (PROOF Food Insecurity Policy Research, n.d., n.p.). In the period between 2017 and 2018, “there were 4.4 million people, including more than 1.2 million children under the age of 18, living in food-insecure households” (Tarasuk & Mitchell, 2020, p. 3). Moreover, “1 in 6 Canadian children under the age of 18 is affected by household food insecurity, while “households with children led by female lone parents are especially vulnerable” (PROOF Food Insecurity Policy Research, n.d., n.p.). According to PROOF, “food insecurity leaves an indelible mark on children’s wellbeing. Experiencing food insecurity at an early age is associated with childhood mental health problems, such as hyperactivity and inattention. Experiences of hunger in childhood increase the risk of developing asthma, depression, and suicidal ideation in adolescence and early adulthood” (n.p.).

While the effects of climate change on Indigenous, and more specifically Inuit food security have been documented in the published and grey literatures, information on the impacts of climate change on the food security of non-Indigenous people and other Indigenous groups remains largely undocumented.

### Vulnerability at Schools and Playgrounds

In Canada, children and young people spend a considerable amount of time at school. According to the Canadian Public Health Association (2019), Canadian “children spend upwards of 30 hours per week at school” (n.p.). As such, school environments can have a tremendous impact on children’s health and wellbeing. As Sheffield *et al* (2017) explain, “children’s respiratory health, neurocognitive development, immune system response, their learning comprehension and school performance, and even adult health status and life expectancy are all influenced by their school environment” (p. 2).

Climate change may increase children's exposure to environmental hazards at school and negatively affect their health and wellbeing. For example, climate change can "worsen indoor air quality due to mold growth or increase risk of exposure to toxic building materials post flooding" (Sheffield *et al* (2017, p. 2). Furthermore, "increasing evidence suggests potential for climate change to also introduce nascent environmental hazards (e.g., heat extremes in previously cooler climates, overcrowding due to displaced populations, or shifting geographic range of vector borne diseases)" (Sheffield *et al*, 2017, p. 2).

In Canada, the length of time children spend playing in schoolyards varies according to jurisdiction. However, "over 80% of schools have one or more active school policies, including [outdoor] recess" (Canadian Public Health Association, 2019, n.p.). As Flax *et al* (2020) point out, "greening schoolyards is an effective and multi beneficial tool to address climate change as a means to offset the heat island effect, absorb rainwater, and abate fine particle pollution" (p. 2) in urban areas. Flax *et al* (2020) outline a number of benefits to greening schoolyards, including addressing adverse effects of climate change, such as urban flooding, "by replacing impermeable asphalt with permeable materials"; "combating fine particle pollution"; contributing "to air quality improvements"; and providing "positive health benefits to children", including "improving cognitive and motor fitness, reducing gender differences," and improving "health indicators" (p. 2). In addition, Flax *et al* (2020) advocate for children's direct involvement in the design process of their schoolyards. As the authors explain, "children's influence in design or transformation of their schoolyards increases the benefit of those investments" (p. 2). More importantly, children "learn about becoming an engaged citizen, are taught the value of their opinion, and become invested in the outcome. Finally, when children are involved early in the project, they learn valuable lessons in how our actions as humans impact the environment and how to adapt their environment for the future" (Flax *et al*, 2020, p. 2).

According to a recent national synthesis entitled *Climate Science 2050: Advancing Science and Knowledge on Climate Change*, "playgrounds can present serious risks to the health of children during extreme heat events, such as burns from metal slides and heat exhaustion" (Environment and Climate Change Canada, 2020, p. 59). The Standards Council of Canada and Health Canada are leading an initiative on playground design, which will "develop guidance on how to include temperature and comfort in playground building standards as part of efforts to

make such infrastructures climate resilient across Canada” (Environment and Climate Change Canada, 2020, p. 59).

As previously mentioned, low-income and marginalized children and youth are more vulnerable to climatic changes and extreme weather events due to existing socioeconomic inequalities. Therefore, priority should be placed on improving schools and playgrounds in disadvantaged neighbourhoods “in order to prevent further structural racism and socioeconomic disadvantages” (Sheffield *et al*, 2017, p 11), as well as disproportionate climate change impacts. This would be in line with a climate justice approach to climate change, which argues that those who are marginalized, disenfranchised, and socioeconomically disadvantaged should not be unfairly or disproportionately affected by climate change. The following paragraphs outline the theoretical frameworks of the principles of *climate justice* and *intergenerational justice*, which are essential in discussions regarding the vulnerability and adaptation of children and youth to climate change.

## Intergenerational Justice and Climate Justice

How will climate change further affect Canadian children and youth who are food insecure, low-income, Black, racialized, immigrant, refugee, and disabled? What actions and interventions can governments take to mitigate further adverse effects of climate change, structural and socioeconomic inequality, environmental racism, and food insecurity exacerbations? Reducing the vulnerability of disadvantaged and marginalized children and youth in Canada will require addressing “the profound social and economic inequities that drive the ways in which many children will be so deeply impacted by the climate crisis” (Rees & Anthony, 2015, p. 11). Furthermore, given young people’s vulnerability and “the overwhelming scientific consensus on the cause and potentially irreversible harm associated with climate change, failure to take prompt, substantive action would be an act of injustice to all children” (Ahdoot & Pacheco, 2015, p. e1469). How can Canada prevent such an injustice? How can governments address the climate vulnerability of Canadian children and youth and facilitate their equitable adaptation?

The view that climate change disproportionately affects children and young people (both presently and in future) is widely accepted in the climate change literature (Hayes *et al*, 2018; Rees & Anthony 2015; Ahdoot & Pacheco, 2015; Gibbons, 2014; Weston 2007); so too is the argument that climate change is both an *intergenerational justice* and a *climate justice* problem

(Rees & Anthony, 2015; Ahdoot & Pacheco, 2015; Mochizuki, & Bryan, 2015; Gibbons, 2014; Weston 2007). Climate change is an intergenerational problem because it has serious implications for future generations who will experience its effects longer than current ones. Moreover, given that the impacts of climate change are *unevenly* distributed and *disproportionately* affect vulnerable, disadvantaged, and marginalized populations more acutely, it is also a climate justice problem. The concepts of intergenerational justice and climate justice are inextricably linked. Gibbons (2014) argues that climate justice ‘has a dimension beyond geographic space: it has a dimension of time, across generations. Children alive today, and those to be born in the future, have a claim to climate justice within their own countries, be they rich or poor’ (p. 20).

Although there are many approaches to climate justice (e.g., historical responsibility approach, rights-based approaches, etc.) this paper focuses in particular on the *human rights approach* and considers “grassroots articulations” (Schlosberg & Collins, 2014) of the climate justice *youth* movement. Caney (2006) argues “that the current consumption of fossil fuels is unjust because it generates outcomes in which people’s fundamental interests are unprotected and, as such, undermines certain key rights” (p. 255). Caney (2006) further argues “that this is unjust whether those whose interests are unprotected are [...] currently alive or are as yet not alive” (p. 255). Schlosberg and Collins (2014) make a similar argument, asserting that “climate change is simply a new way to violate basic human rights, and climate justice means providing for those rights to which we have already agreed” (p. 365). In recent years, children and youth across Canada have echoed these concerns and sought to hold the Canadian Government accountable for violating their basic human rights. Since 2019, children and youth across Canada have filed climate justice lawsuits against the federal and provincial governments alleging violations to their rights and freedoms and to that of future generations under sections 7 and 15 of the Canadian Charter of Rights and Freedoms.

According to Schlosberg and Collins (2014), “the movement idea of climate justice originated with a focus on removing the causes of climate change, as well as addressing the inequitable impacts of the oil industry at all stages” (p. 366). In addition, the movement advocates for “a ‘just transition’ to a post-carbon economy [while] providing assistance to vulnerable communities” (Schlosberg & Collins, 2014, p. 366). The intersectionality between climate, social, and intergenerational justice is often articulated and advocated for by scholars and activists whose research or work is child- and youth-centred or led. This is evidenced by the Fridays for Future

(FFF) Global Climate Strike movement, a youth-led grassroots movement initiated and led by Swedish youth climate activist, Greta Thunberg in 2018. The FFF movement gained international attention in 2019, leading to the largest climate demonstration in human history, which took place in September of that same year.

The FFF movement, which organizes local and global, physical and digital school strikes, rallies, and marches has adopted an *intersectional approach* to climate justice, outlining “collective demands, that include indigenous rights and sovereignty; defending land, water, and life; zero-carbon economy; separation of oil and state, universal public services and infrastructure; justice for migrants and refugees and a sustainable future for all” (Mar, 2019, n.p.). In a 2019 speech to the United Nations Climate Summit in New York, Greta Thunberg said “the eyes of all future generations are upon you”. This concern for future generations, their rights to a healthy planet and natural and cultural resources, as well as the potentially disproportionate distribution of burdens amongst future generations is articulated by many scholars and activists in various fields.

Caney (2006), a political philosophy scholar, argues that “persons should not act in such a way that those who are born in the future are unable to enjoy certain rights” (p. 268). This is perhaps most succinctly expressed in the Great Law of the Haudenosaunee. According to the Great Law of the Haudenosaunee, “in each deliberation, we must consider the impact of our decisions on the next seven generations” (as cited in Graham, 2008, p. 47). As Graham (2008) explains, “responsibility to future generations is a central tenet of the Haudenosaunee decision-making process. [...] Today, this mandate is a governing ethic of many indigenous nations, particularly in the areas of environmental protection and resource development” (n1, p. 47).

The concept of equity between generations is referred to both as *intergenerational equity* and *intergenerational justice* in the published literature. According to Weiss (2008), an environmental law scholar, there are “three principles of intergenerational equity: options, quality, and access” (p. 616). The three principles are described as follows:

The first, comparable options, means conserving the diversity of the natural resource base so that future generations can use it to satisfy their own values. The second principle, comparable quality, means ensuring the quality of the environment on balance is comparable between generations. The third one, comparable access,



means non-discriminatory access among generations to the Earth and its resources (Weiss, 2008, p. 616).

Jörg Tremmel, a political economist, future generations scholar, and founder of the Foundation for the Rights of Future Generations (FRFG), defines intergenerational justice in a similar way. According to Tremmel (2004), intergenerational justice occurs “when the accumulated capital, which the next generation inherits, is at least as high as what the present generation inherited” (as cited in Weston, 2008, p. 392).

Critical to discussions of climate change and intergenerational justice is the concept of *distributive justice*, which considers the distribution of the burdens and benefits of climate change amongst generations (Caney, 2006). As Meyer (2017) explains, “one of the legitimate claims of future generations vis-à-vis present generations appears to be a claim of distributive justice [...] if there is an intergenerational conflict of interests, present generations may be obligated by considerations of justice not to pursue policies that impose an unfair intergenerational distribution of costs and benefits” (n.p.). The following paragraphs outline a number of strategies for mitigating risk and addressing the vulnerability of young Canadians while observing the principles of intergenerational justice and climate justice.

## Reducing Health and Social Vulnerability and Facilitating Adaptation

There is widespread scientific consensus that regardless of current efforts to mitigate climate change, impacts will be felt (in any additional warming scenario) throughout the world because of past fossil fuel emissions (Kagawa & Selby, 2010; Mortreux and Barnett, 2017). As such, adapting to climatic changes is required in order to reduce risk and optimize benefits. For instance, as Séguin *et al* (2008) explain, “adaptation can reduce health risks posed by climate change by providing citizens with the knowledge, tools and confidence needed to take protective actions” (p. 2). Furthermore, vulnerability and “the risks of climate catastrophe can be cushioned or ameliorated by adaptive actions that are or can be brought within the reach of populations at risk” (Rayner & Malone, 2001, p. 177). Regrettably, as Séguin *et al* (2008) explain, “barriers to adaptation exist in Canada and include an incomplete knowledge of health risks, uneven access to protective measures, limited awareness of best adaptation practices to

protect health, and constraints on the ability of decision makers to strengthen existing health protection programs or implement new ones” (p. 2).

The 2019 report of The *Lancet* Countdown on health and climate change argues that “cities and local governments” form “a crucial component of any health adaptation response”, since “the effects of climate change are experienced locally” (Watts *et al*, 2019, p. 1850). Furthermore, the report states that:

An adequate health adaptation response requires an assessment of the vulnerability of populations to different kinds of health effects, an assessment of local geographical and meteorological trends, and assessment of the corresponding capacity of health services. A health vulnerability and adaptation assessment serves as a baseline analysis, against which changes in disease risks and protective measures can be monitored, and strengthens the case for investment in health protection (Watts *et al*, 2019, p. 1850).

Thus, assessing the vulnerability of children and youth to the different kinds of health effects in each province, region, municipality, and community, as well as assessing local geographical and meteorological trends, and the corresponding capacity of health services in each place is essential to developing adequate health adaptations for young Canadians. In addition, identifying which populations are at greatest risk is crucial to address existing health deficits and the implications these have for at-risk populations if left unchecked. Ford (2012) articulates this in the context of Indigenous vulnerability and adaptation. He asserts that “we need to know how global processes interact with local conditions to create vulnerable (or adaptable) populations in light of a rapidly changing climate, where indigenous people are at greatest risk, what characteristics of a population make them vulnerable or adaptable, and what health risks are most pressing” (p. 1263). This, of course, applies to all at-risk populations.

Addressing existing health inequities in Canada is essential to reducing adverse impacts of climate change on children and youth. As mentioned in this chapter, health disparities exist between Indigenous, immigrant, and refugee populations and other populations in Canada. Attending to these disparities, for example through “investments that address the social determinants of physical and mental health and that lead to more accessible [and] culturally appropriate health care” (Inuit Tapiriit Kanatami, 2018, p. 12) would reduce the disproportionate burden of disease on and address the vulnerability of Indigenous, immigrant, and refugee children and youth in Canada. Similarly, identifying the most socially vulnerable communities,

their locations, and exposure to various environmental hazards (Chakraborty *et al*, 2020) is essential to reduce the social vulnerability of Canadian children and youth, develop sustainable and equitable policy, and design interventions which are environmentally, socially, and climate-just. As Chakraborty *et al* (2020) explain, “an understanding of what makes people more vulnerable than others and why can advance knowledge and contribute to more equitable and sustainable risk reduction (p. 2). Furthermore, “social vulnerability analysis further promotes the vulnerability-based justice principle, which maximizes opportunities and minimizes inequalities for the most benefit of least advantaged groups of communities” (Chakraborty *et al*, 2020, p. 2).

The Canadian Paediatric Society provides practical suggestions for mitigating the effects of climate change and addressing the vulnerability of young Canadians (see Buka & Shea, 2019). Buka and Shea (2019) call for “policies to reduce reliance on automotive transport and improve walkability and bike paths in urban and suburban neighbourhoods, to facilitate transfer of outdoor sports to indoor facilities on poor air quality days, and to develop local infrastructure that reduces fossil fuel energy use and flooding or fire risks” (n.p.). Other risk reduction and mitigation strategies include improving food security, educating young people and their parents and caregivers about the importance of reducing waste and animal product consumption, improving cooling centre awareness and use, and mitigating climate-related health effects and disease through education, for example, on heat and sun exposure, air quality, “safe food handling in warmer weather, communicating risks for water contamination with heavy rain events, and promoting protective clothing and repellents to prevent tick and mosquito bite” (Buka & Shea, 2019, n.p.).

Lastly, given the significant influence of schools on children’s health and wellbeing (Sheffield *et al*, 2017), these environments are important places for addressing and reducing their vulnerability to climate change, environmental hazards, and extreme weather events. More specifically, addressing aging and inadequate building infrastructure and environmental hazards at schools, as well as greening schoolyards are important steps towards reducing children and young people’s vulnerability.

