BARRIERS AND BELIEFS:
HOW SASKATOON ADOLESCENTS MAKE SENSE OF CLIMATE CHANGE

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By

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Abstract

Based on recent scientific predictions, we are likely to experience the most serious effects of climate change within the next three decades. Therefore, the current generation of adolescents will be responsible for grappling with the most deleterious effects of climate change as they enter adulthood. However, research shows that adolescents worldwide may be ill prepared for this future, since they lack fundamental knowledge about climate change, do not see it as an imminent personal threat, and do not engage in substantive pro-environmental actions. I was confused about the apparent gaps between adolescents’ climate change attitudes and the seriousness of climate change and concerned about the lack of climate change education in Saskatchewan science curriculum. Therefore, I set out to explore how Saskatoon adolescents were making sense of climate change. To address this research question, I conducted semi-structured interviews with 10 Saskatoon high school students.

As a result of these interviews, this study has revealed that many of the participants were concerned about climate change and hopeful about the future in spite of it. However, the results also revealed that climate change remains a distant and invisible threat for many of the participants, even for those who have substantial knowledge about it. The results also suggest that pre-existing psychological and social factors may enhance or impede climate change educational efforts. Taking these factors into account, this study makes several recommendations for enhancing climate change education in Saskatchewan and addressing the distance between Saskatoon adolescents and climate change.
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Chapter 1: Introduction

In 2018, the Intergovernmental Panel on Climate Change (2018) warned that we only have until 2030 to drastically reduce global carbon emissions before the effects on the global climate system become irreversible. For adolescents who are currently in high school, these time frames overlap with the first decade of their adulthood. Thus, the current generation of teens will be responsible for continuing our transition to a low carbon world, while grappling with the most deleterious effects of climate change (Corner, et al, 2015). Yet teens have little say in the current policies that will shape their future and lack the knowledge and preparation needed to make informed political decisions (IPCC, 2018; Corner, et al., 2015). Research shows that adolescents worldwide, lack fundamental knowledge about climate change, do not see it as an imminent personal threat, and do not engage in substantive pro-environmental actions (Corner, et al., 2015; Leiserowitz, Smith, & Marlon, 2011). Although recent school climate strikes, led by Swedish teen Greta Thunberg, could indicate that adolescents are becoming more concerned about climate change (Mackay, 2019), it is unclear whether their concern will translate into positive political change. After all, scholars have also noted worldwide declines in voting rates and growing negative attitudes towards traditional politics in young adult populations (Corner, et al., 2015; Turcotte, 2015). In other words, youth’s attitudes about climate change may be incommensurate with the risks they face, while their political disengagement may hinder future policy changes. Therefore, we must find ways to engage youth and build public support before meaningful change can be fully realized.

Like teens around the world, Saskatchewan adolescents may be ill prepared for a future with climate change. According to scientific experts, climate change will have a profound effect on the Saskatchewan public, the environment, and key economic industries (Sauchyn, et al., 2009). Thus, Saskatchewan educators have a duty to prepare their students for this future by equipping them with relevant knowledge, skills, and predispositions to engage as socially responsible citizens. But by the time students graduate from high school in Saskatchewan, they may not have had any formal instruction on climate change. Currently, Science 10 is the only science curriculum that explicitly addresses climate change, with one curricular outcome devoted to it (Saskatchewan Ministry of Education, 2015). Although Environmental Science 20 and Earth Science 30 also contain climate change content, these classes are optional and less popular than the Physical and
Health Science 20 classes. As a Saskatoon teacher, I am concerned about the lack of climate change education in schools, despite the clear need to address it, and confounded by the disconnect between teens’ attitudes and the potential consequences they face. This led me to wonder if my students were also apathetic, or if they, like some youth, were anxious, confused, or paralyzed by a situation they have little control over (Corner, et al, 2015; Hibberd & Nguyen, 2013). Therefore, I set out to examine some Saskatoon teens’ perspectives on climate change by conducting semi-guided interviews with ten high school students. The following research question guided my inquiry into these adolescents’ views:

How do Saskatoon adolescents make sense of climate change?

**Background**

As a society, we have an opportunity and obligation to understand teens’ current perspectives on climate change. Understanding these perspectives will not only help us predict how they will act as adults, but it will allow us to influence their attitudes and actions through education. Teens are at a particularly impressionable time and the ideas, events, or experiences that surround them have the potential to shape their attitudes and influence their future actions (Alwin & McCammon, 2003). Since teens are at this critical inflection point in their lives, they may also be an important group for climate change communicators to focus on (Ojala, 2015a; Stevenson, Peterson, Bondell, Moore, & Carrier, 2014). There is evidence to suggest, for example, that adolescents’ climate change views may be less influenced by political ideology and worldview than adult populations (Stevenson, et al., 2014). Thus, educational interventions may be more effective in reducing skepticism in teens, who may not be as likely to discount information that does not align with their pre-existing views. Furthermore, education has been shown to be effective in reducing climate change skepticism and encouraging action with adolescents, if pedagogical approaches are shaped according to their unique perspectives and needs (Monroe, Plate, Oعارت, Bowers & Chave, 2017; Stevenson et al., 2014). Therefore, exploring some Saskatoon teens’ perspectives on climate change can provide insight into the factors influencing them and allow us to shape educational strategies accordingly.

Despite the potential to positively influence teens’ engagement with climate change, educational interventions are not without challenges. Traditional approaches to climate change education largely presumed that increasing knowledge would lead to greater public awareness and concern for climate change; however, “information deficit” approaches alone have proven
insufficient for encouraging concern and action on climate change (Corner, et al., 2015; Wolf & Moser, 2011). In contrast, recent research has revealed that numerous psychological and sociological factors influence people’s beliefs about climate change, while the strength and intersection of these factors can vary by population (Brownlee, Powell, & Hallo, 2013; Corner, et al., 2015; Hornsey, Harris, Bain, & Fielding, 2016; Wolf & Moser, 2011). This confluence of factors and their contextual nature makes it difficult to create educational strategies that can be broadly applied. Moreover, as Monroe, Plate, Oxarart, Bowers, & Chave (2017) point out, these challenges are compounded within the context of a classroom, as educators must grapple with competing views, while addressing students’ knowledge gaps: “climate change educators have the challenge of creating an atmosphere that is welcoming to a diversity of perspectives on climate change, while dispelling students’ misconceptions about climate science, which are often heavily supported by socio-cultural factors” (p. 15). Thus, climate change educators must consider the effect of psycho-social factors when shaping instruction, but also understand how these factors apply to their particular classrooms, to ensure that the pedagogical approaches they use are effective.

When selecting educational approaches, educators must consider a variety of psychological factors that influence an individual’s climate change beliefs and attitudes. Psychological factors, such as knowledge, values, or personal experiences, can influence an individual’s climate change beliefs and attitudes, both positively and negatively (Hornsey, et al., 2016; Kahan, et al., 2012; Leiserowitz, 2006; Norgaard, 2011; Wolf & Moser, 2011). More importantly, however, these factors shape how new information is processed, integrated, and acted upon (Kolmuss & Agyeman, 2002; Frantz & Mayer, 2009; Kahan, et al., 2012). If information conflicts with these psychological factors, a disconnect can occur between the information and an individual’s ability or willingness to integrate it into their existing cognitive structures. Ultimately, this can lead to the rejection of information or worse, further entrench skeptical attitudes and despair (Kahan, et al., 2012). Therefore, effective educational approaches must take into account a variety of psychological filters, which influence an individual’s ability to integrate information and willingness to engage with climate change.

Socio-cultural influences present another key challenge in shaping effective climate change education. Researchers have identified numerous socio-cultural factors that intersect with an individual’s beliefs and attitudes towards climate change, such as cultural norms, media,
geographical location, and political milieu (Corner, et al., 2015; Lee, Markowitz, Howe, Ko, & Leiserowitz, 2015; Norgaard, 2011; Wolf & Moser, 2011). Much like the psychological factors, these socio-cultural factors can influence how climate change information and experiences are interpreted on an individual level. Socio-cultural factors that conflict with the realities of climate change can cause individuals who identify with these factors, to selectively reject information, psychologically distance themselves from the problem, and refrain from acting (Kahan et al., 2012; Norgaard, 2011). Conversely, individual’s disengagement from climate change can be encouraged and legitimized by socio-cultural forces, resulting in a mutually reinforcing cycle of climate change denial (Norgaard, 2011). Thus, the social dynamics of climate change beliefs and attitudes adds a further layer of complexity for educators seeking to reduce the barriers to teens’ climate change acceptance and action.

**Purpose of the Study**

Although there is renewed scholarly interest in teens’ views on climate change, there are still significant gaps in our understanding of their perspectives. The current body of research surrounding climate change beliefs and risk perceptions has largely focused on adults, rather than adolescents (Corner, et al., 2015). As scholars have argued, however, this research gap may mask potential differences between youth and adult populations, whose views have been shown to deviate from one another on a range of issues, such as politics and the environment (Corner, et al., 2015; Ojala, 2015a; Wray-Lake, Flanagan, & Osgood, 2010). Existing research also shows that making sense of a complex issue like climate change involves cognitive, emotional, and social processes, all of which shape an individual’s interpretation and responses (Brownlee, Powell, & Hallo, 2013; Gonzalez-Guadiano & Meira-Cartea, 2009; Kollmuss & Agyeman, 2002). Some of these processes have been identified in adult populations, but several of these aspects have been understudied in teens (Corner, et al., 2015). Furthermore, there is no comprehensive and consistent data on teens’ beliefs and attitudes in Canada to serve as a starting point for educational development. Therefore, it is important to examine Saskatoon teens’ views on climate change in order to understand their unique perspectives, so that educational strategies can be developed accordingly.

Qualitative research offers important and unique insights into students’ climate change views that cannot be gleaned from quantitative research. Research involving adolescents’ views on climate change has largely been done using quantitative surveys, which has been useful for
assessing broad trends in beliefs and attitudes over time (Corner, et al., 2015; Leiserowitz, et al., 2011). However, surveys do not allow for a deep exploration of the attitudes and beliefs themselves and these omissions may lead us to miss opportunities to intervene and reduce barriers to teens’ engagement (Corner et al., 2015; Wolf & Moser, 2011). As Wolf and Moser (2011) further argue, qualitative studies, “can reveal culturally resonant framings and reveal regional ‘hooks’ that are of interest and meaning only to the regional population” (p. 3). In other words, using qualitative methods to explore how Saskatoon teens make sense of climate change can help us to develop methods that are best suited to their context and needs. Therefore, it is important to use a qualitative approach to explore how these Saskatoon teens make meaning about climate change and the contextual factors influencing their perspectives.