## Promoting the Participatory Rights of Canadian Children and Youth

According to the Convention on the Rights of the Child, which Canada ratified in 1991, children have the right to express their views freely (Article 12), the right to freedom of expression

(Article 13), and the right to grow up in a healthy environment (Article 24). It is, therefore, every Canadian child's right to participate in decision-making processes concerning their present and future adaptation and to grow up in a healthy and climate just country. Promoting the participatory rights of *all* Canadian children and youth is essential in addressing their vulnerability to climate change and ensuring their effective adaptation.

Consulting with and including the voices, experiences, concerns, and perceptions of young people in climate change research, as well as encouraging and facilitating their meaningful participation in decision-making processes will ensure that the data collected, and the measures developed are complete and representative of young people and the challenges they face. Furthermore, "adaptation strategies that are developed in collaboration or partnership with youth are more likely to be effective and sustainable, since youth are more invested in the strategies, and will be in the position to advocate for these strategies in years to come" (MacDonald *et al*, 2013, p. 369). As MacDonald *et al* (2013) point out, "a more engaged, knowledgeable, and skilled youth population is not only less susceptible to the socioeconomic and socio-psychological impacts of climate change, but is also a benefit for any community" (p. 369).

The following chapter builds on this discussion of the vulnerabilities and rights of Canadian children and youth to examine the role of education in facilitating and developing their adaptive capacity.

## Chapter III: Adaptive Capacity and Education

### Adaptive Capacity

Despite current mitigation efforts and under any warming scenario, humans will be required to adapt to some inevitable adverse impacts of climate change. However, not every individual, community, or society possesses equal ability or capacity to adapt. The Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change defines *adaptive capacity* as “the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences” (Annex II: Glossary, p. 118). Several factors or ‘determinants’ influence humans’ *adaptive capacity*, as explained below.

Adaptive capacity determinants refer to factors at the individual level or societal levels that support or enhance adaptation. At the individual level, adaptive capacity is determined by individual agency, the perceived need to adapt, the willingness to adapt, and the availability of resources to support adaptation. At the societal level, adaptive capacity determinants include, for example: governance, economics, infrastructure, technology, information and skills, institutions, and equity (Hayes *et al*, 2019, p. 2).

Although research on the concept of adaptive capacity has grown significantly in the last two decades, as Mortreux and Barnett (2017) emphasize, “further empirical research is necessary to understand the relationship between adaptive capacity and adaptation” (p. 7). However, a growing body of research suggests that education, knowledge, awareness, and participation can prepare children and youth for current and future risks, enhance their adaptive capacity, adaptation, engagement, empowerment, and agency (Rees & Anthony 2015; Paas, 2016; Mortreux & Barnett, 2017; Sanson *et al*, 2019; Trott, 2020).

Despite this emerging scholarship, research on the role of education in reducing the vulnerability and enhancing the adaptive capacity and adaptation of children and youth, as well as “consideration of education as a possible protecting factor” remain largely absent in the published literature to date (Muttarak & Lutz, 2014, n.p.). Moreover “educationalists, climate scientists and those shaping or making climate or education policy still have limited understanding of what addressing CC through education should entail” (Mochizuki & Bryan, 2015, pp. 4-5). As Muttarak and Lutz (2014) explain, formal education is “a primary way

individuals acquire knowledge, skills, and competencies that can influence their adaptive capacity” (n.p.). Furthermore, education may indirectly reduce vulnerability by improving socioeconomic status, social capital, and access to information, thereby promoting adaptive capacity (Muttarak & Lutz, 2014). The following sections explore the role of education, and in particular climate change education (CCE), in enhancing the adaptive capacity of children and youth; provide an overview of the state of climate change education in Canada, including current barriers to CCE; and explore a number of educational and pedagogical approaches relevant to this field.

## The Role of Education in Enhancing Adaptive Capacity

Article 6 of the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty signed by 154 states, including Canada, in 1992, outlined six priority areas for addressing climate change. These were “education, training, public awareness, public participation, public access to information, and international cooperation on these issues” (Paas, 2016, Executive Summary, n.p.). All six areas have been identified as “pivotal” in addressing “the complex challenges presented by climate change” (Paas, 2016, Executive Summary, n.p.). This is echoed by Mitchell and Borchard (2014), Rees and Anthony (2015), and Mochizuki and Bryan (2015).

At the United Nations Paris Climate Summit (COP 21) in 2015, Canadian Prime Minister Justin Trudeau said, “Canada can and will do more to address the global challenge of climate change. We will do so because the science is indisputable, and tells us that our planet is already changing in ways that will have profound impacts on our future. . . Our government is making climate change a top priority” (as cited in Wynes & Nicholas, 2019, p. 2). On October 6, 2016, Canada ratified the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Article 12 of the Paris Agreement requires parties to “cooperate in taking measures, as appropriate, to enhance climate change education, training, public awareness, public participation and public access to information, recognizing the importance of these steps with respect to enhancing actions under this Agreement” (United Nations, 2015, Paris Agreement, p. 16).

The United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) recently developed *The*

*Action for Climate Empowerment (ACE) Guidelines* “to help member countries meet their commitments to climate change education, training, and public awareness” (Chopin *et al*, 2018, p. 3). However, as of 2021, Canada has yet to develop “a national strategy in response to the ACE guidelines and to meet their Convention commitments in this regard” (Chopin *et al*, 2018, p. 3). To complicate matters, “the K-12 education system in Canada is federated (province- and territory-based)” and “post-secondary and non-formal education sectors are even more distributed”, therefore, “developing national climate change education policy is difficult” (Chopin *et al*, 2018, p. 3).

Despite its binding obligations to address the aforementioned priority areas and more specifically to enhance climate change education (CCE) in Canada, a recent study found that “while all 13 Canadian provinces mention education within their climate policies, only 46% of provinces specifically mention climate change within their educational policies. When climate change is included, it is often only in relation to reducing school greenhouse gas emissions” (Hargis & McKenzie, 2021, p. 4).

Field *et al* (2019) argue that “education is an essential element of a coordinated response to climate change because of the transformative role that teachers and educational institutions can play in preparing students for climate-altered futures” (p. 21). In addition, Rees and Anthony (2015) argue that “climate change education increases the adaptive capacity of children and their communities, helps to foster environmental stewardship, and develops children’s capacity to be agents of change and active citizens” (p. 67). A recent national synthesis entitled *Climate Science 2050: Advancing Science and Knowledge on Climate Change* emphasizes Canada’s need to understand “how to develop behaviours that lead to resilience and greater literacy related to environmental sustainability” (Environment and Climate Change Canada, 2020, p. 50). Given the importance and potential of education in preparing, informing, and enhancing the adaptive capacity of young people to live in a climate-altered world, how, to what extent, and how effectively is Canada’s education system facilitating this process?

In times of climate change, education must do more than give students the means for upward mobility and “success” as defined by mainstream Western society (Orr, 2004, p. 4). In the words of David Orr (2004):

The plain fact is that the planet does not need more "successful" people. But it does

desperately need more peacemakers, healers, restorers, storytellers, and lovers of every shape and form. It needs people who live well in their places. It needs people of moral courage willing to join the fight to make the world habitable and humane. And these needs have little to do with success as our culture has defined it (p. 4).

Education in general, and climate change education more specifically should develop students' critical, creative, and systems thinking skills and capacities. It should encourage students to "understand systems and recognize the many intertwining, systemic causes of problems" (Weil, 2016, n.p.). For example, Canadian students should be encouraged to question, analyze, and critique Canada's fossil fuel-based economy, systems, and values which support, perpetuate, and advance social inequality, hyperconsumption, environmental degradation, and climate change. As the next generation of adults, young Canadians will play vital roles in preserving the cultural identity and vitality of their communities, as well as assisting in their adaptation, which will require knowledge and the acquisition of new skills. To what extent is Canada's education system preparing young people for these challenges?

## Climate Change Education in Canada

Despite Canada's commitments under the UNFCCC and the Paris Agreement, research has shown that the Canadian education system's response to climate change remains inadequate (Hargis & McKenzie, 2021; Field *et al*, 2019; Wynes & Nicholas, 2019; Chopin *et al* 2018; Bieler *et al*, 2017). A national analysis of "the depth of engagement with climate change education policy across all 13 provinces and territories" has shown "a major gap existing between Canada's climate and education policies" (Bieler *et al*, 2017, abstract). Moreover, "while subnational climate policy calls for education to contribute substantially to addressing climate change, education policy is not aligned towards this call" (Bieler *et al*, 2017, abstract).

A review of climate science curricula in Canadian secondary schools "found that learning objectives tend to focus on" the following three topics: "physical climate mechanisms, observed increase in temperature [and], anthropogenic causes of warming" (Wynes & Nichola, 2019, abstract). In addition, this review found that "Canadian climate change education is not consistent with scientific understanding" and quite concerningly, "doubts are cast on scientific consensus in curriculum documents and textbooks, and debate is encouraged on issues that scientists have already settled" (Wynes & Nicholas, 2019, p. 17). A benchmark survey of Canadians' knowledge and perceptions of climate change found that "about a third of educators



(38% OS and 34% CS) encourage students to debate the likely causes of climate change and about a third of educators (34% OS and 31% CS) also encourage students to come to their own conclusions about the causes of climate change” (Field *et al* 2019, p. 17). This survey also found that only “46% of the student respondents in grades 7 - 12 understand that climate change is happening and that it is human-caused but they do not believe that human efforts in mitigation or adaptation will be effective” (Field *et al* 2019, p. 18). Furthermore, student respondents “indicated that they learn about climate change primarily through their teacher (48%), conversations (40%), class texts (37%), documentaries (37%), and other students (34%). These data highlight how important educational spaces are for students to learn about climate change, its impacts, and mitigation strategies” (Field *et al* 2019, p. 73).

In the same way that public education and educators can influence and contribute to students’ understanding of climate change, its impacts, and mitigation strategies, they can also misinform and in more extreme cases, “promote student subjectivities consistent with neoliberal environmentalism centred on individual actions designed to insulate fossil fuel industries from criticism and dissuade young people from questioning or understanding the role of corporate power in the climate crisis” (Eaton & Day, 2020, abstract). For instance, a recent study “shows how teaching practices and resources work to centre, legitimize, and entrench a set of beliefs relating to climate change, energy, and environmentalism that align with the interests of fossil fuel industry actors in Saskatchewan, Canada” (Eaton & Day, 2020, abstract). Perhaps not surprisingly, Field *et al* (2019) found that only 55% of survey respondents in Saskatchewan acknowledged “that systematic change is a requirement to address climate change challenges” (p. 78).

Despite strong scientific consensus on the gravity of climate change and the role of humans in contributing to this crisis, only 83% of Canadians, age 18 and over, believe our planet is warming, while 60% believe climate change is partly or mostly caused by human activity (Yale Program on Climate Change Communication, 2019). As Hargis and McKenzie (2021) point out “due to increasingly tight timelines to address climate change, and evidence public climate change belief is misaligned with scientific certainty levels, CCE is urgently needed” (p. 2).

The aforementioned national climate change and education survey (Field *et al*, 2019) found that “76% of closed-sample educators and 82% of open-sample educators think the education system should be doing more to educate young people about climate change” (p. 8), while 57%

of parents and “approximately two-thirds of students (62%) and members of the public (63%) indicated the same” (p. 15). Only  $\frac{1}{3}$  of closed-sample teachers surveyed reported teaching any climate change content, while half of teachers surveyed indicated “that they want more professional development on climate change education” (p. 16). Educators cited “lack of time”, “lack of classroom resources”, and “lack of personal knowledge” as barriers for integrating climate change education into the curriculum (Field *et al*, 2019, p. 16). Finally, the survey concluded that “climate change is mostly taught through science-related subjects” despite the fact that “75% of closed-sample educators and 81% of open-sample educators believe that climate change education is the role of all teachers” (Field *et al*, 2019, p. 16). This is not surprising, given the fact that climate change is not a ‘silo’ subject, but rather interdisciplinary in nature, and Canadian secondary school teachers, for example, are subject specialists, or “trained to teach a few specific subjects, rather than all subjects” (Wynes & Nicholas, 2019, p. 4).

A recent review of climate science curricula in Canadian secondary schools found that “curriculum documents often focus on knowledge about climate systems, missing opportunities to educate students on outcomes that would motivate them to contribute to actual solutions” (Wynes & Nicholas, 2019, p. 17). According to Bieler *et al* (2017), “a content analysis of climate and sustainability policies from a representative sample of 50 post-secondary institutions from across Canada found that nearly half had some form of climate policy (Henderson, Bieler & McKenzie, 2016)” (p. 67). However, “policies tended to focus on improving the efficiency of the campus operations and generally had underdeveloped engagement with climate across the institutional domains of overall governance, curriculum, research and community engagement” (Bieler *et al*, 2017, p. 67).

There is growing recognition “that knowledge alone is insufficient to inspire learners’ sustained engagement” and that climate change education should “facilitate learners’ sense of agency and provide opportunities [for] action” (Trott, 2020, p. 34). A 2018 report by the Sustainability and Education Policy Network (SEPN) revealed that “provincial and territorial curriculum guidelines are woefully lacking in preparing an engaged citizenry to help mitigate and adapt to climate change. Aside from a few environmentally focused curriculum guides and subject-specific resources, curricula seem to be largely ignoring the challenge of integrating climate change across the curriculum” (Chopin *et al*, 2018, p. 79). However, despite this, “several Canadian schools are going further than the provincial curriculum to integrate CCE and Education for

Sustainable Development (ESD) within a range of subject classes” (Hargis & McKenzie, 2021, p. 9). For example, the Bruce Peninsula District School, an elementary school in Lion’s Head, Ontario has integrated climate change across subjects (see Figure 1) and adopted a *whole school approach* to climate action.

Subject	Activities
The Arts	Art installations, Protest art, Posters, Energy plays
English	Speeches, Monthly assembly presentations, Reflections
Agriculture	School garden, Orchard, Indigenous tree plantings
Biology	Biological adaptation in the local from climate change
Citizenship	Shoreline and roadside cleanup, Tree planting volunteers
Geography	Carbon footprint around the world
Health	Outdoor classrooms, Forest walks
History	History of resource management to present day extraction
Science	Inquiry based climate change projects
Math	Climate change related math problems
Vocation	Tech class created new raised beds for school garden

Figure 1. Cross-curricular integration of climate-related topics at Bruce Peninsula District School. From Hargis & McKenzie (2021).

How can Canadian Ministries of Education address the aforementioned issues and enhance climate change education in Canada? Field *et al* (2019) offer the following recommendations:

Within formal education, Ministries of Education should embed core climate change expectations across subjects and release policy statements guiding climate change education for each regional jurisdiction. School boards and teachers’ unions should provide professional development to enhance teacher knowledge, tools, and strategies for teaching about climate change, including providing teachers with current provincial/national data and resources. Faculties of Education should include climate change education across subjects in initial teacher education (pp. 8-9).

Bieler *et al* (2017) argue that without “more-in-depth coherence among provincial, territorial climate policies and educational policies and collaboration between researchers and educators, Canadian students will be ill prepared for their future” (p. 81). Furthermore, existing education inequality in Canada may further affect low-income, racialized, and Indigenous children and youth, as discussed below.