In terms of positionality, although I am a high school science teacher, I believe that my liberal arts background has given me a unique perspective on science education. Climate change education can not only help adolescents understand the current climate crisis but encourage critical reflection on the social justice issues surrounding it and inspire youth to become more politically engaged. In other words, I am dedicated to helping students develop the knowledge, skills, and predispositions needed to engage with climate change. However, understanding teens’ perspectives on climate change is a necessary starting point for developing effective educational approaches. Therefore, as mentioned earlier, my primary research question is:

- How do Saskatoon adolescents make sense of climate change?

Part of my motivation for studying Saskatoon teens’ perspectives on climate change is to identify potential barriers to acceptance and engagement. Extrapolation from existing research suggests that Saskatchewan students may be more susceptible to climate change denial because of geographical, social, and cultural factors (Hornsey, et al., 2016; Mildenberger & Leiserowitz, 2017; Mildenberger, et al., 2016; Milfont, Evans, Sibley, Ries, & Cunningham, 2014). Taken together, these factors may make it more difficult for teachers to address climate change in the classroom and encourage students’ engagement. Understanding potential barriers, however, would allow us to develop educational strategies to address and ameliorate them. Therefore, I propose the following research sub questions:

- How do personal experiences influence adolescents’ perspectives on climate change?
- How do values influence adolescents’ climate change views?
- How do outside influences shape teens’ climate change perspectives?
Definition of Terms

Climate Change Skepticism and Denial

Climate change skepticism and denial are often used interchangeably; but some scholars have argued that they should be differentiated (Norgaard, 2011). Accordingly, I use the phrase climate change skepticism to describe explicit expressions of doubt about the scientific facts of climate change, including its causes, effects, and solutions (Capstick & Pidgeon, 2014). In contrast, climate change denial is a persistent refusal to engage with climate change on an individual or social level, which involves psychological, emotional, and physical distancing from the problem (Norgaard, 2011). Thus, I use the term climate change denial to describe the avoidance of or disengagement with climate change and its related issues.

Knowledge and Understanding:

Knowledge or knowing, involves having factually correct information about the science of climate change, including its causes, effects, and solutions. In contrast, understanding is being able and/or willing to act on that knowledge (Wolf & Moser, 2011).

Making Sense:

According to interpretivist organizational scholars, sensemaking is a constructive process in which individuals attempt to create “a coherent account” of a situation or event that disrupts one’s normal sense of the world (Fiss & Hirsch, 2005, p. 31). As these scholars further point out, sensemaking is most pronounced during times of crises or significant change, which may be the case with climate change (Maitlis & Sonenshein, 2010). Based on existing climate change research, it also clear that an individual’s climate change beliefs, attitudes, and risk perceptions are all integral to how they make sense of and respond to climate change (Wolf & Moser, 2011). Therefore, I presupposed that all of these elements—beliefs, attitudes, and risk perceptions, would be employed as these adolescents attempt to construct meaning about climate change, individually and collectively. Therefore, I use the phrase “make sense” to collectively denote an individual’s beliefs, attitudes, opinions, and perceptions about climate change.

Values and Worldview:

Although values figure prominently in the literature on climate change beliefs and attitudes, the term is rarely defined (Corner, et al., 2015; Hornsey, et al., 2016; Wolf & Moser, 2011) Therefore, I have drawn upon the definition outlined by the social psychological theory of values. According to this theory, values are abstract and broad goals that guide individual and
social decision making and behaviours in various situations (Schwartz, et al., 2012). Worldview, on the other hand, is an individual’s collective view of reality, which includes values, along with beliefs and attitudes (Funk, 2001).

**Overview of Chapters**

The following is a brief overview of the proceeding chapters. Chapter 2 outlines the current research on adolescents and climate change and explains why it is insufficient for effective educational development. I then examine some of psychological and sociological influences on climate change beliefs and attitudes, with emphasis on the factors that may be consequential to the participants’ views. In Chapter 3, I outline the theoretical and analytical frameworks of the study. I also explain how I chose and recruited participants and summarize the considerations given to the validity and reliability of the study. Chapter 4 presents the results with corresponding contextual analysis. The results and parallel interpretations are organized into three broad themes, with sub themes delineating the main ideas for each major theme. As a result, the chapter is divided into three parts: Outside Influences, Anatomy of Concern and Personalizing Climate Change. The analysis, or Chapter 5, reflects on the significance of the results in the context of this study. Therefore, this chapter is organized into four sections, according to the key research question and sub questions. Finally, in Chapter 6, I provide an overview of the study in its entirety and briefly summarize the main results. I then outline the implications of the results for educators and policy makers and end with a discussion of the interpretative and study limitations.
Chapter 2: Literature Review

As our future leaders and voting citizens, today’s youth will shape future climate policies (Corner et al., 2015); thus, understanding adolescents’ current views on climate change can help us to predict how they will act in the future (Ojala, 2015a; Wray-Lake, et al., 2010). Simultaneously, during adolescence, an individual’s beliefs, values, and attitudes are still forming (Alwin & McCammon, 2003). As a result, teens may respond more positively to educational strategies aimed at reducing skeptical climate change attitudes and beliefs than adults, whose views are more solidified (Monroe, et al., 2017; Ojala, 2015a; Stevenson, et al., 2014). Reducing skepticism and encouraging engagement, in turn, could reduce political polarization on climate change issues and lead to greater public support for government mitigation and adaptation policies (Wray-Lake, et al., 2010). Therefore, teens’ climate change views are particularly important for researchers to focus on, since adolescents’ unique demographic and historical position makes them potential “barometers” and conduits of social change (Wray-Lake, et al., 2010, p. 2).

The potential to influence adolescents’ attitudes and encourage their engagement with climate change has led to a steep rise in studies involving youth’s climate change beliefs over the past decade (Monroe et al., 2017). Most global research involving teens and climate change has been done using large scale, national surveys, which have been useful for showing trends in beliefs and attitudes over time and across populations (Corner, et al., 2015; Leiserowitz, et al., 2011). But surveys are insufficient for developing effective educational strategies, since they do not explore the factors influencing teens’ beliefs and attitudes, nor identify barriers to concern and engagement (Corner, et al., 2015). In depth studies involving youth and climate change have further illustrated the continued gaps in adolescents’ knowledge of climate change (Chang & Pascua, 2015; Leiserowitz, et al., 2011; Shephardson, Niyogi, Choi, & Charusombat, 2009). However, knowledge is just one component in how people make sense of climate change (Leiserowitz, 2006; Wolf & Moser, 2011). Research involving adult populations has shown that there are a variety of psycho-social factors that precede and influence beliefs, attitudes, and risk perceptions about climate change (Hornsey, et al., 2016; Wolf & Moser, 2011). Although many of these factors are understudied in youth, there have been several in-depth studies in the U.S., Canada, and Europe (Fløttum, Dahl, & Rivenes, 2016; Ojala, 2015a; 2015b; Petrasek
Macdonald, Harper, Willox, Edge, & Rigolet Inuit Community Government, 2012; Stevenson, et al., 2014). Therefore, this study draws upon these in-depth studies that explore youths’ opinions of climate change and the contextual factors influencing their perspectives.

Despite growing interest in adolescents’ climate change perspectives globally, little is known about Canadian adolescents’ perspectives on climate change. This study took place in the spring of 2018 and at that time, research on Canadian teens’ attitudes towards climate change was limited. Currently, there is no national survey of Canadian adolescents’ climate change beliefs and attitudes and existing research focuses on remediating students’ knowledge gaps using varying educational approaches, rather than exploring adolescents’ perspectives in depth (Baker, Loxton & Sherren, 2013; Porter, Weaver & Raptis, 2012; Pruneau, Gravel, Bourque, & Langis, 2003). A single study, conducted in 2012 in Nunatsiavut, Canada, did examine how young Inuit youth, ages 12 to 25, made sense of their personal experiences with climate change (Petrasek-Macdonald, et al., 2012). However, this research is highly contextual and may not be applicable to populations outside of this geographical area or cultural milieu. Therefore, more research is needed into adolescents’ perspectives on climate change in other parts of Canada as well, so that educational strategies can be tailored to their specific needs.

**Why Knowledge is not Enough**

Research focused on students’ knowledge of climate change encourages the view that we need to increase the amount of climate change science instruction in schools (Chang & Pascua, 2015; Shephardson, et al., 2009). After all, global studies have demonstrated that very few students have accurate knowledge of the causes and effects of climate change at the primary, middle and secondary levels. (Chang & Pascua, 2015; Dawson, 2015; Leiserowitz, et al., 2011; Shephardson, et al., 2009). There is considerable scholarly disagreement, however, about the efficacy of knowledge-focused interventions. According to some studies, educating people about the science of global warming and the scientific consensus on human caused climate change has been effective for reducing skepticism in adults (Guy, Kashima, Walker, & O’Neill, 2014; van der Linden, Leiserowitz, Rosenthal, & Maibach, 2017). Similarly, Swedish researcher, Ojala (2015a) found that the less teens perceived they knew about climate change, the more likely they were to be skeptical over time. As a result, she argues, increasing the amount of climate change education that adolescents receive may be effective for reducing their skepticism about climate change.
Contrasting evidence suggests, however, that providing more climate related scientific information may be ineffective for increasing engagement. Some scholars have argued that knowledge of climate change is not a necessary pre-cursor to action, since people do not need to have a sophisticated level of understanding of climate change science in order to engage in pro-environmental behaviors (Kolmuss & Agyeman, 2002; Wolf & Moser, 2011). Furthermore, information-based or cognitive driven educational approaches do little to address an individual’s deeper motivations and non-cognitive responses to climate change (Norgaard, 2011; Wolf & Moser, 2011). Contemplating climate change can cause negative emotions to arise, which some people avoid by psychologically distancing themselves from the problem (Kolmuss & Agyeman, 2002; Norgaard, 2011). Thus, more knowledge alone is unlikely to mitigate these emotional reactions. Critics further argue that focusing too much on an individual’s climate change beliefs and attitudes masks the social and cultural components shaping their climate change perceptions (Brulle & Dunlap, 2015; Kahan et al., 2012). Yet socio-cultural factors can undermine the effectiveness of communication if they are not taken into account. For instance, if individuals are presented with information about climate change in ways that challenges their social identities, they may reject the information and become even more skeptical about climate change (Hart & Nisbet, 2012; Kahan et al., 2012). In essence, providing more information cannot only be ineffective, but counterproductive in reducing climate change skepticism and denial. To counteract this negative effect, it is important to develop educational strategies that consider these potential barriers, thereby increasing the possibility that teens will become a force for change.