### Education Inequality in Canada

Norris (2020) argues that “the democratic character and collective responsibility for the environment of any country depends greatly on an educated population, and to some extent a student contributes to democracy by pursuing education” (p. 880). As O’Brien *et al* (2018) point

out, “research suggests that increasingly unequal access to education [...] can have a complex effect on depressing civic engagement (Flanagan and Levine 2010, Wray-Lake and Hart 2012, Honwana 2013)” (n.p.). Although Canada’s education system “consistently ranks among the highest achieving and the most equitable education systems in OECD countries” (Rogova *et al*, 2016), income and racial inequality affect the learning experiences and outcomes, and educational opportunities of low-income, racialized, and Indigenous children and youth in Canada. For example, Black youth, and young Black men in particular, are less likely to attend a higher education institution and earn a postsecondary diploma, compared to other youth (Houle, 2020). Postsecondary graduation is also considerably lower for Canada’s Indigenous population. For instance, “in 2016, 45% of Inuit in Canada reported having a high school diploma, compared to 86% of the non-Indigenous population in the country” (Inuit Tapiriit Kanatami, 2018, p. 19).

According to Houle (2020) “low education or insufficient earnings—can have negative repercussions on children and youth, in particular because they can lead to low-income status (Lichter and Eggebeen 1994; Thomas 2011)” (p. 28). As Houle (2020) explains, in Canada “the low-income rate for Black children is two and a half to three times higher than that observed for other children” (p. 28). As Rayner and Malone (2001) explain, poverty “is a chronic, systematic exclusion of people from society, and its effects are cumulative” (p. 184). For example, lack of education restricts access to employment throughout one’s lifetime (Rayner & Malone, 2001). Rogova *et al* (2016) discuss the importance of early literacy skills and the implications of social, economic, and education inequality for children.

Extensive research has shown that early literacy skills acquired even before entering kindergarten strongly influence a child’s later academic success. Numerous studies reiterate the importance of early childhood development, highlighting the difficulty of overcoming developmental inequalities. Yet what ought to be more deeply considered is the systemic impact of social and economic inequality, especially as early development depends almost entirely on the resources a family can access both for learning skills and for basic necessities (Rogova *et al*, 2016, n.p.).

The impacts of income and racial inequality on vulnerable children and youth’s educational outcomes in Canada remain largely undocumented in the published literature. How will education inequality affect socially vulnerable children and young people’s adaptive capacity, or ability to anticipate, adjust, adapt, and respond to climatic changes?

Although we are just beginning to understand the impacts of the COVID-19 pandemic on marginalized children and youth's learning experiences and outcomes, some important lessons can be drawn from the pandemic. According to the BC Centre for Disease Control:

Pandemic school closures and the shift to distance education have affected child and youth learning and may result in uneven educational opportunities. Learning insecurity is exacerbated in homes with limited access to technology, multiple platforms used by multiple teachers requiring time and learning by parents and students, school differences providing effective distance learning, as well as home instability and overcrowding (Dove *et al*, 2020, p. 13).

In addition, education disruptions and school closures can have negative effects on the mental health of children and youth. As Dove *et al* (2020) explain, "schools are key settings for mental well-being promotion and access to mental health services. Social and emotional learning curricula foster positive personal attitudes, positive relationships, school connection, and improved academic performance, while reducing emotional distress and conduct problems" (p. 14).

Climate change is likely to increase the incidence of infectious diseases in Canada (Buka & Shea, 2019) and therefore, affect the health, wellbeing, and education of children and youth in Canada, with a disproportional impact on marginalized sectors of the population. Addressing Canada's Indigenous and Black populations' education deficits is crucial to providing equal opportunities for Indigenous and Black children and youth to develop the knowledge and skills necessary to adjust and thrive in a 'climate-altered' world. Canadian children and youth are already experiencing environmental and climatic changes, and the impacts of these changes will be felt well into the future. Therefore, there is a growing need to prioritize children and youth, to "engage them in dialogue and research, and provide educational opportunities and skills-training" so they may "gain the needed knowledge to participate fully in mitigation strategies, adaptation plans, and the futures of their communities" (MacDonald *et al*, 2013, p. 369). Moreover, it is essential to provide equal opportunities for marginalized children and youth in Canada to engage in these processes.

## The Importance of Hope in Climate Change Education

As mentioned in Chapter II of this paper, an increasing number of children and youth are developing negative psychological and emotional responses to climate change, including worry,

fear, stress, hopelessness, anger, grief, and 'climate anxiety' (Clayton, 2020). As previously mentioned, a recent Canadian climate change and education survey found that "46% of the student respondents in grades 7 - 12 understand that climate change is happening and that it is human-caused but they do not believe that human efforts in mitigation or adaptation will be effective" (Field *et al*, 2019, p. 18). As Field *et al* (2019) point out, this is concerning for several reasons, including the impacts this pessimistic outlook may have on the mental health, sense of agency, and political and climate change engagement of young Canadians.

Unfortunately, pessimism regarding climate change is shared by young people globally (Ojala, 2012), therefore, finding ways to "instill hope" (Ojala, 2012) through education, may help young people "use their knowledge in a constructive manner and take an active stance concerning climate change" (Ojala, 2012, p. 637). The concept of hope is complex and includes "emotional, cognitive, existential, identity-related and social aspects" (Ojala, 2012, p. 627). These various components influence a person's sense of hope and motivation (Ojala, 2012). For instance, "the emotional character of the hope concept is a strong motivational force which gives energy to act even in the absence of certainties" (Ojala, 2012, p. 627). It is important to distinguish between hope based on "constructive forms of coping with" climate change and hope based on denial of this phenomenon (Ojala, 2012, p. 636).

According to Ojala (2012), "pessimism seems to be particularly strong when it comes to environmental problems and research has shown that education about global issues sometimes increases these negative feelings" (p. 626). Therefore, the question becomes, how can education inform and empower young people to take effective and constructive action on climate change without generating or further exacerbating mental health issues? How prepared are Canadian educators to take on this difficult task? Jensen and Schnack (1997) propose a participatory and democratic educational concept referred to as *action competence*. According to Jensen and Schnack (1997), "the action competence approach points to democratic, participatory and action-oriented teaching-learning that can help students develop their ability, motivation and desire to play an active role in finding democratic solutions to problems" (p. 62). More specifically, the concept of action competence "comprises two components: an analysis of the nature of environmental problems and an idea of education as something more than academic schooling or behaviour modification" (Jensen & Schnack, 1997, p. 163). Additionally, this concept is divided into "four different components: besides focusing on *knowledge/insight* about the problems and giving the students *action experiences*, they also include *agency and*

*motivation* as well as working with *visions of the future* as important aspects of this educational approach” (Ojala, 2015, p. 134). Thus, “in this regard, there is a close relation between action competence and hope concerning the global future” (Ojala, 2015, p. 134).

The framing of climate change, choice of educational and pedagogical approach, and age-appropriateness of subject matter may influence the response and subsequent engagement of children and youth with climate change. In the words of Hayes *et al* (2018):

The framing of climate change as an impending environmental disaster may contribute to a sense of despair and feelings of helplessness, which can lead to disillusion, apathy, and inactivity, or a perceived lack of potential to influence sustainability outcomes. However, more positive framings and emotions can invoke a sense of hope, engagement, and more constructive strategies of coping (p. 2).

A report from ecoAmerica and the American Psychological Association “indicates that grief and associated anxiety and strong emotions linked to the anticipation of future losses will likely increase in prevalence, and may particularly impact children and youth who are currently growing up with ‘doom and gloom’ narratives” (as cited in Cunsolo & Ellis, 2018, p. 278). As Hargis and McKenzie (2020) explain, “while small doses of concern can provide motivation for action, feeling anxious can result in passivity and hopelessness, especially if the learner is not provided with tools for taking action” (p. 3).

In a world where young people are routinely exposed to highly politicized, conflicting, and controversial news regarding climate change through television, social media, and even textbooks (Wynes & Nicholas, 2019) the need for educators to communicate the science, the seriousness, and the urgency of climate change accurately and effectively, without overwhelming their students and contributing to grief, anxiety, despair, and hopelessness, is ever greater. This is highlighted in the national synthesis *Climate Science 2050: Advancing Science and Knowledge on Climate Change*, which emphasizes Canada’s need to understand “ways of communicating about climate hazards in such a way that does not induce or exacerbate mental health issues” (Environment and Climate Change Canada, 2020, p. 56). Field *et al* (2019) explain that in order “to address apathy and eco-anxiety, school boards, schools and teachers should ensure student learning is authentic and relevant to local climate impacts, utilizing strategies including inquiry, experiential learning, opportunities for deliberative dialogue, and community partnerships for local climate action” (p. 19).

Ojala (2012) argues that education (and education about sustainable development in particular) can serve “as a collective process where teachers and pupils/students together create a story about the future” (p. 637). “Concentrating on hope” is an important aspect of this process (p. 637). Ojala (2012) offers a number of suggestions for co-creating “stories of hope concerning climate change” including emphasizing “trust in one’s own ability to make a difference”, “the importance that one’s own actions have for hope,” encouraging “a feeling of agency”, and, encouraging critical and positive thinking as well as “positive re-appraisal”, all of which can “create a feeling of hope that can help the young to maintain their engagement” (pp. 637-638). Positive re-appraisal refers to the process of reimagining or re-appraising a problem in order to “activate hope” (Ojala, 2012, p. 628). This includes focusing on positive aspects of a given problem (Ojala, 2012).

Recent empirical studies have examined the association between hope and environmental engagement (Ojala, 2008; Ojala, 2012; Li & Monroe, 2019). Ojala (2008) and Ojala (2012) found a positive association between hope and pro-environmental behaviour. Ojala (2008) found “that for individuals highly worried about the global environmental problems, hope was positively related to behavior, while for individuals feeling a low degree of worry, hope was negatively related to behavior” (p. 627). Similarly, Li and Monroe (2019) found “that the association between concern and hope is positive” (p. 948) and “that students’ belief of competency (being effective) is a significant and direct path to hope” (abstract). Interestingly, a study on Swedish high school students (Ojala, 2015) identified two kinds of hope, constructive hope and hope based on denial. Furthermore, the study found that:

Constructive hope was positively associated with engagement and a perception that teachers respect students’ negative emotions concerning societal issues and have a future-oriented, positive, and solution-oriented communication style. Students who felt hope based on denial instead were less inclined to behave pro-environmentally and perceived their teachers as not taking their emotions seriously and as communicating in a pessimistic way (abstract).

Hargis and McKenzie (2021) argue that “climate change education should focus on the social and emotional considerations within which learning occurs” (p. 2), in order to “overcome feelings of eco-anxiety and foster action” (p. 3). According to School Mental Health Ontario, social-emotional skills “are the sorts of skills that are needed to start and keep friendships, complete tasks, and stay positive in the face of stress or adversity” (n.p.). Furthermore, social-emotional learning helps children develop necessary skills to “cope with stress”, “stay positive and



persevere when things are difficult”, and “engage in critical and creative thinking”, all essential skills in the face of climate change (School Mental Health Ontario, n.p.). The following paragraphs explore educational and pedagogical approaches to climate change which foster socio-emotional learning and empower students to think critically and take action.

## Educational and Pedagogical Approaches to Climate Change Education

In recent years, questions of *whether*, *when*, and *how* to teach children and young people about climate change have been widely debated in the private and public spheres. Given the gravity, complexity, urgency, and scale of climate change, parents, scholars, and educators continue to debate about the most appropriate age/time and ways to teach children and young people about this phenomenon. As discussed above, climate change is a highly complex and politicized issue and can contribute to negative psychological and emotional responses in young people. As such, what is the most appropriate age to teach children about this difficult subject? Sobel (1995) famously argued “no tragedies” – “big, complex problems beyond the conceptual and geographical scope of young children” (as cited in the Community Works Journal, n.p.) – “before grade four”, while Kelsey and Armstrong (2012) maintain that “no particular age will feel appropriate” (as cited in Trott, 2020, p. 546). Kellert (2002) argues that middle childhood (ages six to twelve) “is a time of greatly expanded interest, curiosity, and capacity for assimilating knowledge and understanding of the natural world” (p. 133), arguably making this an appropriate time to introduce children to climate change. Some other scholars argue that late childhood (ages ten to twelve) is an ideal period, “given children’s abstract thinking capacity and onset of interest in global problems” (Ojala 2016, as cited in Trott, 2020, p. 546).

Having considered age appropriateness, what educational and pedagogical approaches are most effective in introducing climate knowledge without inducing trauma/further exacerbating mental health issues and fostering constructive climate action? Maclear (2018) explores these complexities in her essay, *Protected or prepared? Children in a stormy world*. The author poses the following salient questions:

In a world of strife and sorrow, how much should children be told? What can they bear, and when does knowledge violate their emotional integrity? At what cost and to what end do we choose to spare or expose children to traumatic subjects? And, perhaps more importantly, given our media-saturated world, what do they already know? (p. 130).

Given the irrefutable evidence of the warming of our planet, teaching children and young people about climate change may be an ethical imperative. However, as previously mentioned the choice of language and framing of climate change cannot be overlooked. Sobel (1995) argues that “if we prematurely ask children to deal with problems of an adult world, we cut them off from the possible sources of their strength” (as cited in the Community Works Journal, n.p.).

The field of climate change education (CCE) is quite new and research on climate change pedagogy and effective climate change education is still nascent. As previously mentioned, climate change is complex and interdisciplinary, which makes it difficult to teach. In addition, educators and students hold diverse personal beliefs, preconceptions, and biases which may further complicate climate change communication and education. Thus, as Perkins *et al* (2018) suggest climate change and sustainability curriculum should be “coupled with the psychological; namely the beliefs and practices that students bring into the classroom. This means that educators may need to insist that students evaluate and critique their own beliefs and common-sense epistemologies” (p. 1045).

As for teachers who do not believe in anthropogenic climate change, it is essential that they be “instructed (through curriculum documents) to present the most relevant material regarding climate change” (Wynes & Nicholas, 2019, p. 13) and receive appropriate and up-to-date professional development education on this topic. However, as Plutzer *et al* (2016) suggest, promoting content knowledge is not enough as “rejection of sound scientific conclusions is often rooted in value commitments rather than ignorance” (n.p.). In a recent study, Plutzer *et al* (2016) found that “political ideology was a more powerful predictor of teachers’ classroom approach than any measure of education or content knowledge” (n.p.). As such, “simply offering teachers more traditional science education may not lead to better classroom practice. Education efforts will need to draw on science communication research and acknowledge resistance to accepting the science and addressing its root causes (Kahan, 2014; Dietz, 2013)” (Plutzer *et al*, 2016, n.p.).

A recent review of Canadian climate and education policies found that climate change pedagogy is “entirely absent from discussions” in these documents (Bieler *et al*, 2017, p. 80). In Canada, current climate change education and actions tend to focus on individual choices as well as behavioural and lifestyle changes to mitigate climate change, while failing to address

systemic problems advancing this issue (Chopin *et al*, 2018; Hargis & McKenzie, 2021). However, there is growing recognition that addressing climate change requires more than individual action or change. As 15-year-old Greta Thunberg (2018) expressed in her speech at the COP24 meeting in Katowice, Poland, “if solutions within the system are so impossible to find, maybe we should change the system itself” (as cited in Bentz *et al*, 2019, p. 1).