If the purpose of educational interventions is to encourage adolescents’ engagement with climate change, understanding the depth of their knowledge or extent of their misconceptions should not be the sole research focus. Focusing on what students know about climate change may lead us to ignore the unique ways that teens respond to climate change and misidentify the barriers to action (Corner, et al., 2015). Conversely, limited in-depth research on teens’ climate change beliefs and attitudes makes it difficult to develop strategies that address their specific concerns (Fløttum, et al., 2016; Ojala, 2015a). Moreover, the factors that influence climate change beliefs, attitudes, and actions are highly variable, both geographically and demographically, which limits our ability to extrapolate from existing research (Hornsey, et al., 2016; Corner, et al., 2015). Some factors, such as gender, appear to be universal determinants of
climate change belief and risk perceptions for both adults and teens (Corner, et al., 2015; Hornsey, et al., 2016). These universal determinants can inform broad educational approaches. Other factors, however, appear to be more context specific and may necessitate the development of unique educational strategies for different populations. For example, a meta analysis of climate change denial reveals that climate change skepticism is much more prevalent in Anglo-Saxon countries (Bjornber, Karlsson, Gilek, & Hansson, 2017), which may mean that standard educational approaches may not be effective in these areas (this will be addressed further in Chapters 5 and 6). Thus, in order to develop differentiated educational strategies for Saskatoon students, we must first understand how they make sense of climate change.

Adolescents’ Climate Change Perspectives

Quantitative research has highlighted how teens feel about climate change and how their views may differ than those of other demographic groups. National opinion surveys indicate that teens generally accept that climate change is happening in comparison to adults and are becoming increasingly concerned (Corner, et al., 2015). However, the surveys have also drawn attention to the continued gaps in adolescents’ climate change attitudes and risk perceptions (Corner, et al., 2015; Leiserowitz et al., 2011). For instance, in a recent analysis, American millennials, ages 17-36, reported feeling more worried about climate change than they had in the past; yet they still underestimate the effects of climate change and do not think it is a personal problem relative to older generations (Kuppa, 2018). Thus, while awareness and concern for climate change has increased among youth, many still do not believe that it will personally affect them. This disconnect between risk perceptions and awareness is problematic, since studies have shown that people who believe in human caused climate change and have high perceptions of risk are more likely to support government mitigation policies and act pro-environmentally (Hornsey, et al., 2016; Whitmarsh, 2011). Therefore, it is important to understand Saskatoon teens’ beliefs, attitudes, and risk perceptions in relation to climate change.

Drawing upon research involving adults, these Saskatoon teens may show higher rates of disbelief in climate change and underestimate the personal risks associated with it. Unfortunately, there is little direct research on Canadian teens’ climate change attitudes; but extrapolation from existing studies may provide some insight. For example, a study of Canadian attitudes on climate change found that there is high rate of belief that climate change is happening. However, the distribution of belief is highly variable across the country, with the
lowest rates occurring in the prairies (Mildenberger, et al., 2016). As a result of this uneven
distribution, it is likely that these participants will demonstrate higher rates of climate change
skepticism than in other areas of the country. Socio-cultural conditions may also encourage
climate change skepticism and denial in Saskatchewan, such as economic dependence on fossil
fuel industries\(^1\), a politically conservative populace\(^2\), and political leaders who downplay climate
change\(^3\) (Hornsey, et al., 2016; Mildenberger & Leiserowitz, 2017; Zahran, Brody, Vedlitz,
Grover, & Miller, 2008). On the other hand, the Canadian attitudes study also showed that urban
areas on the prairies showed higher rates of belief in climate change than surrounding areas
(Mildenberger, et al., 2016). Based on this data, these Saskatoon students may be more aware
and concerned about climate change than their rural and adult counterparts. Nevertheless, as
Wolf and Moser (2011) assert, cultural differences between populations, such as adults versus
teens or urban versus rural, “may be glossed over (by averaging) in national samples.” (p.3)
Thus, it is important to explore how these Saskatoon teens’ make sense of climate change to
better understand how their views compare to other groups.

**Influences on Climate Change Perspectives**

Large scale quantitative surveys have been useful for showing broad trends in climate
change beliefs and attitudes over time; however, they do little to help us understand the
antecedents to these perspectives. Alternatively, comparative and in-depth studies can provide
more nuanced information about specific perspectives. Using these types of approaches,
researchers have identified a number of psychological and socio-cultural factors that shape how
adults interpret, react, and respond to climate change (Hornsey, et al., 2016; Leiserowitz, 2006;
Wolf & Moser, 2011; Whitmarsh, 2011). Research also shows that educational strategies, which
are shaped according to these factors, can increase student engagement and encourage pro-
environmental attitudes (Monroe et al., 2017). Yet many of these factors remain understudied in

\(^1\) In 2018, mining and oil and gas extraction was the largest segment of the Saskatchewan economy at 27.1%
(Government of Saskatchewan, n.d.)

\(^2\) Saskatchewan has had a conservative provincial government since 2007 and voted overwhelmingly Conservative
in the 2015 and 2019 federal elections

\(^3\) In his throne speech on May 17, 2016, then premier, Brad Wall, characterized climate change advocates as being
anti-economic growth: “some in this country who, given the opportunity, would shut down major parts of
Saskatchewan’s economy and put thousands of hard-working Saskatchewan people out of work, all in the name of
some misguided dogma that has no basis in reality” (Wall, 2016, p.8). More recently, the Saskatchewan
Government challenged the federal Canadian government’s imposition of a carbon tax, meant to reduce green
house gas emissions (Government of Saskatchewan, n.d.)
youth populations (Corner, et al., 2015; Ojala, 2015a). Although there are many potential factors influencing how the participants make sense of climate change, I have chosen to focus on three—values, personal experiences, and outside influences— for reasons that will be explained in subsequent sections.

**Values**

An individual’s values can greatly influence their climate change beliefs, attitudes and actions, both positively and negatively (Corner, et al., 2015; Hornsey, et al., 2016; Wolf & Moser, 2011). For adult populations, an individual's environmental, social, and political values are a significant predictor of their climate change beliefs and willingness to support government climate policies (Hornsey, et al., 2016). Most notably, those with hierarchical, individualistic, or weak environmental values are less likely to believe in climate change and less supportive of government mitigation policies (Hornsey, et al., 2016). What is more, research suggests that an individual’s values can supersede other influencing factors, such as knowledge, as individuals selectively credit or discredit information based on their values (Hornsey, et al., 2016; Kahan, et al., 2012). For people who strongly identify with these types of values, providing more information is not likely to change their attitudes about climate change, unless the information is framed in a way that does not conflict with their values (CRED, 2009). Less is known, however, about how values intersect with teens’ climate change perspectives and whether these factors are as influential on their climate change beliefs and attitudes as they appear to be in adults (Corner, et al., 2015; Ojala, 2015a; Stevenson, et al., 2014). Therefore, it is important to examine how environmental, socio-political values affect participants’ perspectives on climate change.

Although research has shown a positive link between pro-environmental values and climate change beliefs among adults, there has been little research on how pro-environmental values influence adolescents’ climate change concerns. Studies have consistently shown that people with strong pro-environmental values show the highest levels of certainty about climate change (Hornsey, et al., 2016; Whitmarsh, 2011), which correlates with greater intentions to act pro-environmentally and “willingness to prioritize the environment over the economy” (Hornsey, et al., 2016, p. 624). Similarly, Ojala (2015a) found that Swedish teens, who had strong environmental values, were less likely to engage in climate change skepticism than those with hedonistic values. Thus, it can be predicted that the participants who have strong environmental
values are more likely to be concerned and engaged with climate change than those with weak values.

On the other hand, there is little existing research on the strength or consistency of adolescents’ pro-environmental values within or across populations (Corner, et al., 2015). This lack of evidence makes it difficult to predict the extent and intensity of Saskatoon teens’ pro-environmental values, which is necessary to know when selecting appropriate educational strategies (Monroe, et al., 2017). Despite being dated, an American longitudinal study of adolescents’ environmental beliefs, attitudes, and behaviours reveals a precipitous decline in adolescents’ environmental conservation behaviours between the 1970s and early 2000s, while showing a simultaneous increase in their materialistic values (Wray-Lake, et al, 2010). Wray-Lake, Flanagan, and Osgood (2010) argue that these trends could reflect a widespread and steady weakening in adolescents’ pro-environmental values; however, they also acknowledge that pro-environmental values and climate change related behaviours were not directly assessed in this study. In contrast, a UK longitudinal study of climate change skepticism noted that young people were less skeptical of climate change than UK adults and reported stronger pro-environmental values (Whitmarsh, 2011). As a result, Whitmarsh (2011) hypothesized that increased environmental education and changing social norms could be having a positive impact on youths’ environmental values. Given these conflicting accounts, however, it is difficult to predict the prevalence of pro-environmental values among these Saskatoon adolescents and whether these values will influence their climate change views. Therefore, exploring how participants’ environmental values influence their sense making about climate change could clarify the relationship between them.

Socio-political values also play a significant role in shaping an individual’s climate change beliefs and attitudes. An individuals’ socio-political values or, how they think societies should be structured, involve two intersecting dimensions. The ‘hierarchy-egalitarian’ dimension relates to how resources should be distributed among members of society and ‘individualism-communitarianism’ refers to the extent that people believe “individual interests should be subordinated to collective ones” (Corner, Markowitz, & Pidgeon, 2014, p. 417). Studies have shown that individuals with hierarchical-individualistic value orientations are more likely to deny climate change than those with egalitarian-communitarian values (Kahan et al., 2012). In parallel, U.S. based research reveals that conservative Republicans have stronger hierarchical
and individualistic values than Democrats, who show stronger communitarian and egalitarian values (Hornsey, et al., 2016; Kahan, et al., 2012). Thus, many scholars have argued that persistent political divides on climate change issues in countries like the U.S, are likely the result of diverging socio-political worldviews between political conservatives and progressives (Corner, et al., 2014; McCright & Dunlap, 2011; Oreskes & Conway, 2010). Canadian national surveys have shown similar partisan divides on climate change with Conservatives showing lower levels of belief in climate change than those aligned with the Liberal and NDP parties (Pew Research, 2015). These patterns suggest that differing socio-political value orientations are shaping Canadian’s climate change beliefs and attitudes as well. Thus, based on quantitative national studies, socio-political values are likely to inform how the participants make meaning about climate change.

In spite of the established links between values and climate change views, the extent to which socio-political and environmental values influence adolescents’ perspectives remains less clear. For instance, in a Swedish, longitudinal study of teens’ climate change attitudes, conservative political orientation, and environmental values were significant predictors of climate change skepticism (Ojala, 2015a). However, when social powerlessness factors were considered, political orientation and environmental values no longer predicted skepticism, nor were they significant predictors of skepticism over time. These findings suggest that values and orientations may exert less influence on youth’s climate change views than on adults’ views (Ojala, 2015a). Furthermore, in a 2014 American study, targeted educational strategies aimed at reducing climate change skepticism in middle school students were especially effective for those with individualistic worldviews (Stevenson, et al., 2014). Since these results diverge from studies involving adults (Hornsey, et al., 2016; Kahan, et al., 2014), they indicate that adolescents’ worldviews may be less solidified than adults (Ojala, 2015a; Stevenson, et al., 2014). If so, this further strengthens the argument that youth are an important group to target with education (Ojala, 2015a; Stevenson, et al., 2014). Nevertheless, these studies also demonstrate that students with individualistic, hierarchical, and materialistic values are likely to enter a classroom with higher rates of skepticism than those with contrasting values (Ojala, 2015a; Stevenson, et al., 2014). Therefore, how participants’ values influence their climate change views is an important consideration for future educational development.
**Personal Experiences and Psychological Distance**

Younger generations will experience the detrimental effects of climate change more keenly and for a greater length of time than older generations (Corner et al., 2015); however, it is unclear how their personal experiences will affect their beliefs and attitudes about climate change. Emerging research on personal experiences and risk perceptions reveals that experiences with natural hazards and climate change effects can lead to increased concern and support for mitigation policies (Lujala, Lein and Rød, 2015; McDonald, Chai & Newell, 2015; Myers, Maibach, Roser-Renouf, Akerlof & Leiserowitz, 2013). Yet personal experiences with climate change do not affect people’s beliefs and attitudes uniformly. According to some studies, the connection between personal experiences and climate change beliefs and attitudes is dependent upon the type of experience one has (Lujala et al., 2015; Milfont, et al., 2014). People who have had a direct experience with natural disasters or salient climate change effects generally report higher levels of concern than those who have not, while simply living in proximity to affected areas or a vulnerable location is not correlated with increased concern (Lujala et al., 2015; McDonald et al., 2015). Studies also reveal that an individual’s previously held beliefs, attitudes, and values can act as filters for personal experiences and mitigate the effects of experiences on concern (Asplund, 2016; McDonald et al., 2015; Whitmarsh, 2008). In other words, psychological barriers can prevent an individual from acknowledging the connection between their personal experience and climate change. Therefore, there is little guarantee that increasing personal experiences with climate change for youth will lead to greater concern and engagement.

Although personal experiences may not directly lead to greater concern, decreasing the psychological distance between adolescents and climate change may be important for encouraging concern and engagement. Many scholars have argued that one of the most significant barriers to increased concern and action on climate change is psychological distance (Corner et al., 2015; Wolf & Moser, 2011). According to risk perception researchers, individuals who report the highest levels of concern and willingness to act on climate also perceive climate change as psychologically ‘close’ (McDonald, et al., 2015). These individuals are certain that: climate change is happening (hypothetical), the effects are being felt or will be in the near future (temporal), it will affect them and others like them (social), and the effects are

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4 McDonald, Chai, and Newell (2015), differentiate psychological distance from ‘motivated’ psychological distancing, although they acknowledge that the two phenomena are related.
geographically close (spatial) (McDonald et al., 2015). Thus, some scholars contend, educators need to encourage people to see the connections between their personal experiences and climate change in order to reduce the psychological distance between them (Corner et al., 2015; McDonald, et al., 2015).

Conversely, educational strategies that aim to reduce psychological distance can have detrimental impacts. In some cases, using communication frames that reduce the psychological distance of climate change can cause negative emotional reactions if individuals lack the tools necessary to act (Corner, et al., 2015; McDonald, et al., 2015: Ojala, 2012). Additionally, pro-climate change frames can trigger skeptical beliefs, attitudes, or values (McDonald, et al., 2015). These “frame clashes,” in turn, can exacerbate climate change denial (Asplund, 2016; McDonald, et al., 2015) and lead to, “increasing the levels of distrust between partners” (Asplund, 2016, p. 571). Consequently, psychological distance frames that conflict with students’ beliefs or emotional states may cause students to mistrust the teacher and reject the information they present. Therefore, educators need to understand the types of psychological distance that students may be experiencing so that they can shape climate change instruction accordingly.

Although direct research on adolescents and psychological distancing is rare, existing evidence suggests that youth are psychologically disconnected from climate change (Corner, et al., 2015; Flöttum, et al., 2016; McDonald, et al., 2015). For instance, young people in the U.K. and Australia believe that climate change will mostly affect people and places far from them, which could reflect spatial and social distancing (Corner, et al, 2015). 5 Similarly, in a Norwegian study, high school students struggled most with the temporal and spatial aspects of climate change, when asked which aspects of climate change they found most difficult to understand (Flöttum, et al., 2016). Thus, according to these studies, teens are disconnected from climate change in several, if not all, dimensions of psychological distance. If this is also the case for these Saskatoon teens, psychological distance may be a barrier to their engagement with climate change and have a negative impact on their concern (McDonald, et al., 2015). Furthermore, psychological distance research suggests that Saskatoon students may experience greater distance than other youth because of their unique context. For example, Saskatoon teens may be at risk for geographical distancing, since they live in an urban area and in a landlocked province, 5 Recent bushfires in Australia may have shifted young people’s attitudes in this regard (Law, 2020)
far from coastal areas (McDonald, et al., 2015; Milfont, et al., 2014). Therefore, it might be especially important to utilize educational strategies that reduce psychological distance when working with this population. Nonetheless, studying participants’ personal experiences with climate change may further elucidate how psychological distancing influences their sense making about climate change.

**Outside Influences**

Developmental psychology has long shown that an individual’s beliefs, attitudes, and values are shaped through socialization (Alwin & McCammon, 2003). While parents are the primary influences on a child’s development, as a child ages, their experiences in school and with peers also become influential (Alwin & McCammon, 2003; Ojala, 2015a). For educators, this timing presents a key opportunity to shape youth’s beliefs and attitudes about climate change (Corner, et al., 2015; Monroe, et al., 2017); but this opportunity is not without challenges. Research involving adults indicates that an individual’s reaction to climate change information is dependent upon many factors, including the source of the information, how the information is framed, and an individual’s prior beliefs and attitudes (Wolf & Moser, 2011). Thus, a growing number of quantitative studies have examined how some of these factors affect adolescents’ concern for and engagement with climate change (Mead, Roser-Renouf, Rimal, Flora, Maibach, & Leiserowitz, 2012; Ojala, 2015a; Ojala, 2015b; Ojala & Bengtsson, 2018; Stevenson, Peterson, & Bondell, 2016b; Stevenson, King, Selm, Peterson & Monroe, 2018; Valdez, Peterson & Stevenson, 2018). More specifically, these studies have compared adolescents’ climate change concern and pro-environmental behaviours with the frequency of communication between friends, family and teachers, youth’s perceptions of these interactions, and their perceptions of others’ climate change attitudes. In conjunction, this qualitative study can contribute further insights into how various outside influences shape participants’ climate change views.

Research clearly shows that parents play a significant role in shaping youth’s climate change beliefs and attitudes (Corner, et al., 2015; Ojala, 2015a; Ojala, 2015b; Valdez et al., 2018). Several studies have confirmed that young people’s beliefs and attitudes towards climate change largely mirror those of their parents (Ojala, 2015a; Mead, et al., 2014; Valdez et al., 2018). Research further indicates that parents are the most important social influence on adolescents’ climate change beliefs, attitudes, and actions---exceeding the influence of peers or
teachers (Mead et al., 2012; Ojala, 2015a; Stevenson, et al., 2018b; Valdez, et al., 2018). These results suggest that parents who hold skeptical climate change attitudes, may undermine educational efforts aimed at reducing skeptical attitudes in Saskatoon teens. On the other hand, even if Saskatoon parents have skeptical attitudes, these attitudes may not be a barrier to participants’ concern and engagement with climate change. Several studies indicate that parents’ behaviours and emotional approaches to climate change may matter more than the specific attitudes they hold (Mead, et al., 2012; Stevenson, et al., 2016b; Ojala & Bengtsson, 2018). For instance, the more frequently climate change is discussed in the home, the more likely that students will seek out information about climate change and the more concerned they are about it, regardless of whether their parents have skeptical views (Mead, et al., 2014; Stevenson, et al., 2016b). Thus, it appears that other mechanisms, such as behavioural modelling and coping strategies of parents, might influence adolescents’ climate change perspectives more so than the climate change information or views that parents share with their children (Ojala & Bengtsson, 2018). Nevertheless, research confirms that parents do have a significant influence on youth’s climate change attitudes, which is likely to be reflected in participants’ perspectives on climate change.

Although parents exert the most influence on adolescents’ climate change views, peers and teacher may also have an indirect impact. Research confirms that peers and teachers can influence adolescents’ perspectives on climate change (Ojala, 2015a; Ojala, 2015b; Stevenson, et al., 2016a; Stevenson, Peterson, & Bradshaw, 2016b), but to a lesser extent than parents (Ojala, 2015a; Stevenson, et al., 2016b). However, the extent and mechanisms of peer and teacher influence on adolescents’ climate change perspectives remains ambiguous. Some studies have shown that the more teens believe that friends and family accept human caused climate change, the more likely they are to be concerned themselves (Stevenson, et al., 2016b), while those who believe that their friends and family hold skeptical attitudes are more likely to hold skeptical attitudes too (Ojala, 2015a). Thus, several scholars contend that descriptive norms or, perceptions of what others believe, can impact teens’ climate change views (Ojala, 2015a; Stevenson, et al., 2016b). Other studies have also shown that discussions about climate change with family, friends, and teachers can enhance adolescents’ concern for climate change, particularly if these people share similar attitudes about it (Mead, et al., 2012; Stevenson et al., 2016b). On the other hand, some of these studies also suggest that discussions can positively
impact teen’s climate change concern, regardless of the perceived views of the others’ attitudes (Mead et al., 2012; Stevenson, et al., 2016b). Thus, scholars theorize, engaging in conversations about climate change may increase the saliency of the issue, which leads to increased concern about it (Mead, et al., 2012; Stevenson, et al., 2016b). To further complicate the matter, more recent research reveals that adolescents rarely discuss climate change with family and friends (Kuppa, 2018; Valdez, et al., 2018). and the frequency of discussions does not predict adolescents’ pro-environmental actions (Valdez, et al., 2018). Thus, the extent of peer and teacher influence on adolescents’ perspectives remains unclear. Nevertheless, peers and teachers are likely to exert some influence on the participants’ responses to climate change; but due to the limited nature of this research, further exploration into how peers and teachers influence these adolescents’ climate change views is needed.