If young people are to become “systems changers” (Bentz *et al*, 2019), how can educational systems facilitate this process and what educational approaches are most conducive to this task? Bentz *et al* (2019) argue that “empowering young people to be ‘systems changers’ is not [...] straightforward. It is particularly challenging within educational systems that prioritize instrumental learning over critical thinking and creative actions” (p. 1). Research to date indicates that the Canadian education system is in many ways failing to empower young people to become systems changers. A national overview of climate change education policy confirmed “a tendency towards ecologically modernizing sites of learning without adequately attending to what is learned therein (i.e., curriculum and pedagogy)” (Bieler *et al* 2017, p. 80). Furthermore, “in cases where teaching and learning are addressed in relation to climate in policy in Canada, we see a dominance of smart growth reform discourses that position education as training for low-carbon sectors and a green economy” (Bieler *et al* 2017, p. 80). Eaton and Day (2020) argue that “schools are now expected to produce scientifically literate job-ready workers who will go out into the world-as-it-is and reproduce the social relations which have led to climate and environmental crises” (p. 470). The question then becomes, what educational and pedagogical approaches are most effective in educating children and young people about climate change while simultaneously empowering and enabling them to become systems changers? Hargis and McKenzie (2021) make the following suggestions:

Students could be encouraged to utilize critical thinking skills to determine the source of systemic problems contributing to climate change. Schools could also adopt climate action approaches to help address feelings of powerlessness associated with climate change and implement initiatives aimed at the broader systemic social structures that support climate inaction. For example, students could engage with representatives in municipal, provincial, and federal government to advocate for broader governmental and policy change (p. 11).

This would entail less instrumental and more inclusive and participatory approaches to learning (Field, 2017) than is currently the norm in Canada.

To date, climate change education (CCE) has consisted primarily of efforts to increase students' scientific literacy and understanding of climate science (Hargis & McKenzie, 2021). However, research suggests that scientific literacy alone is insufficient to spur and sustain students' political engagement and action on climate change (Trott, 2020; Hargis & McKenzie, 2021). Eaton and Day (2020) argue that “the emphases on scientific literacy and on science, technology and society (STS) have not resulted in the kind of transformative pedagogy that would challenge the corporate power of the industries that are actively blocking a transition to a post-carbon economy” (p. 470). Similarly, Orr (2004) argues that “more of the same kind of education will only compound our problems. This is not an argument for ignorance, but rather a statement that the worth of education must now be measured against the standards of decency and human survival [...] It is not education that will save us, but education of a certain kind” (p. 2).

There is a growing emphasis on “transformative” or “transformation-oriented” learning as an alternative educational paradigm in the field of climate change education. Additionally, transformative learning is gaining increasing attention in the field of sustainability, “and is considered critical to enhancing and catalysing social transformations towards sustainability (Boström *et al*, 2018)” (Aboytes & Barth, 2020). As Bentz *et al* (2019) explain, the transformative learning approach builds on Brazilian educator and philosopher Paulo Freire’s (1974) “idea that education should contribute to a critical awareness (*conscientização*), also seen as an increased capacity for choice, which is the basis for conscious action” (p. 3). Mezirow (2003) describes transformative learning as “learning that transforms problematic frames of reference—sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets)—to make them more inclusive, discriminating, open, reflective, and emotionally able to change” (p. 58). One of the most important characteristics of this approach is that it explores and highlights “the social, ethical, and political dimensions of climate change, while encouraging diverse participation and social change action (Schreiner *et al*, 2005)” (Trott, 2019, p. 44).

A recent arts-based experiment with students at an Art High School in Lisbon, Portugal demonstrated that “a transformative learning approach that engages students with art can support critical thinking and climate change awareness, new perspectives and a sense of empowerment” (Bentz *et al*, 2019, abstract). Bentz *et al* (2019) argue that “art can contribute to transformative learning for systems change” (p. 5) given its historical ability to create “novel spaces for reflexivity and experimentation” (abstract). A recent study which “integrated

transformative pedagogy with arts-based and participatory methodology to empower children’s agency through personally relevant and locally meaningful action projects addressing climate change” found that its participants (children 10 to 12 years of age) “acquired new knowledge about climate change and its local impacts” and “developed stronger beliefs in their agentic capabilities, while taking tangible steps towards the sustainable transformation of their communities” (Trott, 2019, p. 58). Field (2017) also emphasizes the importance of transformative learning, arguing that “educational responses that emphasize participatory, place-based and transformative or emancipatory approaches to learning are likely to be more generative and responsive to young people’s needs” (abstract).

Hargis and McKenzie (2020) highlight the “critical” role of social learning and place-based pedagogies “in moving beyond climate and environmental awareness to empowerment and action” (p. 2). They further advocate for “a ‘whole institution’ or ‘whole school’ approach to climate change, which involves engagement in each of the areas of teaching and learning, facilities and operations, community partnerships, and governance” (p. 3).

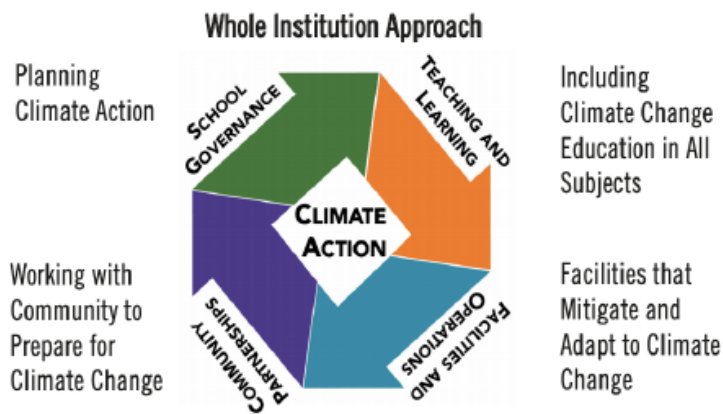


Figure 2. Overview of the ‘whole institution’ approach to climate change education. Source: Hargis & McKenzie (2020, p. 3).

For example, Central Memorial High School in Calgary, Alberta offers a course on Energy and Environmental Innovations which employs the whole institution approach. As Hargis and McKenzie (2020) explain, students in the course have “participated in policy initiatives, with some taking part in the Intergovernmental Panel on Climate Change meetings in Edmonton in 2018 (teaching and learning; community partnerships). In previous years, a proposal from the course resulted in the former NDP provincial government committing \$9 million to install solar panels on school roofs (facilities and operations; community partnerships)” (p. 9). Similarly, the

Bruce Peninsula District School in Lion's Head, Ontario has adopted a whole school approach to climate action, becoming a certified Ontario EcoSchool—a certification program recognizing environmental excellence through environmental learning and action—and creating a program called *Simply Living Simply*. This program “drives climate actions across all four whole school domains within the elementary school” (Chopin *et al*, 2018, p. 25). As part of this program, “local and community experts are invited [...] to work with students to solve school problems related to climate change” and students learn “outside the classroom through cooperative learning experiences and action projects, such as garbage cleanups and tree planting days with local environmental groups and parks” (Chopin *et al*, 2018, p. 25).

Initiatives and programs of this nature help to make climate change *local, tangible, and relevant* to students (Hargis and McKenzie, 2020). A growing body of research supports place-based approaches to climate change education (Field, 2017; Hargis and McKenzie, 2020). According to Gruenewald and Smith (2014) “place-based or place-conscious education introduces children and youth to the skills and dispositions needed to regenerate and sustain communities. It achieves this end by drawing on local phenomena as the source of at least a share of children’s learning experiences, helping them to understand the processes that underlie the health of natural and social systems essential to human welfare” (n.p.). Gruenewald (2003) argues that “place-based pedagogies are needed so that the education of citizens might have some direct bearing on the wellbeing of the social and ecological places people actually inhabit” (p. 3). As Gruenewald and Smith (2014) explain, unlike “conventional schooling with its focus on distant events and standardized knowledge, education conscious of place systematically inducts students into the knowledge and patterns of behaviour associated with responsible community engagement” (n.p.).

Place-based education serves as an important vehicle for contextualizing climate change and helping young people to understand that climate change is not a far-away problem with complex and inaccessible solutions. Rather, place-based education allows “children to recognize the assets found in the human and natural environments closest to them, including understandings drawn from traditional cultural practices that emphasize restraint in the use of natural resources and support for social practices informed by mutuality (Bowers, 2005)” (Gruenewald and Smith, 2014, n.p.). Hargis and McKenzie (2020) argue that “inclusion of local problems and solutions, demonstrates that climate change issues are both local and actionable. Thus, how CCE is taught is just as important as the content” (p. 3). A recent systematic review of the literature on

climate change education revealed “six themes that contribute to effective climate change education” (Monroe *et al*, 2019, p. 804). These are: “focusing on personally relevant and meaningful information, using active and engaging teaching methods, engaging in deliberative discussions, interacting with scientists, addressing misconceptions, and implementing school or community projects” (Monroe *et al*, 2019, abstract). Trott (2020) also emphasizes these themes, highlighting the need to provide young people with examples of local practices and initiatives to address climate change, engage them through active dialogue, and provide them with opportunities for action, for example through community projects. Similarly, Field (2017), argues that “adopting community as curriculum into schools, focuses on knowledge production becoming a participatory process that is practiced with community members trying to solve problems (Cormier 2010)” (p. 86). Additionally, some scholars have emphasized the benefits of integrating traditional and Indigenous knowledge into climate change education. Currently in Canada, “few schools, divisions, or Ministries [link] Indigenous knowledge to climate action” (Hargis & McKenzie, 2020, p. 20). However, as Hargis and McKenzie (2020) explain, “Indigenous knowledge often includes crucial locally relevant mitigation and adaptation strategies, which can bolster community resilience in the face of climate change. Meaningful engagement with local Indigenous communities can also make climate change education more relevant to students through connections to local place” (p. 20). As Orr (2004) notes, important local/vernacular knowledge is currently being lost. “All things considered, it is possible that we are becoming more ignorant of the things we must know to live well and sustainably on the Earth” (Orr, 2004, p. 3).

While place-based education models can provide opportunities for engagement with Indigenous communities and Indigenous knowledge, Tuck *et al* (2014) caution against “place-based and other forms of environmental education that position themselves as culturally or politically neutral while perpetuating forms of European universalism (Mignolo 2003) and settler colonialism, including understandings of Indigenous peoples as repositories of static forms of cultural knowledge (Friedel 2011)” (p. 1). As Calderon (2014) explains, “while place-based education models emphasize community needs and engagement, they do not go far enough to promote decolonizing goals that should be included in any place-based education model interested in cultural and ecological sustainability” (p. 26). In contrast, land education “acknowledges that Indigenous knowledge(s)/cosmologies are many times the most viable knowledge systems related to place-based goals of critical sustainability, community building

(Brandt 2009; Cajete 1994; Peña 1998), and addressing issues of territoriality” (Calderon, 2014, p. 27).

Recent scholarship also highlights the importance of engaging young people in decisions regarding their education (MacDonald *et al*, 2015; Field, 2017). Field (2017) “argues that too often educational responses to uncertainty result in instrumental approaches where children and youth are not given agency to be active participants in their educational choices” (abstract). Field (2017) proposes “designing spaces for learning” where children and youth’s “perspectives and input about local issues related to climate change is not only considered in civil governance but that their ideas, designs, and solutions are brought forward, trialed, and modified as part of their learning experiences. It is this active engagement in local community, as in their school curriculum, that allows children and youth to imagine and co-create preferred futures” (p. 85).

As this chapter has highlighted, there is an urgent need to 1) provide Canadian children and youth with effective/appropriate climate change education, 2) integrate climate change across subjects and institutional activities, 3) provide opportunities for active and constructive climate change engagement and action, and 4) provide Canadian educators with professional development opportunities to enhance their knowledge about climate change and strategies for teaching this complex subject (as outlined in this chapter). These are essential steps in helping to prepare an engaged and informed generation to help mitigate and adapt to climate change.

The next chapter explores the concept of agency and outlines ways to strengthen children and youth’s constructive climate change engagement and their sense of agency in a changing climate. In addition, it provides an overview of youth climate change activism in Canada.



## Chapter IV: Agency, Engagement, and Activism

Adaptive capacity is partly determined by individual agency (Hayes *et al*, 2019), which refers to one's "ability to imagine and effect change" (O'Brien *et al*, 2018, n.p.) as well as the belief in one's own capacity or competence. Children and young people's sense of agency is "strongly embedded in the socio-cultural contexts in which [they] live" and is supported by various factors, including one's socio-emotional well-being (Kumpulainen *et al*, 2014, p. 211). Although primary caregivers are critical in supporting the social-emotional wellbeing and sense of agency of children and young people, teachers, schools, and other formal institutions of education also play a key role (Kumpulainen *et al*, 2014). For instance, teachers "can play an important role in creating social contexts for supportive classroom interaction and relationships that contribute to children's sense of agency and well-being (Johnson, 2008; Luther & Zelazo, 2003)" (Kumpulainen *et al*, 2014, p. 212). As Kumpulainen *et al* (2014) explain, "through agentic experiences, and recognising them, children can learn to trust their own agency to act in different situations" (p. 212).

In general, "all children need support mechanisms to strengthen their beliefs about their own potential and to become agentic individuals that have the competence required to nurture socioemotional well-being (Weare, 2010)" (Kumpulainen *et al*, 2014, p. 212). As mentioned in the previous chapter, emerging research emphasizes the importance of supporting children and young people's social-emotional development through social-emotional learning and enhancing their sense of agency, in order to overcome and address feelings of climate anxiety and foster hope, engagement, and action (Ojala, 2012, Hargis & McKenzie, 2021). As previously mentioned, social-emotional learning helps children develop necessary skills to "cope with stress", "stay positive and persevere when things are difficult", and "engage in critical and creative thinking", all essential skills in the face of climate change (School Mental Health Ontario, n.p.).

Hope plays an important role in pro-environmental behaviour, climate change engagement, and climate change education. According to Ojala (2012) "hope about a better, alternative, future could play an important part in motivating people to take action concerning global problems" (p. 626). Furthermore, "people feeling a high degree of hope take action, and have the ability to figure out ways to reach their desired goals" (Ojala, 2012, p. 627). According to Snyder (2000), hope equals agency plus pathways. More specifically, Snyder's theory "proposes that the

cognitive part of the hope concept contains three different aspects: (1) a positive future goal—that which we want to happen; (2) pathway thinking—to be able to find ways to reach the desired goal; and (3) agency thinking—to be able to motivate oneself to use these pathways” (as cited in Ojala, 2015, p. 135). Thus, children and young people who experience a high degree of (constructive) hope concerning climate change are more likely to act and seek out solutions (Ojala, 2008; Ojala, 2012; Li & Monroe, 2019).

In order to become more resilient and adaptive, children need agentic experiences (Kumpulainen *et al*, 2014). In other words, they need to know “that the things they do and ideas they produce are respected and recognised, and that they have some impact on their lives. To become an agent, one must be treated as if one can do something of one’s own volition” (p. 213). As Mitchell and Borchard (2014) have argued, “children can be extraordinarily adaptive in the face of stresses and shocks, especially if they are actively involved in responses to them (Bartlett, 2008; IPCC, 2012)” (p. 375). Furthermore, “as children interact with other children and adults, if they are well informed and supported, they can be effective channels of information, role models and agents of change” (Mitchell & Borchard, 2014, p. 375).

When it comes to climate change, there are many ways to provide children and young people with agentic experiences and opportunities to strengthen their sense of agency and enhance their adaptive capacity. For instance, children and young people can serve as co-researchers in climate-related research projects and/or active participants in climate change decision-making processes. As noted in the previous chapters, children and young people can also become involved in the design process of their schoolyards and participate in decisions concerning their educational choices (e.g., school curriculum).

Field (2017) argues that students who have agentic or “authentic opportunities to engage in ideation, design, project management, creative problem-solving, assessment and managing risk, evaluating processes, and collaborating with others, are less likely to be the ‘victims’ of great change” (p. 85). This inclusive, emancipatory, and participatory approach to education stands in contrast to instrumental approaches which often position students as “passive receivers” for whom “specific goals/outcomes/outputs are decided” (Field, 2017, p. 84). Instead, it places young people at the centre of educational and decision-making processes, demonstrating and affirming their potential to be active agents of change, who are more than capable of imagining and co-creating their futures.