Despite younger generations’ dependence on digital media for news and information, there is little research on the role that digital media plays in shaping adolescents’ perspectives on climate change (Corner, et al., 2015). Studies have shown that teens are more likely than adults to look to the Internet for information (Leiserowitz, et al., 2011) and intentionally seek out nuanced and opinion driven ‘news,’ rather than traditional ‘balanced’ reporting (Marchi, 2012). Research further suggests that teens’ reliance on digital media could lead to greater knowledge and concern for climate change but could also expose them to more climate change misinformation (Anderson, 2017). This exposure to misinformation, in turn, could increase teens’ skepticism and polarization on climate change issues (McCright, & Dunlap, 2011). Furthermore, the prevalence and persuasive nature of digital climate change misinformation could be problematic for students who lack the skills necessary to distinguish between reliable and untrustworthy information. Preliminary research, conducted at Stanford University, suggests that adolescents might be particularly poor at distinguishing reliable information from unsubstantiated claims in online sources (Donald, 2016). Conversely, there is very little research on how teens’ reliance on digital media may impact their climate change views. A single Swedish study found that social media use was not significantly correlated with skeptical climate change attitudes in teens (Ojala, 2015a). However, this study focused on the predictors of climate change skepticism, which does not preclude the possibility that digital media influences teens’ climate change perspectives. Therefore, further research may illuminate how digital media use shapes participants’ climate change views.
Chapter 3: Methodology

Theoretical Framework

The intent and design of this study rests upon an assumption that human understanding of the world is both internally and externally shaped. Constructivists assert that people are not passive observers of an objectively knowable world, but rather, make meaning of events or ideas by actively incorporating or rejecting new information while shifting their conceptual structures accordingly (Charmaz, 2006; Creswell, 2014). Social constructivists also contend that meaning making or, how we interpret and assign value to ideas, people, or things, is not entirely driven by the individual. Instead, they argue, our understanding of the world is heavily influenced by social forces, structures, and interactions that are rooted in historical and geographical contexts (Lincoln, Lynham, & Guba, 2018). Thus, theorists often refer to meaning as being ‘negotiated’ between the individual and the surrounding culture or society. As critical theorist McLaren (2009) states, “the individual, a social actor, both creates and is created by the social universe of which he/she is a part” (p. 61). I share the same position and presupposed that these Saskatoon students would not only use a variety of emotional and cognitive strategies to create meaning about climate change, but that their interpretation would also be shaped by the unique social forces surrounding them.

To better understand the factors shaping participants’ views on climate change, I undertook an interpretive, qualitative study. An interpretivist approach to research is concerned with, “how people define events or beliefs and how they act in relation to their beliefs” (O’Donoghue, 2002, p. 16). Chen, Shek, and Bu (2011) further argue that understanding how individuals interpret and construct their subjective reality helps researchers come to a better understanding or explanation of our shared reality. Similarly, I wanted to understand how these Saskatoon teens constructed meaning about climate change and to explore how various contextual factors affected their perspectives. Much like social constructivism, an interpretivist paradigm also assumes that knowledge of the world is socially constructed and mutually negotiated through social interaction. Therefore, interpretivists assume that meaning is modified and reified through the interpretative process (O’Donoghue, 2002). For the interpretivist researcher, the purpose of research is to understand how participants make meaning, while also acknowledging that their role in the interaction shifts or alters that meaning. Thus, I acknowledge that my own
interpretation of the topic, as reflected in the design of the research project---the focus, the interview questions and the analysis, has influenced how I have constructed meaning about the participants’ responses.

**Data collection**

Language is often central to social constructivist research approach (Chen, et al., 2011). Language, in all its forms—written, spoken, and visual, creates the boundaries around what can be communicated, how it is expressed, and how it is received or interpreted between members of a given culture or society. As discourse analysis scholar Wetherell (2001) explains, “Words are about the world but they also form the world as they represent it” (p. 16). In other words, language acts as both a constructive and descriptive force, since it reflects our ideas and values, but also shapes our ideas and values in the process of using it. On the other hand, social constructivists also reject a static and objectifiable notion of reality (Lincoln & Guba, 1985). Accordingly, the language that individuals use to communicate their understanding or perceptions may not be an accurate lens on their internal workings, nor reflect an objective reality. At best then, interviews can be an approximate and dynamic interpretation of the world, as viewed through the participants’ lens, in conjunction with the researcher (Alshenqueeti, 2014; Chen, et al., 2011). Nevertheless, much insight can be gleaned by how individuals communicate their understanding and by what is said or not said. Moreover, when multiple individuals use similar language to communicate their understanding or perceptions—known as discursive patterns, these patterns can illuminate larger socio-cultural forces at work as interpreted by the participants (Chen, et al., 2011). Therefore, I chose to conduct semi-structured interviews in the hopes that the language students used to describe their perspectives would illuminate how teens internalize, interpret, and respond to climate change and the socio-cultural forces surrounding them.

A semi-structured interview is a useful tool for exploring perspectives because it allows the participant to share their understandings and responses in their own words. Unlike a survey, interviews do not pre-determine and restrict the wording and depth of a participants’ responses (Creswell, 2014). Interviews also allow responses to go into a multitude of directions and allow seemingly unconnected or novel ideas to surface that the researcher may not have anticipated. As qualitative psychological researchers Brinkmann and Kvale (2015) explain:
[D]oing conceptual interviews can serve to uncover respondents’ discourse models, that is, their taken –for-granted assumptions about what is typical, normal, or appropriate (Gee, 2005), and can favorably be conducted in concert with questions that ask for concrete descriptions, which sometimes gives interesting points of contrast (p.177)

In other words, interview responses may reflect a more authentic representation of the participants’ conceptual frameworks, since they are communicated through the participants’ lens. In contrast to surveys, semi-structured interviews also allow the researcher to clarify any ambiguous responses during the interview itself, which can make the analysis of the interview transcripts more fruitful (Brinkmann & Kvale, 2015). I believed that interviews would allow me to gather in depth and detailed insights into how students relate to climate change through careful and deliberate probing. Furthermore, interviews can allow us to glimpse deeper motivations and influences, which may not be explicitly acknowledged by the participants. In a Norwegian study of climate change denial, for example, Norgaard (2011) noticed that a participant’s emotional responses to climate change were not always acknowledged by the participant and in some cases, were strategically omitted from what was stated. Interviews and the subsequent analysis of the transcripts, however, can reveal underlying factors or influences that may not be apparent to the participants themselves. Thus, semi-structured interviews can be useful for exploring adolescents’ perspectives on climate change, since they allow participants more freedom to shape their own responses and allow for deeper probing and analytical interpretations.

I conducted 11 semi-structured, face to face interviews with students drawn from a variety of Saskatoon public high schools. The first interview took place in the fall of 2017 and was co-conducted by myself and my thesis supervisor, Dr. Paul Orlowski. The first interview was a pilot interview, which allowed Dr. Orlowski to provide guidance and constructive feedback on interviewing techniques. The pilot interview also allowed for reflection on and refinement of the interview questions. These questions were subsequently altered as a result of the responses elicited during the pilot interview. I then conducted the remaining 10 interviews alone during the spring of 2018. Most interviews were conducted at locations that were most convenient for participants, such as schools and local restaurants. All interviews were recorded using voice recording software and then digitally transcribed; however, the transcripts from the pilot interview were not included in the study’s results.
Participants

Sampling decisions not only determine how the research is carried out, but they impact the validity of the study as a whole. According to one psychological researcher, (Robinson, 2014), the validity and transparency of a qualitative study is heavily influenced by the researcher’s sampling decisions. Decisions made about sampling, such as who is and is not included, determine what can be said about the results and the extent to which those results can be generalized beyond the sample (Robinson, 2014). Therefore, much consideration was given to the study’s sampling process and the implications of sampling decisions on the subsequent data analysis. In the following sections, I address the four components of sampling as outlined by Robinson (2014) --the “sample universe”, sample size, sampling and sourcing methods (p. 25), and explain the practical and theoretical considerations underlying them.

The primary function of a “sample universe” is to determine who can and cannot be included in the study (Robinson, 2014, p. 25). To be considered for this study, participants had to be in Grade 11 or 12 of high school and ranged in age from 16-18. I focused on high school students because of the potential significance of their climate change views. As Ojala (2015a) points out, high school students are the most immediate group transitioning into adulthood; therefore, she argues, examining their views may be more important in comparison to younger adolescents or children because of their potential to influence climate policy sooner. I also chose to focus on this group because by these educational levels, students should have completed Science 10, which is the only mandatory high school science course that contains learning outcomes related to climate change (Saskatchewan Curriculum). Based on this, I presumed that students would have had some formal instruction about climate change that could serve as a baseline of knowledge among the participant pool. On the other hand, even if students had taken Science 10, there is no guarantee that they would have learned about climate change; there may be substantial variations between the curriculum and what is actually taught, based on teacher preference. To some degree, varying levels of exposure to formal climate change instruction may impact the participants’ perspectives on climate change (Guy, et al., 2014) and may limit what can be generalized about these teens’ climate change views. Nevertheless, I focused on students in the upper years of high school to establish inclusionary boundaries for the sample and a baseline for comparing participant responses.
The secondary function of a “sample universe” is to determine what generalizations can be made about the sample (Robinson, 2014). Since I utilized a thematic analytical approach, which seeks to “find repeated patterns of meaning” (Braun & Clarke, 2006, p. 86) across a sample, I tried to increase the validity of these generalizations by establishing a diverse sample. According to Robinson (2014), the validity of any generalizations made about a sample is largely defined by the sample itself; the more homogenous a sample is, the less generalizable the results will be. Robinson (2014) also argues that, “any commonality found across a diverse group of cases is more likely to be widely generalizable… than a commonality found in a homogenous group…” (p. 27). In this case, identifying patterns in participants’ climate change views and determining the influence of a shared socio-cultural environment on those views would depend on how heterogenous the sample was. Accordingly, I attempted to establish a sample that was as heterogenous as possible, so that generalizations made about the sample would be valid.

Establishing a diverse sample for this study, however, was limited by practical and ethical consideration. For example, the sample contains five males and five females, so that the results would reflect a gender balance. But to limit the amount of information gathered about students by the researcher, as recommended by research ethics guidelines, participants were not asked to self identify their gender. Therefore, the gender ascribed to each participant may not reflect their actual gender identity. Moreover, I have presented participants’ gender in binary terms—male or female, which was ascertained based on culturally biased, external expressions of sex. I acknowledge that these interpretations are heavily influenced by my own bias, as a heterosexual cis female. On the other hand, gender identification was only used for sampling purposes and the analysis of the results does not involve gendered comparisons; therefore, I believe that the effect of my bias is minimized. In addition, participants for this study were recruited from five different Saskatoon public high schools; however, students from other school divisions, including the separate Catholic school system, were not included because of time constraints. I was also not able to recruit students from all Saskatoon public high schools, while demographic information about individual students, such as cultural or socioeconomic background, was not collected due to ethical considerations. As a result, the cultural and socioeconomic heterogeneity of the sample cannot be guaranteed, and the views of these participants may or may not reflect the views of Saskatoon students as a whole. The following table
illustrates participant and school demographics based on the limitations cited above. In order to protect participants’ anonymity, all names are pseudonyms.

Table 3.1 Participant Demographics

<table>
<thead>
<tr>
<th>Student</th>
<th>Grade</th>
<th>Age</th>
<th>Gender</th>
<th>School Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greg</td>
<td>11</td>
<td>17</td>
<td>Male</td>
<td>East Saskatoon Upper Middle Class</td>
</tr>
<tr>
<td>Chris</td>
<td>12</td>
<td>18</td>
<td>Male</td>
<td>West Saskatoon Lower-Working Class</td>
</tr>
<tr>
<td>Natalie</td>
<td>11</td>
<td>16</td>
<td>Female</td>
<td>East Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Owen</td>
<td>11</td>
<td>17</td>
<td>Male</td>
<td>East Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Eric</td>
<td>11</td>
<td>16</td>
<td>Male</td>
<td>East Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Hannah</td>
<td>12</td>
<td>18</td>
<td>Female</td>
<td>East Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Inaya</td>
<td>11</td>
<td>16</td>
<td>Female</td>
<td>West Saskatoon Lower-Working Class</td>
</tr>
<tr>
<td>Mark</td>
<td>11</td>
<td>16</td>
<td>Male</td>
<td>North Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Danielle</td>
<td>12</td>
<td>17</td>
<td>Female</td>
<td>North Saskatoon Middle to Upper Middle Class</td>
</tr>
<tr>
<td>Yasha</td>
<td>12</td>
<td>17</td>
<td>Female</td>
<td>East Saskatoon Middle Class</td>
</tr>
</tbody>
</table>

Socioeconomic data is based on demographic information from City of Saskatoon, Neighborhood Profiles, 2017.
Similar to sample demographics, the sample size for this study was largely influenced by practical considerations. Although many researchers acknowledge that sample size is an important consideration when collecting data, there is little scholarly agreement about what constitutes a sufficient sample size for qualitative research studies (Charmaz, 2006; Creswell, 2014; Robinson, 2014). Some researchers, such as grounded theorists, argue that the sample size is sufficient when the data no longer yields new insights for theoretical categories (Charmaz, 2006), while others suggest that the size should follow standards established by similar research approaches (Creswell, 2014). There are even fewer guidelines on what constitutes a suitable sample size in thematic analysis when it is used as analytic framework, rather than a methodological approach (Braun & Clarke, 2006). On the other hand, most qualitative researchers agree that the sample size should be based on the practical constraints of the project, as well as the theoretical underpinnings of the research (Braun & Clarke, 2006; Creswell, 2014; Robinson, 2014). Since I conducted the research myself during a five month leave of absence, the number of interviews was limited by time and resources to 10 interviews. I attempted to conduct a follow up focus group interview in order to further validate the results from the individual interviews, but I was unable to recruit participants. Although more interviews would likely increase the validity of the results, I believe that 10 interviews provide a useful starting point in exploring how these adolescents make sense of climate change. Nonetheless, the results are limited by the small sample size and would need to be further validated with continued research.

Finally, I relied on convenience sampling and word of mouth to recruit participants for this study, which also affects the subsequent data analysis. I am a teacher in the school division where I conducted research; therefore, I relied on my secondary teacher colleagues to share information about the study with their students and to recommend students who might be interested in participating. According to Robinson (2014), convenience sampling such as this, cannot be considered random because it relies on selecting those who fit the sample criteria on a “first—come—first--served basis” (p. 32). As a result, analytical conclusions cannot extend beyond the geographical and demographic limitations of the sample (Robinson, 2014). In other words, the themes developed from the data are specific to this group of Saskatoon teens and may not extend to others outside of the geographical area or demographic group. Furthermore, participants were recruited on a voluntary basis, which may impact the reliability of the results.
For instance, students who volunteered to participate may have had a pre-existing interest in climate change and therefore, their views may not reflect the views of Saskatoon teens who do not share this interest. Although Robinson (2014) argues that the effect of self-selection bias is unavoidable in interview-based studies that rely on voluntary participation, I have taken into consideration the potential impacts of this bias on the findings. These potential impacts are discussed further in subsequent sections.

Data Analysis

In this study, I used thematic analysis as a framework for coding, analyzing, and constructing meaning about the data. Thematic analysis is an iterative approach to qualitative data analysis that involves coding and analyzing data concurrently for the purpose of identifying and developing patterns or ‘themes’ (Boyatzis, 1998; Braun & Clarke, 2006). Although thematic analysis can be done deductively, which involves analyzing the data from a pre-determined theoretical framework, I chose to use an inductive approach (Braun & Clarke, 2006). In an inductive approach, the themes or conceptual categories are increasingly broadened and modified as they are drawn out of their textual context (Boyatzis, 1998; Braun & Clarke, 2006; Charmaz, 2006). In this way, an inductive thematic analysis enables themes to be developed from the data, through an iterative and emergent process much like a grounded theorist approach (Braun & Clarke, 2006; Charmaz, 2006). Unlike grounded theory development, however, I was unable to conduct multiple stages of data collection and analysis because of time and resource constraints. Nevertheless, Braun & Clarke (2006) argue that in such situations, thematic analysis is an appropriate alternative to grounded theory and that it can be used as a framework for all levels of the analytical process (coding, analyzing and reporting data). Thus, my thematic analysis of participants’ climate change views closely resembles a constructivist grounded theory approach, in which the researcher “aims to learn participants’ implicit meanings of their experience to build a conceptual analysis of them” (Charmaz & Belgrave, 2012, p. 349). But in contrast to grounded theory, I chose to use thematic analysis as an analytical framework, rather than as a methodological tool.

My decision to utilize a thematic analytical approach was based on the many advantages it offered to me, as a novice researcher, and to the aims of this study. Some of the advantages of thematic analysis, such as ease of use and accessibility, held practical appeal since I had no previous experience conducting qualitative research and analyses on my own (Braun & Clarke,
Other aspects of thematic analysis also aligned with key attributes of this study. As Braun and Clarke (2006) explain, one of the most advantageous aspects of thematic analysis is its inherent flexibility. As a result of this flexibility, thematic analytical approaches are often used in exploratory studies, where the research area is relatively new or understudied (Braun & Clarke, 2006; Charmaz, 2006). Since there was a lack of qualitative research on Canadian adolescents’ perspectives on climate change, this absence hampered my ability to use an existing framework or comparable study as a foundation for the analysis. Braun and Clarke (2006) also argue that thematic analysis can be useful when researchers do not wish to be bound to a single theoretical perspective or approach. In parallel, this study draws on research from a variety of disciplines such as, psychology, social psychology, sociology, and education; thus, adhering to a single theoretical framework from one disciplinary area could preclude unique insights or patterns from emerging in other areas. Thematic analysis done with a “contextualist” stance allows further analytical flexibility, as it does not exclusively fit within an essentialist or constructivist stance. A “contextualist” analytical approach “acknowledges the ways individuals make meaning of their experience and, in turn, the ways the broader social context impinges on those meanings” (Braun & Clarke, p. 81). Analogously, I believed that utilizing a “contextualist” approach would allow me to interpret and construct meaningful patterns in students’ climate change views, while also identifying some of the factors influencing those patterns. Therefore, I chose a thematic analytical framework because of its accessibility, flexibility, and alignment with the goals of this study.

In an inductive thematic approach, themes are developed through the coding process in a recursive manner (Braun & Clarke, 2006). Using NVivo qualitative analysis software, I created codes by highlighting and labelling significant fragments of text in the interview transcripts (Boyatzis, 1998; Braun & Clarke, 2006). Since I did not start with a pre-determined codebook, I utilized a descriptive, open coding approach to create initial codes (Charmaz, 2006; Saldana, 2014). This approach also allowed me to code for “as many potential themes/patterns as possible” (Braun & Clarke, 2006, p. 89) and remain open to any patterns or insights emerging from the participants’ accounts (Charmaz, 2006). I then conducted a second round of coding, using “focused coding” (Charmaz & Belgrave, 2013, p. 356) to further explore the most frequently occurring or notable patterns identified in the first round. In other words, coding and analysis occurred simultaneously, as codes were developed into increasingly abstract categories.
As a result, the codes in the second stage of coding decreased in number from the first stage as codes were combined, omitted, or reconceptualized.

The culmination of the inductive and interpretive coding process is theme development (Braun & Clarke, 2006). A theme, at its most basic level, “represent[s] on some level of patterned response or meaning within the data set,” (Braun & Clarke, 2006, p. 82), which means that the data within each theme must share common characteristics and be repeating in some form. Accordingly, I have developed three themes—Outside Influences, Anatomy of Concern and Personalizing Climate change, which represent the overarching patterns in adolescents’ perspectives about climate change. Each broader theme is further delineated by several subthemes, which represent the most salient characteristics of each theme. Thematic analysis scholar Boyatzis (1998) also emphasizes the importance of using a systematic approach to theme development to maintain the consistency and reliability of the analysis. Based on his recommendations, I defined and delineated the characteristics of each theme in the Results section, as well as, provided labels for each theme and subtheme (Boyatkis, 1998). Moreover, when investigating an under researched area, Braun and Clarke (2006) recommend developing broad themes across the entire data set, rather than developing fewer, but more focused themes. Accordingly, these themes and subthemes attempt to capture and summarize the most prominent aspects of participants’ climate change perspectives across the data set. Although this necessarily results in a loss of complexity and detail, I believe that this approach provides a “rich, overall description” of participants’ climate change views (Braun & Clarke, 2006, p. 83).

Despite following a systematized approach to theme development, the themes do not simply reflect an objective picture of these adolescents’ climate change perspectives. As Braun and Clarke (2006) assert, themes must go beyond describing the data. Instead, themes must provide an “analytical narrative” and argument about the entire data set, based on the purpose of the research (Braun & Clarke, 2006, p. 84). This study had two purposes: to explore how these Saskatoon students collectively make sense of climate change and to understand how external factors influenced their perspectives. Addressing these dual purposes, however, required two different analytical approaches, which are subsequently reflected in the themes and subthemes. In some cases, the themes reflect a more manifest analytical approach and more closely reflect the participants’ accounts in their own words. Conversely, some themes reflect a more latent analytical approach. These themes reflect my interpretation of the participants’ deeper
motivations, assumptions, or influencing factors that may be beyond the participants’ awareness (Braun & Clarke, 2006). In essence, the themes reflect my interpretation of participants’ climate change views and constitute my collective arguments about those interpretations.

**Reliability and Validity**

There has been much scholarly debate about the external validity of qualitative research when compared to quantitative research (Lincoln, et al., 2018). As Canadian researcher Krefting (1991) points out, however, concerns about validity and reliability in qualitative studies cannot and should not be assessed using the same method of measurement as quantitative research. Instead, she argues, the quality of the research should be judged according to a standard that aligns with the intent and purpose of the research being conducted. For instance, generalizability of the results is a common means for determining the reliability of results in quantitative studies (Creswell, 2014; Krefting, 1991) In contrast, the intent of qualitative research is to explore the complexity of a particular phenomenon at a particular point in time, rather than draw general conclusions that can then be applied to a larger population (Creswell, 2014; Krefting, 1991; Lincoln & Guba, 1985). Thus, for qualitative research studies, *transferability* is a more appropriate standard of trustworthiness for qualitative studies than *generalizability* (Creswell, 2014; Lincoln & Guba, 1985). Similarly, the purpose of this study was not to explore students’ perspectives as a representation of all students but to examine how a unique configuration of factors influenced these Saskatoon teens’ views on climate change.