As Haynes and Tanner (2015) explain, “young people regularly face great hurdles to get their voices heard, while research and practice in the disaster and climate change community commonly represent young people as passive victims requiring protection” (abstract). However, when properly informed, empowered, and enabled, young people have the capacity to engage in constructive climate change action, influence adults, parents/caregivers, peers, and the general public, and inform climate change research, policy, and practice. Participatory youth-centred research studies in the global South and the Canadian Arctic have demonstrated the importance of directly involving young people in climate change research and including their voices in policy discussions, as important pathways for enhancing their agency and adaptive capacity and facilitating their adaptation to climate change (Haynes & Tanner, 2015; MacDonald *et al*, 2015).

Engaging children and young people in climate change research, policy, and practice and supporting their participation in the highest levels of climate change decision-making is important for several reasons. Many scholars have argued that young people’s climate change engagement is a *moral imperative* – that young people have a right to be informed and consulted regarding issues that will affect their future (Chawla & Heft, 2002; Hicks & Holden, 2007; Page, 2007, Trott, 2020) – while others have argued that children’s engagement is necessary in preparing them to face and address future climatic changes (Ballantyne *et al*, 1998; see also Ojala 2012; Koger 2013; Schreiner *et al*, 2005).

As noted by Haynes and Tanner (2015), young people’s “capacities to inform decision-making processes, communicate risks to their communities and take direct action to reduce risks” have been largely neglected to date (abstract). Children and young people “have unique perspectives on climate change, represent an audience that is easily reached through schools and are arguably best equipped to navigate the ideologically fraught topic of climate change with older generations in ways that inspire action” (Lawson *et al*, 2018, abstract). Lawson *et al* (2018) argue that “children may be able to overcome anti-reflexive tendencies of adults through intergenerational learning (IGL) in the context of climate change” (p. 205). This is because “the bond between parent and child helps facilitate conversations around uncomfortable topics” and parents, in general, tend to perceive their children as being more trustworthy and “ideologically neutral” sources of climate change information (Lawson *et al*, 2018, p. 205). According to Lawson *et al* (2018), anti-reflexive “forces” or “tendencies” include “individuals’ political

ideologies and worldviews” and “politically driven climate change skepticism” (pp. 204-205). Since “adults are more prone to anti-reflexive thinking that clouds their judgement when forming perceptions on controversial subjects (Gifford, 2011; Kollmuss and Agyeman, 2002), relying on older generations to be the teachers may be counterproductive in the case of climate change” (Lawson *et al*, 2018, p. 205). Given their effectiveness as climate change communicators, children and young people are ideally suited to communicate climate-related risks to their communities and raise awareness of these issues with government officials and other stakeholders. In addition, given their situated knowledge, observations, and lived experiences, children and young people are important stakeholders in climate change processes and can offer unique perspectives and policy ideas. Thus, supporting their engagement and developing their sense of agency is essential.

According to Bieler *et al* (2017), agency is one of the factors that contribute “to shaping patterns of public (dis)engagement with climate change” (p. 65). Other factors include affective and cognitive processes, worldviews, media (Bieler *et al*, 2017), as well as “gender, class, social expectations, ethnicity, life course, values, and education” (O’Brien *et al*, 2018, n.p.). Wray-Lake and Hart (2012) “speculate that more educated youth, especially those with greater access to resources, are exposed to more novel and effective opportunities to engage in politics and influence policy outcomes” (as cited in O’Brien *et al*, 2018, n.p.). In contrast, “social inequalities compound the lack of institutional support for civic participation during childhood and adolescence” (O’Brien *et al*, 2018, n.p.). Schlitz *et al* (2010) argue that “the ability to express political dissent rather than simply frustration requires a mature level of social consciousness, moral reasoning, and insight into the situation that an individual or community is experiencing. In this sense, expression of any form of political dissent requires support, including education, to enable young people to reflect critically” (as cited by O’Brien *et al*, 2018, n.p.). Additionally, “research suggests that increasingly unequal access to education, unstable employment, and high housing costs can have a complex effect on depressing civic engagement” (O’Brien *et al*, 2018, n.p.).

According to Ojala (2012), internal and external factors motivate pro-environmental behavior, including “social influence from parents and peers” (p. 626). In addition, hope “could be a factor [...] in predicting engagement concerning global environmental problems” (Ojala, 2012, p. 626). Empirical research to date suggests that environmental and social engagement as well as the opportunity to become involved and actively participate in climate change research and

decision-making processes can enhance young people’s agency, adaptive capacity, and adaptation. For example, “the opportunity to be meaningfully involved in their community, whether through research projects or community programs, is one of the many protective factors known to enhance circumpolar Indigenous youth resilience to a variety of stresses, including climate change challenges” (MacDonald *et al*, 2015, p. 487).

Engagement is thought to contribute to one’s mental health and can be used as a strategy to address climate anxiety. According to Clayton (2020) “active engagement in addressing climate change may itself have positive effects on the mental health of those who are involved” (p. 5). For example, “engagement in mitigation can entail social engagement and promote social ties that are a source of positive emotions as well as resilience” (Clayton, 2020, p. 5). Trott (2020) argues that “children’s constructive engagement enables [them] to envision alternatives and to believe they can be agents of transformative change” (p. 535). As Corner *et al* (2015) note, when young people’s “perceived self-efficacy is limited, personal engagement with climate change is likely to be lower” (p. 530). In addition to directly benefitting children and young people in the short- and long-term, their sustained, constructive engagement is beneficial to society, as it can lead to “societal transformation to sustainability” (Trott, 2020, p. 535). The following section explores ways to support children and youth’s constructive engagement while strengthening their sense of agency and adaptive capacity and providing opportunities for action.

## Participatory Methods to Enhance the Agency and Promote the Voices of Young People

Children and young people need agentic experiences to develop their sense of agency and become more resilient and adaptive. Emerging research indicates that participatory research methods, like digital photography (e.g., photovoice) and participatory video, may enhance children and youth’s agency, adaptive capacity, climate change awareness, knowledge, engagement, visibility, and influence (MacDonald *et al*, 2015; Trott, 2019; Trott, 2020). Participatory research projects which employ these methodologies offer young people opportunities to be in control of the research process and share their unique perspectives on climate change, local problems, and solutions. In addition, they allow young people to “shape the outcome according to their own interests, ideas, skills, and values and [...] contribute rich, unanticipated, and meaningful understandings of [the] research questions” (MacDonald *et al*,

2015, p. 490). This approach to research challenges the narrative that children and young people are *victims* of climate change who require the protection and assistance of adults and caregivers to speak and make decisions on their behalf; rather, children and young people are positioned as “negotiators who are powerful experts” (Marr & Malone, 2007, p. 4). This promotes “the agentic child construct of childhood” (Marr & Malone, 2007, p. 4).

As Trott (2019) explains, participatory methods stand out for their potential to empower young people’s agency and facilitate their constructive climate change engagement. For example, youth participatory action research (YPAR), “provides young people with opportunities to study social problems affecting their lives and then determine actions to rectify these problems” (Cammarota & Fine, 2010, p. 2). Most importantly, “YPAR teaches young people that conditions of injustice are produced, not natural; are designed to privilege and oppress; but are ultimately challengeable and thus changeable” (Cammarota & Fine, 2010, p. 2). As such, YPAR may contribute to young people’s sense of empowerment and agency, or belief in their capacity to effect change, thereby addressing feelings of hopelessness and helplessness – known factors that contribute to apathy and disengagement. However, as Trott (2019) points out, PAR-based studies involving “children as social actors, change agents, collaborators, or co-researchers” remain rare (p. 46). The following sections explore two participatory methods for empowering young people’s agency and facilitating their constructive climate change engagement.

## Photovoice

Photovoice, a participatory action research (PAR) method, based on feminist theory and the theoretical literature on Paulo Freire’s education for critical consciousness, “is a process by which people can identify, represent, and enhance their community through a specific photographic technique” (Wang & Burris, 1997, p. 369). This strategy enables children and youth to “record and vivify their community’s strengths and concerns; promote critical dialogue and knowledge about community issues through group discussion of photographs; and reach policy makers” (Wang, 2006, abstract). Furthermore, photovoice is emancipatory and agentic (Derr & Simons, 2020), as “it entrusts cameras to the hands of people to enable them to act as recorders, and potential catalysts for change, in their own communities” (Wang & Burris, 1997, p. 369).

To date, photovoice remains underutilized as a strategy for facilitating young people's engagement with climate change (Trott, 2019). However, Trott (2019) demonstrated the potential of this strategy in supporting children's constructive climate change engagement through a collaborative participatory action research project with children ages 10 to 12. The project, a 15-week after-school program in the United States, called *Science, Camera, Action!* (SCA), combined hands-on climate change educational activities with photovoice, integrating "transformative pedagogy with arts-based and participatory methodology to empower children's agency through personally relevant and locally meaningful action projects addressing climate change" (Trott, 2019, p. 58). According to Trott (2019), program "activities provided children opportunities to make personal and place-based connections to the issue while building a foundation for informed action through individual and collaborative projects" (p. 46). As a result, project participants reportedly "acquired new knowledge about climate change and its local impacts" and "developed stronger beliefs in their agentic capabilities, while taking tangible steps towards the sustainable transformation of their communities" (Trott, 2019, p. 58). According to Trott (2019), "children's sense of agency was a confluence of hope, confidence, and motivation to affect change, and its source was children's climate change awareness and action (p. 56).

## Participatory Video

As MacDonald *et al* (2015) explain, "participatory video (PV) is a digital media research method with roots in community activism and social development that aims to shift power dynamics by having participants direct and control the creation of a film on a topic of research and community" (p. 488). Although youth-centred PV research examining climate change is still uncommon, this research approach has become more popular in recent years (Haynes & Tanner, 2015). As Kindon (2003) explains, PV offers "a *feminist* practice of looking, which actively works to engage with and challenge conventional relationships of power associated with the gaze in geographic research, and results in more equitable outcomes and/or transformation for research participants" (p. 143). Hence, its appeal as a strategy for child- and youth-centred climate change research. Furthermore, Haynes and Tanner (2015) argue that PV can "aid communication as it bypasses the barriers of literacy, allowing messages to be sent and received without writing or reading (Okahashi 2000)" (p. 359).

Empirical research from participatory video (PV) methods with groups of young people in the Philippines has demonstrated the potential and efficacy of this method in increasing young

people's awareness and knowledge of local disaster and climate-related risks and empowering them to engage with community members and decision-makers around climate change. In addition, the project allowed young people, ages 13 to 21, to “document and raise awareness of disaster risk and use screening events to mobilise and advocate for risk reduction measures in their communities” (Haynes & Tanner, 2015, abstract). Similarly, MacDonald *et al* (2015) examined “the potential of youth-led participatory video (PV) as a strategy to foster known protective factors that underpin the resilience of youth and their capacity to adapt to various stresses, including impacts of climate change” (abstract). This research, which focused on Inuit youth in Labrador, Canada, showed “that PV may be a pathway to greater adaptive capacities because the process connects to known protective factors that enhance resilience of circumpolar indigenous youth. PV also shows promise as a strategy to engage youth in sharing insights and knowledge, connect generations, and involve young Inuit in planning decision making in general” (MacDonald *et al*, 2015, abstract).

Participatory research methods such as PV and photovoice “bring awareness and respect of the culture and context of the partner community, facilitate capacity development, and highlight local knowledge, voices, and experience that advance research in a way Western science cannot do alone” (MacDonald *et al*, 2015, p. 487). When employed with young people, these participatory research methods can facilitate and highlight the importance of collective engagement, which “can promote children’s hope and well-being—by creating conditions that allow children to feel part of a collaborative effort rather than acting in isolation (Kelsey & Armstrong, 2012)” (Trott, 2019, pp. 57-58). In addition, participatory research methods can be effective strategies for children and youth to share knowledge, information, and local perspectives with diverse stakeholders, including policy makers. Lastly, they offer opportunities for political advocacy and youth climate activism. The following section provides a brief overview of youth climate activism in Canada.

## Youth Climate Change Activism

In recent years, children and youth globally have – in unprecedented ways and numbers – engaged in climate change activism to express opposition against the status quo that is contributing to climate change and demand systemic change, climate justice, and political action on this issue. O’Brien *et al* (2018) argue that when young people engage with climate change, they are “implicitly or explicitly entering into debates that involve dissenting from prevailing



norms, beliefs, and practices, including economic and social norms like consumption, fossil energy use, and the unjust use of power in decision making” (n.p.). This is evidenced by the Fridays for Future (FFF) Global Climate Strike movement, a youth-led grassroots movement initiated and led by Swedish youth climate activist Greta Thunberg in 2018.

The FFF movement, which organizes local and global, physical and digital school strikes, rallies, and marches has adopted an *intersectional* approach to climate justice, outlining “collective demands, that include indigenous rights and sovereignty; defending land, water, and life; zero-carbon economy; separation of oil and state, universal public services and infrastructure; justice for migrants and refugees and a sustainable future for all” (Mar, 2019, n.p.). The FFF movement gained international attention in 2019, leading to the largest climate demonstration in human history, which took place on September 20, 2019 – with over 4 million people worldwide, including hundreds of thousands of Canadians from at least 85 Canadian cities and towns, joining the Global Climate Strike. The FFF movement has been a catalyst for youth climate activism in Canada and globally, demonstrating the potential of young people to exert political and intergenerational influence at national and global scales.

### Fossil Fuel Divestment Movement

The fossil fuel divestment (FFD) movement aims to eliminate public and private investment in fossil fuel companies. The first FFD campaign took place in 2010 in Philadelphia, where a Swarthmore College student group called upon their institution to stop investing in fossil fuel companies after learning about the environmental impacts of mountaintop removal (Maina *et al*, 2020). In 2012, environmentalist and 350.org co-founder Bill McKibben (2012) wrote a radical essay for *Rolling Stone Magazine* urging the public to “view the fossil-fuel industry in a new light” (p. 6). In his essay, McKibben (2012) boldly declared: “[The fossil fuel industry] has become a rogue industry, reckless like no other force on Earth. It is Public Enemy Number One to the survival of our planetary civilization” (p. 6). The essay sparked a global fossil fuel divestment movement, with higher education institutions and students in particular, playing a key role.

Canada has the third-largest proven oil reserve in the world—most of which is found in Alberta's oil sands—and is the fourth largest global producer and exporter of oil (Natural Resources Canada, 2019). According to a recent report by Environmental Defence (2021), “In 2020, the

federal government either announced or provided a minimum of nearly \$18 billion to the oil and gas sector” (p. 1). According to the Canadian Association of Petroleum Producers (2021), the oil sands are responsible for 11% of total national greenhouse gas emissions (n.p.). However, recent aircraft measurements over the Canadian oil sands (OS) “indicate that CO<sub>2</sub> emission intensities for OS facilities are 13–123% larger than those estimated using publicly available data. This leads to [...] 30% higher overall OS GHG emissions (17 Mt) compared to that reported by industry” (Liggio *et al*, 2019, abstract).

Divesting from fossil fuel companies is seen by many Canadians as a vital step in addressing climate change and the environmental and social impacts of fossil fuel extraction in Canada. Given the fact that “post-secondary institutions have a significant amount of their endowment funds invested in fossil fuel companies” (Maina, 2016, p. 1), they can play an important role in the divestment movement and influence similar action by other investors. FFD campaigns across higher education institutions, led primarily by students, have increased steadily over the last decade (Maina *et al*, 2020). According to Maina *et al* (2020), students in the Canadian higher education institution FFD movement are responsible for initiating 31 of the existing 37 campaigns in Canada. Furthermore, “student organizing has often garnered support from faculty, staff, alumni, as well as national and international organizations and networks”, including OurClimate.ca, formerly known as the Canadian Youth Climate Coalition (CYCC), which has provided training and resources to help students start and lead FFD campaigns in Canadian higher education institutions (Maina *et al*, 2020, p. 6).