The transferability of qualitative research is predicated upon the researcher’s ability to provide thick and detailed descriptions of the phenomenon they are studying (Lincoln & Guba, 1985). Proponents of interview-based research assert that semi-structured interviews allow for a rich, contextualized account of a person’s perspectives and emotional responses (Brinkmann & Kvale, 2015; Charmaz, 2006). Therefore, the descriptiveness and breadth of the responses can provide a basis of comparison for other studies, which increases the validity of the results (Creswell, 2014). The richness of the responses, however, largely depends upon the interviewing skills of the researcher such as, building rapport, skillful probing, and careful listening (Brinkmann & Kvale, 2015; Charmaz, 2006). I tried my best to build rapport with participants before and during the interview, while occasionally asking follow-up questions that were not predetermined to further probe students’ responses. I also co-conducted a pilot interview with my thesis supervisor, Dr. Paul Orlowski, who modelled interview techniques and provided me with
advice. Thus, I attempted to solicit rich responses from participants to enhance the transferability of the results and strengthen the study’s validity.

In addition to interviewing techniques, I employed other strategies to strengthen the validity and reliability of the results in the research design. Critics argue that the nature of qualitative research and its susceptibility to researcher bias makes it difficult to ensure that inferences drawn about qualitative data are objective and rigorous (Lincoln, et al., 2018). According to research scholar Creswell (2014), however, researcher bias and its effect on the accuracy of the results can be addressed by utilizing a multitude of strategies. For instance, Creswell (2014) contends that piloting the research instrument can help validate data collection in a qualitative research study. Therefore, I conducted a pilot interview and revised the interview questions according to the post pilot responses. Creswell (2014) also explains that “backyard research” conducted within the researchers’ immediate work environment can compromise the internal validity of the data (p. 188). Analogously, I am a teacher in the school division where I conducted the research; but I purposefully refrained from soliciting respondents from the high school where I was teaching at the time. I can also confirm that, apart from the pilot interview, I had no previous experience with the students I interviewed. Finally, I employed several strategies during the coding process to help to increase the validity of the study. For instance, many of the codes and subthemes were developed “in vivo”—reflecting participants’ accounts in their own words, to avoid imposing my views on the data as much as possible (Charmaz, 2006). I also shared and discussed the codes with my supervisor, Dr. Paul Orlowski, at various points in the analytical process, to ensure that there was intercoder agreement about the analytical codes (Creswell, 2014). Thus, I embedded several strategies into the research design to ensure that the results of this study were trustworthy and accurate.

Still, there are other threats to the validity and reliability of the results that should be considered when weighing the trustworthiness of the conclusions. For example, the social desirability effect could have impacted the authenticity of students’ responses if they provided responses that they believed, I wished to hear or to paint themselves in a more positive light. Collins, Shattell, and Thomas (2005) warn that such an effect may particularly acute when research topics are morally or socially threatening, which may be the case with research involving climate change (Norgaard, 2011). Although I was not familiar with the participants prior to the interviews, all of them knew that I was a science teacher who was interested in
climate change. As a result, participants could have responded in a way that made them appear more concerned about climate change than they are. On the other hand, I assured the students that their participation would be kept confidential, which can alleviate some of these perceived pressures (Collins, et al., 2005). Moreover, I acknowledge that it difficult to draw conclusive and generalized accounts about adolescents’ perspectives based on a single interview. Arguably though, these responses can provide insight into how these teens make sense of climate change, if we accept the limitations of those interpretations (Robinson, 2014). Finally, I acknowledge that my analysis was not purely inductive, since my review of the literature on climate change beliefs and attitudes influenced how I conducted the study and analyzed the results. But as grounded theorist Charmaz (2006) argues, reviewing the literature on a topic provides the researcher with “sensitizing concepts” (p.16) and “points of departure” (p. 17) for various aspects of the research project. Therefore, being familiar with the literature allowed me to be ‘sensitive’ to phrases or instances in the data that might coincide with notable themes, while also providing a starting point for the interviews. Nevertheless, despite taking measures to ensure that the conclusions I have drawn about these adolescents’ climate change perspectives are trustworthy and accurate, I acknowledge that there are inherent limitations to these conclusions.
Chapter 4: Presenting the Data Using Thematic Analysis

These results have been analyzed using thematic analysis, which aims to generate abstract concepts or “themes” from the data (Boyatkis, 1998). Therefore, the data is organized into three main themes ---each containing several subthemes and is presented in conjunction with a cursory analysis. The purpose of this corresponding analysis is to explain why and how each theme was generated, as well as elucidate how the subthemes connect to one another within a larger thematic framework (Braun & Clarke, 2006). The three main themes paint an overall picture of how participants make sense of climate change, while the subthemes highlight each theme’s most salient aspects. The first theme focuses on how outside influences shape adolescents’ climate change perspectives. The subthemes explore where participants turn to for information about climate change, why some sources are more trusted than others, and how different sources influences their perspectives. The second theme highlights the characteristics of these adolescents’ climate change concerns. This theme explores the varying levels of adolescents’ concern, how concern is expressed, what students appear to be most worried about, and the main factors that influence their views. The third theme focuses on how participants interpret climate change on a personal level. This theme examines how these adolescents understand and make sense of their personal experiences and connections to climate change, how their values shapes their perspectives, and how they rationalize their own action or inaction.

It is important to note that the adolescents interviewed were all aware of climate change and had rudimentary knowledge of its causes and effects. However, as reflected in the literature review, most participants had difficulty accurately explaining the scientific principles of climate change, had gaps in their understanding of its causes, impacts, and solutions, or reported common misconceptions, such as the depletion of the ozone layer. On the other hand, this study is not focused on the accuracy of adolescents’ climate change knowledge, but the ways that they construct meaning about climate change. Therefore, the subsequent discussion will focus on the patterns in participants’ climate change perspectives and highlight the factors that appear to shape their views, rather than illuminate what students know or do not know about climate change.
Outside Influences

A key assumption of this study was that teens’ sense making about climate change would be influenced by outside sources. This assumption was tested by examining how various sources influenced students’ climate change views. Outside influences were identified both explicitly and implicitly from the data; participants self identified some sources, while others were inferred by the researcher after careful examination of their accounts. Interpreting and categorizing a sources’ influence followed a similar pattern of analysis and was based upon several factors. Factors that were considered when assessing a source’s influence included: the emphasis placed on the source, its frequency in the accounts, the weighing of contradictions, both in a single participant’s account and between them, and by noting absences or omissions. As a result, five subthemes were generated to highlight how outside influences impacted participants’ climate change perspectives.

Environmental education considered the most influential on adolescents’ perspectives

Environmental education in schools can arouse participants’ interest and deepen their understanding of climate change; however, the lack of climate change education outside of specialized programming appears widespread. For most students interviewed, climate change education primarily occurred in optional environmental education programs. Of the ten students interviewed, seven had taken specialized environmental classes such as Environmental Science 20, or immersive, integrated, and experientially based programs such as, Outdoor Education. But many students claimed that they had received little, if any, instruction in other science classes. Surprisingly, only three of the ten students clearly recalled learning about climate change in Grade 10 Science, while several said that it had not been taught at all or that instruction was cursory, even though the Science 10 curriculum contains learning outcomes explicitly related to climate change. In addition, only two students remembered climate change being addressed in another high school science class. Thus, according to the students interviewed, climate change instruction appears to occur predominantly in specialized environmental programming.

The lack of climate change education outside of specialized programs or classes is surprising, given the influence that education appears to have on adolescents’ understanding and attitudes towards climate change. Most students who believed that climate change was occurring, attributed much of their understanding and concern to environmental education, like Chris:
Chris: Uh, I didn’t really have much of an opinion on climate change other than, "Oh. That’s bad" until [specialized program] when I actually learned about it…. So, I’d say for me, the main influence was [specialized program] … a lot of what we … learned, was focused on … environmental things and … at this point, you can’t really learn about environmental things without learning about, at least, touching on climate change.

In fact, several students reported that environmental educational programming was responsible for momentous shifts in their perspectives about climate change. For example, Danielle recounted how learning about climate change in a specialized, environmental program completely altered her attitude towards climate change:

Danielle: … I’ve heard before … global warming’s not real … it’s just a theory. But then … I went to [specialized program] and they’re like, "No. It’s actually a thing" and I was like, "Oh my God." So then, because I went from … not believing to … believing within … one day… I was … really caught off guard … my whole life I didn’t think it was actually real … nobody’d every showed me … the research behind it … what can happen in the future. They didn’t teach me the science of it, so I just didn’t really understand it.

Learning about climate change may also influence participants’ behavior in addition to their attitudes. For example, Inaya explained how a deeper knowledge of climate changed what she did:

Inaya: I really wanted a car until I took Environmental Science and I was able to understand … how small, little things like, carpooling or using buses, public transport or when walking .... even it’s… just me, one person thinking that, it can create a big change, right?

The optional nature of environmental classes or programming, however, could indicate that students who engaged in these programs had a pre-existing environmental awareness or interest, allowing them to be more open to climate change education. After all, a few participants acknowledged that they had already been aware of and concerned about climate change before taking a class or program. Nevertheless, all participants who took the classes felt that their knowledge and level of concern was deepened because of their educational experience.

The effect of environmental education on participants’ understanding of climate change appears to stem from the types of learning that occurs in these classes and the perceived relevancy of the information. Many of the students that had in depth environmental education felt that their understanding about climate change came specifically from the class research projects, activities and discussions. For example, Greg recalled how the research projects and
class discussions in the experiential environmental program influenced his understanding of climate change:

Greg: Well, I think, obviously most people don’t have the experience, like [specialized program]. I think that’s really where my views shifted, right? ... I mean, I was conscious of climate change, but I didn’t really realize that it’s … something that’s happening. But, I think again … lots of those big projects …a big, like research paper was… on how climate change will affect agriculture in Saskatchewan …. You know, whether it’s just because we’re having a class discussion about it … Or…more people are thinking about it, so … you’d have more casual conversations about it … And as well, I think, because you kinda think similarly, it’s easier for your ideas to grow…Build on each other, I guess.

It was also clear that most of these participants thought that environmental education was valuable because it was relevant to their everyday lives. Inaya, for example, believed that her experiences in Environmental Science class allowed her to better understand the world around her:

Inaya: … because Environmental Science, it was more how our everyday lives are…what’s going on in our environment and how it’s impacting us. So, I was able to understand what’s going, how the environment is changing and how it’s impacting my own life … I could relate to it and I could understand it.