In January 2021, Fridays for Future Toronto, Sustainabilityteens Vancouver, Fridays for Future Calgary, School Strike for Climate Halifax, and Climate Justice Guelph initiated a series of ‘bank switch’ actions to bring attention to the fact that “Canada’s big five banks—TD, RBC, Scotiabank, BMO and CIBC—are among the biggest financiers of fossil fuels in the world” (Speers-Roesch, 2021). Through these actions, youth intended to pressure the aforementioned banks “by threatening to remove [their] money from [these] banks unless they made stringent, concise plans to fully divest from fossil fuels” (Fridays for Future Toronto, 2021). Similarly, in 2021, students across Ontario released a video urging teachers “to demand that the Ontario Teachers’ Pension Plan (OTPP) stop investing their retirement savings in oil, gas, coal, and pipeline companies that fuel the climate crisis” (Shift: Action for Pension Wealth & Planet Health, 2021). In the words of David Orr (2014):

Students hear about global responsibility while being educated in institutions that often invest their financial weight in the most irresponsible things. The lessons being taught are those of hypocrisy and ultimately despair. [...] What is desperately needed are faculty and administrators who provide role models of integrity, care, thoughtfulness, *and* institutions that are capable of embodying ideals wholly and completely in all of their operations (p. 5).

The aforementioned groups have used a number of tactics including “signing of petitions, sit-ins, rallies, and protests, facilitated through face-to-face and online platforms” to mobilize FFD campaigns and promote climate and ecological justice more broadly (Maina *et al*, 2020, abstract). In Canada, the FFD movement has given young people opportunities to engage in constructive climate change activism and express opposition to neoliberal capitalism, continuing legacies of colonialism, and the status quo that is contributing to climate change (Saad, 2019). Saad (2019) argues that for many students “divestment is an important first entry point into environmental politics and social justice” because it “takes [a] complex, unwieldy global problem and relocalizes it so that people can connect and recognize opportunities to work together to make institutions more democratically accountable and more socially and environmentally responsible” (Saad, 2019, p. 126).

In general, FFD organizers have “found success by building coalitions and collaborations with other stakeholders, by leveraging the institutional contexts within which they were working, and by being resilient and persistent in their efforts” (Maina *et al*, 2020, p. 7). Through their collaborations, innovations, and resilience, young people across Canada are not only leading the FFD divestment movement, but also the fight against climate inaction and social, intergenerational, and ecological injustice. In addition, they are turning to the Canadian legal system in unprecedented efforts to demand action on climate change. The following section provides a brief overview of climate change litigation in Canada, outlining specific examples of youth-led climate justice lawsuits in this country.

### Climate Change Litigation in Canada

In the year 2019, children and youth across Canada filed climate justice lawsuits against the federal and provincial governments alleging violations to their rights and freedoms. In June 2019, ENvironnement JEUnesse (ENJEU), an environmental non-profit, presented a climate lawsuit against the Canadian government at the Superior Court of Quebec, on behalf of young Quebecers 35 years old and under. In July 2019, the Court refused “to grant ENvironnement

JEUnesse the authorization to institute a class action” on behalf of the plaintiffs (ENvironnement JEUnesse) because it “found the age 35 cut-off to be arbitrary and inappropriate, since it did not consider the rationale for choosing it to be adequately justified” (Amnesty International). In August 2019, ENJEU appealed the Court’s decision and in February 2021 it presented “its application for authorization to institute its class action to the Quebec Court of Appeal. The Court will take a few weeks or months to deliver its decision” (ENJEU, 2020).

In October 2019, fifteen young people—ages 10 to 19 years—from seven provinces and one territory filed a lawsuit (*La Rose et. al. v. Her Majesty the Queen*) against the Canadian Government alleging Canada’s actions on climate change violate their rights to life, liberty and security of the person under Section 7 of the Canadian Charter of Rights and Freedoms and their right to equality under Section 15, given the disproportionate impacts of climate change on young people. The federal government responded with a motion to strike the plaintiffs’ claim to stop the case from proceeding to trial. On October 27, 2020, the Federal Court of Canada granted the government’s motion, despite acknowledging that “the negative impact of climate change to the Plaintiffs and all Canadians is significant, both now and looking forward into the future” (Our Children’s Trust). On November 24, 2020, the attorneys for the plaintiffs filed a Notice of Appeal with the Federal Court of Appeals and are currently in the process of preparing the appeal.

In November 2019, seven young Ontario climate activists, between the ages of 13 and 24, filed a similar lawsuit arguing that Ontario’s new greenhouse gas reduction target and the repeal of the old Climate Change Act, “violate the rights of Ontario youth and future generations under ss. 7 and 15 of the *Charter*” (Chen, 2020). Like the federal government, the Ontario government responded with a motion to strike. However, in July 2020, the youth plaintiffs countered the motion and the court ruled in their favour. For the first time in Canadian history, a court “ruled that fundamental rights protected under the Charter can be threatened by climate change and citizens have the ability to challenge a Canadian government’s action on the climate crisis under the highest law in the land” (Ecojustice, n.d., n.p.). In response, the Ontario Government applied for leave to appeal the ruling, which the court dismissed, further “solidifying the historic motion to strike decision and paving the way for the youth applicants to have their day in court” (Ecojustice, n.d., n.p.). As noted by Ecojustice, the “case is already changing the Canadian legal landscape” (2021, n.p.). More specifically, the *Mathur et. al. case 1*) “established the courts are a viable avenue for citizens to challenge government actions that threaten their Charter rights

and the climate”, 2) “established that the harms from climate change are not speculative nor impossible to prove”, and 3) “established that climate change can impact Canadians’ rights to life, liberty and security of the person” (Ecojustice, 2021, n.p.).

These lawsuits represent a potential turning point in climate change litigation and youth climate activism in Canada. They illustrate how children and youth are expressing their agency by taking legal action to challenge government actions and contributions to climate change – a trend seen in other parts of the world, including Colombia and the Netherlands (Savaresi & Auz, 2019). This chapter has emphasized the ever-growing need and desire by Canadian children and young people to make use of opportunities to develop their sense of agency and constructive climate change engagement. Without these experiences current and future generations of children will be ill prepared to advocate for their rights and meaningfully participate in climate mitigation and adaptation measures and decision-making processes affecting their lives. Despite lack of educational opportunities to engage with climate change in schools and contribute to solutions inside/outside of formal institutions of education, young Canadians are demonstrating remarkable agency, resilience, and resourcefulness, successfully engaging in organizing and climate activism and mobilizing other youth and actors for climate action, fossil fuel divestment, and social and ecological justice. The following chapter outlines a number of policy responses and recommendations for climate, financial, economic, health, and education policymakers, as well as teachers’ unions (and other unions) in Canada. These recommendations are intended to safeguard the rights of Canadian children and youth, advance their ideas, promote their equitable participation, and ensure a socially and environmentally just and sustainable future for *all*.

## Conclusion

While children and youth are among the most vulnerable Canadians to the impacts of climate change, their unique vulnerability has been rarely addressed in the grey and published literatures to date. Similarly, the experiences, perceptions, and observations of Canadian children and youth are largely absent in the published literature. As Canada's climate continues to change, it is essential for children and youth to share their perceptions, inform climate research and policy, and contribute actively to local solutions. For ethical and pragmatic reasons, young people must enjoy *equal* opportunities to express their views and become active participants in research and decisions on issues which may affect their lives and futures, as is the case with climate change.

This Major Paper has sought to answer the following research questions:

1. What factors contribute to the vulnerability of Canadian children and youth to climate change?
2. How can education and other factors enhance and promote the adaptive capacity of children and youth?
3. To what extent is Canada's education system enhancing students' climate knowledge and constructive climate change engagement?
4. What contributes to constructive climate change engagement and young people's sense of agency?

This paper has described in detail some of the implications of climate change for the physical and mental health and wellbeing of young Canadians. It has outlined biological and behavioural factors which make children and young people uniquely vulnerable to health impacts of climate change and discussed how children and youth's health outcomes and health status are influenced by various factors including education, housing conditions, access to healthcare, childhood experiences, and climate change (Hayes *et al*, 2019). Additionally, this paper has highlighted the ways in which Canadian children and youth who experience existing socioeconomic, health, and educational inequities (e.g., those who are Indigenous, low-income, Black, racialized, disabled, refugees, and immigrants) will be adversely affected by climate change.

This paper has explored the role of education in enhancing young people's adaptive capacity, knowledge and awareness of climate change, and meaningful and effective participation in climate change research, policy, and practice. It reviewed the state of climate change education in Canada and concluded, based on existing research, that Canada's education system is *not* adequately preparing young Canadians to mitigate, cope with, or adapt to climate change. Nor is it preparing or empowering them to meaningfully engage in climate change processes or provide innovative solutions to this phenomenon. Lastly, this paper explored the concept of agency and outlined strategies to enhance the sense of agency and constructive engagement of children and youth with climate change. Additionally, it provided an overview of youth-led climate change activism in Canada, including a number of youth-led climate lawsuits in this country.

## The Way Forward

In order to prepare young Canadians to live and thrive in a changing climate, Canada will need to adopt and develop a series of policies and measures which, 1) take into account the unique needs and vulnerabilities of children and youth, 2) enhance their adaptive capacity, agency, and knowledge of climate change, 3) address existing inequities, including health disparities and education inequality, 4) improve the socioeconomic conditions of disadvantaged and marginalized children and youth, 5) address systemic problems advancing climate change, systemic discrimination, poverty, and inequality, 6) promote children and youth's participation in climate change processes, and 7) recognize and uphold every young Canadian's right to freedom of expression and a healthy environment (as outlined in the the Convention on the Rights of the Child) and the right to equality, life, liberty and security of person (as outlined in the Canadian Charter of Rights and Freedoms). It is also crucial to note that Canada must address the cumulative impacts of the Residential School System on Indigenous peoples, as well as other continuing legacies of colonialism, "for anthropogenic climate change is an intensified repetition of anthropogenic environmental change inflicted on Indigenous peoples via colonial practices that facilitated capitalist industrial expansion" (Whyte, 2017, p. 156). As noted by Whyte (2017), "Indigenous scholars discuss climate vulnerability as an intensification or intensified episode of colonialism" (p. 155). Thus, Canada must continue to take steps toward Indigenous reconciliation and seek to minimize the profound and disproportional impacts of climate change on the cultures and ways of life of Indigenous peoples in Canada.

During the April 22, 2021 Leaders Summit on Climate, the Hon. Jonathan Wilkinson, Minister of Environment and Climate Change, stated that “Canadians understand the need to ensure the future economic prosperity of our country and to ensure a sustainable future for our children and grandchildren” (Wilkinson, 2021). However, if Canada continues to prioritize economic prosperity, while heavily subsidizing the fossil fuel industry, it will likely fall short of meeting its targets to reduce national greenhouse gas (GHG) emissions and provide a sustainable and climate just future for its children and grandchildren.

As described in Chapter II, climate change is already adversely affecting Canadians and has serious implications for the health of Canadian children and youth. Yet, the literature on the impacts of climate change on Canadian children and youth’s health and wellbeing is scarce. From a procedural justice perspective, children and youth must be represented in climate policy and decision-making processes, considering they have a stake in the outcomes and will be directly or indirectly affected by decisions made today long into the future. Furthermore, children and youth must enjoy *equal* opportunities as other generations of Canadians to express their needs and interests and to inform climate change policy. Consulting with and including the voices, experiences, concerns, and perceptions of young people in climate change research, as well as encouraging and facilitating their meaningful participation in decision-making processes will ensure that the data collected, and the measures developed are complete and representative of young people and the challenges they face. As MacDonald *et al* (2013) point out, “a more engaged, knowledgeable, and skilled youth population is not only less susceptible to the socioeconomic and socio-psychological impacts of climate change, but is also a benefit for any community” (p. 369).

Considering Canadian children and youth are not a homogenous group, climatic changes and extreme weather events will affect them in different ways and degrees of severity. Children and youth’s socioeconomic and sociocultural circumstances (and the intersectionality of their identities) may exacerbate their vulnerability and undermine their capacity to cope with, adjust, and adapt to climate change. Thus, Canada’s climate change and adaptation strategies must simultaneously address existing inequities, including health inequities and education inequality.

Regardless of their circumstances, Canadian children and youth should receive age and culturally-appropriate education on climate change and become empowered through education to contribute to solutions to this phenomenon. Currently, less than half of all Canadian provinces



and territories specifically mention climate change education within their educational policies, while policies that do, focus heavily on reducing school greenhouse gas emissions (Hargis & McKenzie, 2021). Canadian provincial and territorial education policies must engage more deliberately and holistically with climate change to prepare young Canadians to live, adapt, and thrive in a changing climate.

Educators, students, and parents across Canada agree that the Canadian education system should do more to educate young people about climate change (Field *et al*, 2019). In addition, Canadian “educators say they need professional development, classroom resources, current information on climate science, curriculum policy, information on the economics and politics of climate change, and national/provincial climate data” (Field *et al*, 2019, p. 8). Field *et al* (2019) argue that “Faculties of Education should include climate change education across subjects in initial teacher education” (p. 9) and “ensure teacher-candidates’ courses address best practices of climate change education” (p. 19).

At the school level, students should be offered agentic opportunities, like engaging “with representatives in municipal, provincial, and federal government to advocate for broader governmental and policy change” (Hargis and McKenzie, 2021, p. 11). As Field (2017) argues specific goals/outcomes/outputs should not be *decided* as “preferred behavior and educational interventions designed for” (p. 84) children and youth; rather, they should have the opportunity “to imagine, design, shape, or create” (p. 84) their preferred futures. Similarly, “Ministries of Education should develop a consultation mechanism for youth to participate in curriculum development and review processes for climate change content” (Field *et al*, 2019, p. 19). Within formal education, Ministries, school boards, teachers’ unions, and post-secondary institutions must prioritize climate change in curriculum development, institutional activities, operations, and investments. This means, among other things, divesting their pensions and endowments from fossil fuel companies.

On July 12, 2021, the Hon. Jonathan Wilkinson, Minister of Environment and Climate Change, formally submitted Canada’s enhanced Nationally Determined Contribution (NDC) to the United Nations. As previously mentioned, the enhanced NDC commits Canada to cut its greenhouse gas emissions (GHG) by 40-45 percent below 2005 levels by 2030. According to the International Institute for Sustainable Development (IISD), “Canada’s new Nationally Determined Contribution shows progress but misses key opportunities” (2021, n.p.). More

specifically, “this target is not in line with the ambition necessary to incent rapid decarbonization and a climate-safe future” (IISD, 2021, n.p.). Although Canada recognizes that “climate change is the greatest long-term threat that we face as a global community,” (Prime Minister of Canada Justin Trudeau, 2021), it continues to heavily subsidize the fossil fuel industry. In addition, according to the IISD,

Canada still lacks clear sectoral pathways and carbon budgets for high-emitting sectors—this is particularly concerning for oil and gas, whose emissions are the largest of all economic sectors in Canada and are on the rise. The NDC also fails to address fossil fuel subsidy reform and the phase-out of public finance for fossil fuels. The International Energy Agency’s recent report emphasizes that governments must end all new funding to oil and gas to reach net-zero by 2050 (2021, n.p).

Canada must recognize the urgency and importance of addressing these gaps and adopting more ambitious goals and aggressive timelines to effectively mitigate global climate change.

The enhanced NDC was submitted in conjunction with Canada’s first Adaptation Communication to the United Nations Framework Convention on Climate Change (UNFCCC). While the Adaptation Communication recognizes the disproportional impacts of climate change on Indigenous populations and children (Environment and Climate Change Canada, 2021b, p. 9), it does not discuss how Canada will help to advance the climate priorities of Canadian children, including Indigenous children. In fact, the word “children” is only mentioned *once* in the entire document. Youth, however, are mentioned a total of seven times. Importantly, the Adaptation Communication affirms Canada’s commitment to work with “key partners, including youth” to develop its first-ever National Adaptation Strategy (NAS) (Environment and Climate Change Canada, 2021b, pp. 3-4). According to the document, “the strategy will establish a shared vision for climate resilience in Canada, identify key priorities for increased collaboration, and establish a framework for measuring progress at the national level” (Environment and Climate Change Canada, 2021b, p. 4). Further details, such as the definition of “youth” or specific information on the process of engaging youth to assist with formulating the NAS are not discussed.

According to the Adaptation Communication, “to help ensure that actions are holistic and link to other social, economic, and environmental priorities in Canada, the NAS will seek to: [...] Contribute to advancing equity and Just Resilience, and use of inclusive processes that empower and enable all Canadians to participate, including youth” (Environment and Climate

Change Canada, 2021b, p. 10). Although this is encouraging, the document does not elaborate or provide more information on these inclusive processes, nor does it mention whether they include capacity-building to ensure youth have the knowledge to effectively engage in the process of developing the NAS (Hammill *et al*, 2021). Canada's NAS should "provide a general framework [...]—for coordinating adaptation efforts at the national level, including a process for engaging" children and youth (Hammill *et al*, 2021, p. 3).

As emphasized by the IISD, "Canada's NAS must reflect the priorities and needs of Canadians in all their diversity, ensuring buy-in for its implementation" (Hammill *et al*, 2021, p. 27). Thus, historically marginalized groups of Canadian children and youth must be meaningfully engaged, consulted, and represented. For example, the Yukon territory "invited Indigenous knowledge keepers and youth to share their perspectives and created space for Yukon First Nations storytelling" throughout its climate risk assessment (Hammill *et al*, 2021, p. 33). As the IISD explains, "globally, NASs [...] are typically structured around economic sectors", which "can limit the potential to address interconnections and interdependencies between different climate change impacts and [...] the drivers of climate vulnerability", for example. Therefore, the federal government should "consider the extent to which an Indigenous worldview might frame or inform the structure of its NAS" (Hammill *et al*, 2021, p. 33).

The Adaptation Communication also mentions existing federal investments including funding for "Indigenous Services Canada to support First Nations and Inuit as they manage the health impacts of climate change, such as access to country food, impacts of extreme weather events, and mental health impacts of climate change on youth" (Environment and Climate Change Canada, 2021b, p. 4). Although this is of paramount importance, investments including funding to address the mental health impacts of climate change on non-Indigenous youth are not mentioned. This is important as many non-Indigenous children and youth are also being (directly and indirectly) affected by adverse impacts of climate change, including extreme weather events (e.g., B.C.'s 2021 heat wave and wildfires and Barrie's devastating tornado).

Surprisingly, the Adaptation Communication only mentions the COVID-19 pandemic once in reference to the National Adaptation Strategy. More specifically, the document states "the NAS will seek to: [...] Generate jobs and support economic recovery from the COVID-19 pandemic as well as future emergencies and climate disasters" (Environment and Climate Change Canada, 2021b, p. 10). The document does not articulate how Canada will apply

insights/lessons from the pandemic (including disproportional impacts on the health, wellbeing, and food security of vulnerable populations) to the climate crisis. As the IISD points out, “the COVID-19 pandemic may be an inflection point for adaptation action around the world, as recovery efforts may potentially divert attention and resources away from adaptation or, conversely, usher in more resources for adaptation if deliberate and strategic linkages are made between the two agendas” (Hammill *et al*, 2021, p. 4). Thus, Canada’s investments through COVID-19 recovery packages should “seek to create strategic and intentional linkages with actions that build climate resilience and that are well aligned with” its climate adaptation priorities (Hammill *et al*, 2021, p. 6).

COVID-19 has negatively affected the lives, health, wellbeing, and education of children and youth worldwide, creating disruptions, further exacerbating health inequality, leading to digital divide for many, delayed access to vaccines, domestic violence, etc. This compounds ongoing climate impacts and is a precursor for what the worsening climate crisis may bring. The following section explores lessons offered by the COVID-19 pandemic for the global climate crisis.

## Lessons of the COVID-19 Pandemic

As this paper has been written during the Coronavirus disease (COVID-19) pandemic, it is important to mention critical lessons offered by the pandemic for the global climate crisis. As has been recently highlighted in the literature, effectively tackling both the COVID-19 pandemic and the climate change emergency, requires among other things, collective action, early, coordinated, and aggressive responses, and societal and governmental trust of science and “early scientific calls for action” (Manzanedo & Manning, 2020, p. 2). Unfortunately, the consequences of delayed action to both the COVID-19 pandemic and the global climate crisis can prove catastrophic – “as with the muted response to early warnings of the spread of SARS-CoV-2 in China [...] much needed early action” to tackle the climate crisis “has not been taken” (Manzanedo & Manning, 2020, p. 2). This is evident in Canada, where despite its commitment to tackle climate change, Canada continues to invest heavily in the fossil fuel industry.

The COVID-19 pandemic has negatively affected children and youth in several ways. As Public Health Ontario (2020) outlines,

These negative effects include loss of income/employment in families, loss of education, lack of access to school meal programs and school health services, decreased vaccination coverage, decreased physical activity and increased sedentary behaviour, poor diet, and various mental health concerns (e.g. increased depressive symptoms). The pandemic-related service closures implemented in response to the COVID-19 pandemic come with significant individual and societal costs, and create disruption in the lives of children that may be associated with adverse childhood experiences such as trauma and a decline in mental health (p. 1).

The COVID-19 pandemic has also made ever more evident the inequitable distribution of burdens brought forth by emergency crises on disadvantaged, racialized, and marginalized populations. As Manzanedo and Manning (2020) point out, “low resource groups, such as those living paycheck-to-paycheck, and underrepresented groups will suffer the most from lockdowns, rising unemployment, and unexpected medical costs” (p. 2). In Canada and worldwide, “racialized and Indigenous communities (Laurencin and McClinton, 2020), (Poteat et al., 2020) and people living in poverty (The World Bank, 2020) are populations whose physical health outcomes have been disproportionately impacted by the COVID-19 virus” (Jenkins *et al*, 2021, p. 2). For instance, “in Toronto, 79 per cent of hospitalizations are of racialized persons. Torontonians of African and Caribbean descent currently experience the highest COVID rates in the city, comprising 26 per cent of total cases” (Alhmidi, 2021).

As Jenkins *et al* (2021) explain, “COVID-19 will have a greater adverse effect on those experiencing other health, social, and structural inequities related to gender, sexual orientation, and mental health and disability status, for example (Casey, 2019; Douglas et al., 2020)” (p. 2). Thus, establishing “policies that will minimize social inequality when the crisis strikes” is imperative (Manzanedo & Manning, 2020, p. 2). This can be accomplished by improving the access of socially vulnerable populations (e.g., those who are racialized, Indigenous, disadvantaged, and marginalized) to the Social Determinants of Health (SDoH), discussed in Chapter II of this paper. Addressing existing health inequities and the Social Determinants of Health influencing the health outcomes and health status of Canadian children and youth (including poverty) is vital to minimizing future climate change and pandemic impacts and burdens on young Canadians.

The following sections provide policy recommendations and suggested responses for addressing the vulnerability of young Canadians and enhancing their adaptive capacity and agency, while respecting their rights to freedom of expression and a healthy environment, as

outlined in the the Convention on the Rights of the Child, and the right to equality, life, liberty and security of person, as outlined in the Canadian Charter of Rights and Freedoms.

## Recommendations

The following recommendations based on information gathered in this paper fall into several categories based on levels of jurisdiction and responsibility in Canada for policies related to climate justice for Canadian children and youth. They are organized accordingly.

Recommendations for the general public are also offered.

### **For federal climate policymakers:**

- 1) Climate policy in Canada must consider the ethical implications and, more specifically, the *distributive*, *procedural*, and *intergenerational justice* aspects of climate change. For instance, policy choices must recognize the *distribution* of burdens of climate change. Canada should not pursue policies that impose an unfair *intergenerational* or *intragenerational* distribution of burdens and benefits (Meyer, 2017). In other words, current and future generations of Canadian children should not endure a heavier burden than existing generations of adults. For instance, the Ford Government's *Cap and Trade Cancellation Act, 2018* – which replaced Ontario's "relatively progressive climate targets" with "a significantly weaker 2030 target" (Ecojustice, n.d., n.p.) – has serious ramifications for current and future generations of Canadian children. The seven youth plaintiffs in *Mathur et. al. v. Her Majesty in Right of Ontario* allege that Ontario's 2030 climate target "is inadequate, unconstitutional, and must be struck down" as it violates Ontarians' Charter rights to life, liberty, and security of the person (Ecojustice, 2020, n.p.). Considering the Ontario Superior Court of Justice's ruling "that fundamental rights protected under the Charter can be threatened by climate change" (Ecojustice, 2020, n.p.) and in recognition of the inequitable distribution of future climate burdens on young Ontarians, the Government of Ontario should revise its climate policy, accordingly, as should all Canadian provinces and territories whose targets fall short of preventing dangerous climate change.
- 2) Similarly, the needs of Indigenous children and youth must be considered and recognized in climate policy development. More specifically, their cultures and "natural processes that form part of cultural identity and practices" must be recognized,

protected, and valued (Schlosberg, 2012, p. 451). Canadian climate policies must recognize and address the disproportionate burden of climate change on Indigenous peoples, whose survival, subsistence, and culture are intrinsically tied to the land. In addition, to advance Indigenous reconciliation, Canada must include the voices of Indigenous children and youth in policy spaces and processes. As MacDonald *et al* (2013) suggest, Indigenous youth (and children whenever possible) should be actively involved in climate decision-making processes at the local and regional levels. Community and regional governments should be mandated to engage and involve young representatives from all Indigenous communities in these processes. As demonstrated by MacKay *et al* (2020) Indigenous youth participation in climate governance can, among other things, help to address climate anxiety and build hope and resilience for Indigenous youth.

- 3) Adaptation efforts in Canada should integrate the needs and contributions of children and youth and ensure maximum inclusivity. Additionally, adaptation initiatives should be “disability-responsive, culturally-sensitive for Indigenous Peoples and ethnic minorities, appropriate for children and youth experiencing displacement and low socioeconomic status, and respective of age-specific needs across their life cycle” (Mizutori, 2020).
- 4) Those developing Canada’s National Adaptation Strategy (NAS) should directly and meaningfully engage with children and youth throughout its development – this should include a “number of (in-person) consultations, held across the country, [...] to ensure that the NAS reflects diverse local climate impacts and adaptation needs” (Hammill *et al*, 2021, p. 28). Consultations should involve diverse groups, including LGBTQ2 communities, and other vulnerable and marginalized populations (e.g., those who are Indigenous, racialized, immigrants, refugees, disabled, etc.). Additionally, consultations should be “accessible to a diversity of Canadians, including language, communication channels (considering, for example, barriers to internet access), the creation of safe spaces for dialogue, and tailored messaging for specific groups” (Hammill *et al*, 2021, p. 28).
- 5) Government bodies should establish “formal roles for civil society representatives in the federal decision-making mechanisms on adaptation, not just in the process of formulating the NAS but also in its implementation” (Hammill *et al*, 2021, p. 28). For example, children and youth can serve as members of national climate change advisory boards or committees.

### **For federal financial and economic policymakers:**

- 1) Canada's subsidies for fossil fuels must end. While Prime Minister Justin Trudeau recently announced that Canada will reduce its GHG emissions by 40 to 45 per cent below 2005 levels by 2030, some argue this target is not nearly ambitious enough, with Green Party Leader Annamie Paul suggesting Canada should adopt a 60% emission cut and NDP Leader Jagmeet Singh suggesting 50% (Walsh & Graney, 2021). In order to prevent dangerous climate change and ensure a healthy and sustainable future for all Canadians, including children and youth (those living and not yet living), Canada will need to adopt more ambitious goals and policies that honour its commitments under the Paris Agreement, strengthen action to meet the Paris targets, end subsidies for fossil fuels and “build a cleaner [...] future for all” (Prime Minister of Canada Justin Trudeau, 2021).
- 2) The needs of vulnerable children and youth (and other vulnerable sectors of the population), equality, and social inclusion (Hammill *et al*, 2021) should be prioritized in climate change mitigation and adaptation, promoting the health and wellbeing of current and future generations over (unchecked) economic growth.
- 3) Canada’s NAS should effectively and inclusively engage children (whenever appropriate) and youth throughout the development of Canada’s National Adaptation Strategy (NAS). “This means going beyond consultations to investing in capacities for engagement and, once capacity is strengthened, co-designing processes and solutions” (Hammill *et al*, 2021, p. 47).
- 4) Canadian governments should invest heavily in clean energy, technology, and infrastructure that support a low carbon economy. Additionally, governments should adopt “policies to reduce reliance on automotive transport and improve walkability and bike paths in urban and suburban neighbourhoods [...] and to develop local infrastructure that reduces fossil fuel energy use and flooding or fire risks” (Buka & Shea, 2019, n.p.). Some of these recommendations are particularly relevant for children and youth who can’t drive, need exercise, rely on parks and recreational facilities, and have different social needs than adults. Thus, policies which address and improve public transportation, walkability, bike paths, parks, playgrounds, local infrastructure, and energy services will benefit children, youth, and society as a whole in myriad ways, furthering other needs of children and youth while also helping build effective climate policy.



**For federal and mainly provincial social and health policymakers:**

- 1) Given the statistics on the demographic characteristics of socially vulnerable Canadian children and youth, there is an urgent need to understand the climate vulnerability of these groups. As mentioned in Chapter II, the health status and psychosocial wellbeing of children and young people are greatly influenced by the socioeconomic and health status of their parents and caregivers. As such, racialized and Indigenous children and youth in Canada, as well as those who experience existing health, social, and structural inequities will be disproportionately affected by future pandemics and climate change. This further affirms the need for equity-oriented policy responses which address the structural, social, and health vulnerability of Canadian children and youth to future emergency crises.
- 2) Canada should pursue climate policies which protect the most vulnerable, including children and youth, and those who are Indigenous, low-income, Black, racialized, disabled, refugees, and immigrants, among others. Climate policies must not further harm these groups or perpetuate social and structural inequities. For example, the Ford Government's *Cap and Trade Cancellation Act, 2018* leaves room for more GHG emissions, which in turn accelerate climate change and worsen climate impacts for Ontarians and Canadians in general. As previously mentioned, health disparities currently exist between Indigenous, immigrant, and refugee populations and other populations in Canada (see pp. 17-18), which means that these at-risk populations will suffer further disproportionate health impacts of climate change as a result of this Act.
- 3) Canada should pursue policies to reduce inequity among Canadian children and youth, including existing health inequities, food insecurity, education inequality, and poverty. As is the case with COVID-19, climate change will have greater adverse effects on those experiencing other health, social, and structural inequities. For example, "the government needs to take action on food insecurity through income-based interventions" and "address the root of food insecurity" (PROOF, n.d., n.p.). In addition, the federal government should "collaborate with First Nations, Inuit and Métis governments and Indigenous organizations to develop plans to prevent, reduce and eradicate child and family poverty in Indigenous communities" (Campaign 2000, 2020, p. 3).
- 4) Canada should "invest in climate change and public health research, monitoring, and surveillance to ensure a better understanding of the adaptation needs and the potential

health co-benefits of climate mitigation at the local and national level” (Watts *et al*, 2015, n.p.). These are vital steps in protecting public health and the health and wellbeing of young Canadians. In addition, Canada must “encourage a transition to cities that support and promote lifestyles that are healthy for the individual and for the planet. Steps to achieve this include development of a highly energy efficient building stock; ease of low-cost active transportation; and increased access to green spaces” (Watts *et al*, 2015, n.p.). According to Watts *et al* (2015), “such measures improve adaptive capacity, whilst also reducing urban pollution, greenhouse gas emissions, and rates of cardiovascular disease, cancer, obesity, diabetes, mental illness, and respiratory disease” (n.p.).

- 5) Knowledge and understanding of health risks, including “mental health and psychosocial impacts of acute climate impacts and longer-term impacts on mental health and well-being, including impacts to children and youth [and] knowledge of affirmative mental health outcomes” (Environment and Climate Change Canada, 2020, p. 56) should be improved.
- 6) Existing health promotion programs for children and youth should be strengthened and new programs should be implemented. For example, disease prevention programs (e.g., safety and injury prevention) targeted at parents and caregivers should be updated to include information about regional climate-related health risks and impacts (e.g., food and water contamination, exacerbation of asthma, health impacts of wildfires including smoke exposure, heat-related illnesses, sports-related health challenges in hot, dry conditions; etc). Health education programs should provide anticipatory guidance and information to parents and caregivers on how to mitigate impacts, minimize risk exposure, and adapt to climate change.
- 7) Training for physicians and other health care providers (including those serving Canada’s rural, Indigenous, and remote communities) should be offered on the following topics:
  - a. Climate-related health effects and diseases (Buka & Shea, 2019), including how to identify, manage, and prevent climate change-related health hazards
  - b. How to appropriately counsel families on climate-related health effects and diseases including anticipatory guidance on heat, sun, tick, air pollution, wildfire smoke, and pollen exposure/protection, food and water contamination, etc. (Buka & Shea, 2019)

- c. Mental health practitioners should receive clinical training on the mental health consequences of climate change, including climate anxiety, as well as best practices for treating those experiencing symptoms (Clayton, 2020).  
Additionally, “climate change should be integrated into medical education” (Maxwell & Blashki, 2016, abstract).
- 8) Provincial and territorial medical associations should work in conjunction with governments to improve healthcare practices, support a just recovery from the COVID-19 pandemic and a just transition to a low carbon economy, support accessible, culturally-sensitive/culturally-appropriate, and inclusive healthcare, and address existing health inequities.
- 9) Playground building standards should be improved to make infrastructure climate resilient, safe, and accessible for children across Canada

**For Ministries of Education and provincial education policymakers:**

- 1) A national strategy in response to the *Action for Climate Empowerment (ACE) Guidelines* (see pp. 30-31) or “pan-Canadian priorities and strategies” to support and advance climate change education should be developed and strengthened (Chopin *et al*, 2018, p. 3). Education policies must engage more deliberately and holistically with climate change.
- 2) As emphasized by Wynes and Nicholas (2019), “curriculum documents are the basis for teacher instruction and textbook content” thus, “aligning these documents with the best possible evidence can improve student learning and engage the next generation of Canadians on the critical issue of climate change” (abstract). Considering climate change research is accelerating and knowledge is changing, curriculum documents dealing with climate science, policy, and social-ecological impacts should be updated every two years.
- 3) As emphasized by Bieler *et al* (2017), climate change education policy in Canada must adequately attend to curriculum *and* pedagogy. This means providing guidance (and subsequent training) on appropriate pedagogical approaches to climate change education (see Chapter III for educational and pedagogical approaches to climate change education).
- 4) Since children are increasingly facing climate impacts in their own lives, they need opportunities to develop their agency at an early age. These skills can and should be

part of curriculum design and pedagogy. Ministries of Education should support, facilitate, and encourage children and youth's meaningful participation in educational choices, including curriculum development (see Chapter III).

- 5) All Canadian provinces and territories should include climate change within their educational policies and integrate climate change across subjects (see Chapter III; see also Cho, 2014; Hargis & McKenzie, 2021).
- 6) Statements in curriculum documents which challenge/oppose scientific consensus on anthropogenic climate change and lead/encourage students to debate the causes of this phenomenon should be *urgently* revised.
- 7) Critical thinking, creative actions, and transformative and place-based approaches to learning should be prioritized to encourage students to critically reflect on/challenge systemic injustices and inaction on climate change and become systems changers. To support generations of informed critical thinkers, who are environmentally responsible and politically engaged, the Canadian education system needs to adopt more comprehensive responses to climate change, integrate climate change across subjects and institutional activities, and incorporate Indigenous knowledge and perspectives into the curriculum.

#### **For school boards and teachers' unions**

- 1) Provide Canadian educators with *mandatory*:
  - a. Professional development courses to enhance their knowledge of climate change
  - b. Training on how to effectively teach this complex subject, including tools and strategies for:
    - i. Supporting constructive climate change engagement and action
    - ii. Instilling hope (e.g., concentrating on hope, co-creating stories of hope, etc.) and appropriately addressing climate anxiety, apathy, pessimism, misinformation, hope based on denial of climate change, and conflicting opinions/viewpoints on this subject (see "The Importance of Hope in Climate Change Education" section of this paper).
    - iii. Effectively educating students on the systems that perpetuate global climate change and inequality (e.g., through systems thinking) and the process of systemic change

- c. Training on how to support children’s socio-emotional development and enhance their sense of agency.
- 2) Teachers should be provided with classroom resources—up-to-date, scientifically-accurate, and locally-relevant books, videos, online resources, articles, worksheets, and lesson plans on climate change, climate justice, and systemic change—which they can easily and readily integrate into their classroom practices (see Learning for a Sustainable Future’s *Climate Change Resources for Teachers*).
- 3) School boards should provide parents and caregivers with information sessions and resources on climate change and climate-related impacts on children and youth.

### **For schools and teachers**

- 1) As suggested by Field *et al* (2019), “schools and teachers should ensure student learning is authentic and relevant to local climate impacts, utilizing strategies including inquiry, experiential learning, opportunities for deliberative dialogue, and community partnerships for local climate action” (p. 19) (see Chapter III for educational and pedagogical approaches to climate change education).
- 2) Adopt participatory, place-based, and transformative learning approaches (e.g., arts-based and participatory methodology) to empower students’ sense of agency
- 3) Provide students with opportunities for climate action in and outside of school
  - a. Help students to strengthen their sense of agency and belief of competency
- 4) Make climate change *local, tangible, and relevant* to students, while fostering connections to local place
- 5) Encourage responsible community engagement
- 6) “Engage [...] students in taking action against climate change” (Resources for Rethinking, n.d., n.p.). See Learning for a Sustainable Future’s [EcoLeague Action Projects](#) for funding opportunities for projects that “directly engage students in actions that address a local sustainability issue” (Resources for Rethinking, n.d., n.p.).
- 7) Foster critical thinking and creative actions
- 8) Encourage students “to determine the source of systemic problems contributing to climate change” (Hargis & McKenzie, 2021, p. 11)
- 9) Avoid ‘doom and gloom’ narratives and carefully frame the issue of climate change, choosing language and communication styles that are conducive to learning and do not induce or further exacerbate mental health issues and climate anxiety

- 10) Concentrate on *hope* and encourage students to reimagine climate change and local climate-related issues. Help students to envision and co-create “stories of hope concerning climate change” (Ojala, 2012), as described in Chapter III
- 11) Advocate for/demand professional development courses to enhance teachers’ knowledge of climate change
- 12) Adopt a whole school approach to climate change. According to Hargis and McKenzie (2020), “a ‘whole institution’ or ‘whole school’ approach to climate change involves engagement in each of the areas of teaching and learning, facilities and operations, community partnerships, and governance” (p. 3).
- 13) Become a certified EcoSchool. This certification “represents environmental excellence for kindergarten through grade 12 schools in Canada. Participation in the program allows students, teachers, school administrators, custodians, and parents to get a clear picture of their current environmental practices and take action to reduce their environmental footprint” (EcoSchools Canada, n.d., n.p.)
- 14) Integrate traditional and Indigenous knowledge into climate change education (while being mindful and careful not to perpetuate forms of European universalism and settler colonialism)
  - a. Link Indigenous knowledge to climate action
  - b. Create opportunities for meaningful engagement with local Indigenous communities
- 15) Formal institutions of education must *embody*, *model*, and *embrace* values that promote sustainability, reciprocity, and environmental and democratic responsibility, and condemn and reject ideals and actions which perpetuate and contribute to climate change, environmental degradation, and social injustice.
- 16) Ensure that any pension, endowment, or other investment funds do not profit from or support the fossil fuel industry. Thus, teachers’ pension plans should divest from fossil fuel companies immediately.
- 17) Universities should integrate teaching about climate change into medical education (Maxwell & Blashki, 2016, abstract). Similarly, as emphasized by Field *et al* (2019), “Faculties of Education should include climate change education across subjects in initial teacher education” (p. 9) and “ensure teacher-candidates’ courses address best practices of climate change education” (p. 19).

**For parents’ groups, community organizations, and children/youth allies**

- 1) To model comprehensive climate change education and behavioural change, advocate for:
  - a. Improved climate change education in schools
  - b. Greening schoolyards
  - c. Addressing existing environmental hazards at schools and inadequate/aging school infrastructure
  - d. Improved playground building standards and climate resilient, child-safe infrastructure
  - e. Reduced reliance on automotive transport and improved walkability and bike paths in urban and suburban neighbourhoods (Buka & Shea, 2019)
- 2) Educate other caregivers and the general public on:
  - a. Heat and sun exposure
  - b. Lyme disease and tick exposure and prevention (including protective clothing to prevent tick exposure/bite, tick prevention in backyards, tick habitat, safe tick removal, etc.)
  - c. Other vector-borne diseases in Canada (e.g., West Nile virus) and prevention strategies (including protective clothing and repellent to prevent mosquito bites, tips to prevent mosquito breeding)
  - d. Health, including mental health impacts of climate change on children and youth
  - e. The importance of reducing waste and animal product consumption
  - f. Safe food handling in warmer weather (Buka & Shea, 2019)
  - g. Risks for water contamination with heavy rain events (Buka & Shea, 2019)

## Future Research Needs

The scientific findings discussed in this Major Paper pertaining to the disproportionate health impacts of climate change on children and young people, combined with the increase and intensification of extreme weather events and climatic changes in Canada, provide impetus for expanded research on the specific vulnerability of Canadian children and youth. Few studies to date have focused on the social vulnerability of Canadian children and youth, including marginalized, racialized, and Indigenous children and youth, in the context of anthropogenic climate change. Thus, future research should aim at “appraising and understanding the social and economic processes which facilitate and constrain adaptation” of these groups (Adger &

Kelly, 1999, abstract). This research is needed to provide a holistic and comprehensive understanding of specific barriers to climate change adaptation and inform adaptation policies and measures. Future research should aim to investigate 1) the socioeconomic and sociocultural factors contributing to and/or exacerbating the vulnerability of young Canadians and 2) how these factors limit the adaptive capacity of children and youth. For instance, how are racialized, refugee, low-income, and homeless children and youth in Canada disproportionately affected by extreme weather events, natural hazards, and climatic changes and how do socioeconomic factors limit their ability to cope with and adapt to adverse effects? To what extent do current policies take their unique vulnerability into account and seek to address socioeconomic inequities while increasing their adaptive capacity? Answers to these questions are noticeably missing in the climate change literature and efforts should be made to address these research gaps for obvious equity reasons.

Future climate change research in Canada must include the voices, observations, and perceptions of children and youth (including and especially those who are marginalized) and support their meaningful participation. Without their contributions, climate change research will remain incomplete and unrepresentative of these groups. Youth, and to some extent children themselves, should be involved in participatory studies designed to understand and develop their political agency on climate change. MacDonald *et al* (2015) argue that “research should also include investigating opportunities and barriers for youth participation, understanding how youth participate in decision-making processes, and what venues and platforms are currently available or could be developed to allow greater youth participation in this field” (p. 369). Unless and until the needs and priorities of the most intersectionally vulnerable (including children and youth) are considered and included in policy and research, caring for them and addressing their needs will demand an ever-increasing portion of the social budget, while at the same time, managing this will be unnecessarily costly since their own lived experience and awareness of what should be done will be ignored. This is already evident in the case of mental illness among children and youth affected by COVID. Similarly, climate-related depression and mental illness have serious ramifications for families, schools, education, and health systems as well as those affected themselves.

Identifying and understanding the mental health effects of climate change on Canadian children and youth is essential for minimizing adverse effects, increasing the adaptive capacity of young Canadians, and providing the support they need in a changing climate. *Climate Science 2050*



calls for research on “longer-term impacts on mental health and well-being, including impacts to children and youth [and] knowledge of affirmative mental health outcomes” (Environment and Climate Change Canada, 2020, p. 56). Furthermore, research is needed to understand the ways in which climate change is further affecting children and youth who already suffer high levels of mental illness, including involuntary migrants (Burke *et al*, 2018) and Indigenous children (Cunsolo Willox *et al*, 2013) in Canada.

Future research could investigate “student perceptions of teachers’ emotion communication style” in Canada (Ojala, 2015, abstract). How do Canadian elementary and secondary school teachers communicate with students about the complexity, threat, science, and social dimensions of climate change? Do their communication styles (e.g., positive, negative, pessimistic, solution-oriented) influence or affect young Canadians’ climate change engagement? How do students navigate these feelings? Future research could also investigate how many and how often children and youth in Canada seek out psychological assistance to address climate anxiety from psychologists working in schools and post-secondary institutions. Similarly, understanding whether/to what extent educators address, discuss, and raise awareness of mental health consequences of climate change within schools would be helpful, as would understanding whether they feel prepared to engage in these conversations or require professional development and training to do so.

With respect to climate change education in Canada, research is needed to understand how well teachers receive and whether/to what extent they deliver curriculum guides which include climate change as a topic (Bieler *et al*, 2017). In addition, more research is needed to understand what constitutes effective or ‘good’ climate change education and “how to develop behaviours that lead to [...] greater literacy related to environmental sustainability” (Environment and Climate Change Canada, 2020, p. 50), a knowledge gap outlined in the synthesis *Climate Science 2050*. Research should also investigate opportunities and barriers for child/youth participation and involvement in educational decisions in Canadian schools and jurisdictions. Additionally, future research could investigate what climate change topics are covered in different provincial and territorial elementary curriculum materials.

These are just some of many research and knowledge gaps that currently exist in Canada. In order to understand the vulnerability and adaptive capacity of young Canadians, more research and interdisciplinary collaboration are needed. Many have made the analogy that Earth is like a

ship and humans are its crew. As we consider this analogy, we must ask ourselves whether to carefully train and prepare the next generation of our ship's crew—taking their specific needs and perspectives into account—or simply pass the baton, hoping they will somehow weather the storm we so carelessly steered them towards? This paper's aim has been to provide a recognition and greater understanding of the challenges that lay ahead for the current and future generations of Canadian children and youth, so that we together as a people may set them on the right course, help them to thrive in the face of adversity, provide spaces and opportunities for them to voice their opinions, express, develop, and realize their ideas, and most importantly, enjoy their *right* to a just and sustainable future.

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