On the other hand, taking an environmental science class did not preclude someone from being concerned about climate change, nor did climate change education necessarily lead to concern. Two participants believed that climate change was occurring and were concerned about it, even though they had received little climate change education in school, while one participant who had learned about climate change in Grade 10 Science in some depth, did not believe in human caused climate change.

**Teens’ climate change views align with family’s views**

According to the adolescents interviewed, family was not reported to be a main source of information about climate change. The data suggests, however, that families do influence teens’ climate change views, although the participants may not be aware of the effect that their families have on their perspectives. Only one student, Natalie, believed that a parent (i.e. her mother) was a main influence on her climate change views, as she stated, “I’ve learned most of my … views, most of my ideas of climate change and all that, from her.” In some cases, though, what students
explicitly identified as influential on their perspectives contradicted what emerged during the interview. For example, when asked what had sparked her interest in climate change, Yasha said, “…probably experiences with family, experience in science class … we always talk about science in my home, and then, projects like that.” But when asked what most influenced her perspectives on climate change, she thought that school and personal research had had the most effect. In contrast, Owen thought what he had learned in school and his own personal research were the main sources of information. But when asked if his father has influenced his views about climate change, he responded:

Owen: … I know how that sounds … “Oh, it’s just… it’s dad’s views” … we go back and forth on a lot of things and I think … I’ve shown him just as much on my opinions on it, as he has on his. And… I think that … it’s not his … favorite thing. It’s not like when climate change comes up, he’s like, "Oh! Let’s talk about this …Why is there, all wrong," stuff like that … he just gets curious and I tell him what he knows and he tells me what he knows.

Perhaps most interestingly, in this case, Owen had received in depth climate change education in Grade 10 science but did not believe that climate change was occurring--an attitude he presumably shares with his father. Thus, these adolescents largely perceive that their parents are not primary sources of information about climate change; however, circumstantial evidence suggests that parents do have an influence on participants’ climate change perspectives.

In spite of participants’ claims that parents were not a main influence on their climate change views, most acknowledged that they had conversations about climate change with their parents. Only one student interviewed did not recount any conversations about climate change with parents or a guardian, while only one other participant reported that conversations with a parent about climate change were cursory. Moreover, most participants believed that their attitudes about climate change were shared by at their parents, such as Inaya:

Interviewer: So, who else do you know that thinks the same way that you do about climate change?

Inaya: Umm …. I definitely think … my family … ’cuz we talk a lot about … what we have here in Canada versus what we had in Pakistan. So, we definitely talk a lot about climate … So … they have similar views as me, but … for example, my mom … She doesn’t have the same information as I have researched right now. So, she doesn’t know as much as I
do, but she definitely has the same views as me … because understanding that what we have here, we didn’t have in Pakistan …

A couple of students also said that they were more likely to discuss climate change with a parent who shared their views, as opposed to a parent who did not, like Natalie: “my mom is more scientific and my dad is more mathematical with anything and so … I seem to have better conversations with my mom about this kind of stuff.” Thus, participants’ discussions with parents who share their views, suggests that parents do influence their child’s perspectives to some degree. Only in one case did have a parent with an opposing view appear to influence a participant’s perspective. Mark, who shared similar perspectives with his mother but not his father, said he did not discuss climate change with his father because they had opposing views, but later said that he could relate to his father’s viewpoint:

Mark: … I’ll use my dad as an example. I’ve talked to him before… ’cuz he doesn’t really understand why I went vegetarian or why I went vegan … He doesn’t think that animal agriculture impacts the environment a lot. He just thinks it’s cars and planes and stuff like that …

Mark: … I try to be as environmentally conscious as I can, but I don’t know. I mean, I kinda agree with my dad’s point … I’m not going to be able to do anything myself … you’d have to get a ton of people on board …

On the other hand, Mark’s father did believe in human caused climate change, as did Mark, so the difference in viewpoint in this particular case could be considered a moot point.

**Peers, but not friends, as sources of information**

These Saskatoon adolescents appear to learn about climate change from their classmates, but may not be sharing information with friends, since they do not often engage in conversations about climate change outside of the classroom. Participants who had taken environmental education programs seemed to learn a lot about climate change from their peers, as they recounted what they had learned from peer presentations or from class discussions. For example, Danielle recalled having class discussions about the role of government in climate change adaptation and mitigation in her environmental education class:

Danielle: … they [teachers] actually talked a lot about like how, Justin Trudeau was gonna introduce… a carbon tax and stuff. And we had a lot of… debates as a classroom … about … our opinions on what we think should happen with … global warming prevention or …
what the government should be doing … there was so many different viewpoints … there’s
so much debate with … the carbon tax thing …

Greg also explained how the environmental education environment fostered casual conversations
about climate change between peers:

Greg: … it’d come up in different ways. I mean … we always biked to school so …
sometimes we’d talk about … how so many people drive cars. How that’s crazy and how
we can reduce it … So … it’s not exactly like, "K, right now, we’re going to talk about
climate change," … one week we did that climate symposium and kinda researched a
different thing real quickly and then, we talked about it for a couple of hours as a class.
And then … you’d break for lunch and … it’d kinda spill into your own little conversations
with your tighter friends.

Although students, both in and out of environmental educational programs, reported having
small conversations with friends, most conversations that were recalled appeared to take place
within a school context. Thus, schools and in particular, environmental education programs, may
be important sites of conversations and information sharing about climate change for these teens.

While it appears that these adolescents are discussing climate change and sharing
information in a classroom context, most participants reported that they did not have
conversations with friends outside of school. When asked why they did not have conversations
with friends about climate change, some participants were unsure, while others provided
explanations such as the emotionally distressing nature of the topic, feeling that the conversation
would be unproductive, or fear of hurting someone’s feelings. However, participants’ willingness
to talk about climate change may also be influenced by their perceptions about their friends’
attitudes and values. For example, Greg shared how he would discuss climate change with his
friends in the specialized environmental program and how the discussions affected his views:

Greg: … whether it’s just because we’re having a class discussion about it, like, that’s what
we’re doing for that period, or whatever. Or … more people are thinking about it, so …
you’d have more casual conversations about it … And as well, I think, because you kinda
think similarly, it’s easier for your ideas to grow… Build on each other, I guess.

Yet Greg did not talk about it with friends outside of the program because “… they wouldn't be
interested … It’s be more difficult to kind of have a dead serious conversation about it because
they don’t have the same amount of care … It doesn’t matter to them …” Conversely, most
participants believed that they shared similar views about climate change with their classmates from their environmental class or program.

Furthermore, educational contexts may provide a safe place to have discussions, even when peers do not share similar attitudes. For example, Chris said that his peers from the environmental education program would have some differing views on climate change, but that they still engaged in conversations about it:

Chris: …. well pretty much mostly everybody at [specialized program] would ah, think mostly the same … about what climate change. Well, yes, what climate change is, not necessarily agree about what should be done about it …. there are a few people who think that the benefit … isn’t worth giving up oil or a few people who think we should cut out everything immediately, right now. Like, mostly about how urgent it is and what we should do about it and where it falls on priorities for … the government to do things about it or people.

Interviewer: … But you guys talked about it as a group, quite a bit?

Chris: Mmhmm … And it never got … angry or anything.

Not all students felt more comfortable discussing climate change in class though. Owen, who did not believe in human caused climate change and perceived that he did not share similar views about climate change with his teacher and classmates, did not appear comfortable discussing it in class. He did, however, feel comfortable discussing his ideas with his friends because he perceived that they were open to his views and had similar values. Therefore, in the absence of shared views, some of these adolescents may still discuss climate change provided they feel comfortable expressing dissenting views.

On the other hand, shared attitudes do not appear to be the only condition for participants to have discussions about climate change with their peers. Curiously, several participants said that their friends would have similar attitudes about climate change, although they did not have discussions about it with them. For example, Danielle believed that her friends could potentially share the same level of concern, if given more information; however, she did not appear to have discussions about climate change with her friends outside of school:

Danielle: … I feel like, if my friends … learned … what it was, they can be really passionate about like, I have a friend … She’s a feminist … she’s all about equality, so I feel like, if she learned about global warming, she’s the type of person that likes to take on
… I guess political viewpoints and … be really passionate about it. So, I feel like if she learned about it, she could care about it, but she just hasn’t been taught. Thus, having shared attitudes about climate change may or may not lead to more discussions between these teens and their friends.

_Digital sources and climate change information: Types vary by context_

According to the data, all the participants relied almost exclusively on online, digital sources for information about climate change; only a few students mentioned using books as a source, personally or academically. The most frequently mentioned sources included:

- social media platforms such as, Snapchat, Facebook, and Instagram
- online databases
- scientific journals
- blogs
- websites such as, NASA, Union of Concerned Scientists, and Prairie Climate Atlas
- YouTube
- Online videos or documentaries
- News sites such as, CBC or Globe and Mail

The frequency of use and the type of source varied though, depending on the context. When asked where they would look for information on climate change, most students discussed using digital sources for school related projects such as, online databases, journal articles and websites. In the context of school, participants emphasized the need to use credible sources when doing research and reportedly relied on journal articles or websites sponsored by governments or educational institutions. Natalie, for example, said that if she was looking for reliable information, she would, “…go to the library and see if I can find … a book or something that I could read … or …I’ll go on the Internet. I’ll look for scientific journals and that kinda stuff…,” but would avoid sources like Wikipedia because, “I don’t really trust it, just because anybody can say anything.” Participants typically viewed reliable information as academic, evidence based and disseminated by institutions; unreliable information, conversely, cannot be verified or is not published by a credible source. In sum, according to the participants’ reflections, these adolescents rely predominantly on digital sources that are well-researched, reputable, and academic in nature when researching climate change for school related projects.
Participants’ perceptions and knowledge about bias also influences which sources they rely upon for information. During discussions about reliability, six of the ten students mentioned bias and explained how it affected the reliability of information or source. Although there was no common definition, most students characterized it as being rooted in opinion and one sided, as described by Yasha:

Yasha: I think I would, on either side of this debate … I wouldn't avoid sources … but I would definitely take them with a grain of salt or do further research if it’s very opinion based … I think that’s the problem … when things become too opinion based, and opinions are very important, emotions are important, but when they’re not backed up with substantial evidence, I think that’s sort of the red light and then, it’s like, we need further research on this topic or this isn’t sufficient enough.

In some cases, students viewed bias as unavoidable and believed that it could cause the reader to become confused about the facts or less objective. Natalie, for example, thought that reading unreliable or biased information could influence the reader’s understanding or opinions:

Natalie: … I don’t necessarily like to look at bogus websites … Because then, it kinda … changes how I think of things. And I’ll see something and … it won’t necessarily be true and then I’ll be like, "Oh! But that’s … like, what I saw, so that's what I’m gonna go with." … Like, I’ll see… a random thing. Like, alligators have five legs … And … I will kinda bias my understanding towards that if I see it. And I’m like, "Oh, that’s sounds right." But, it’s not actually.

Furthermore, when discussing bias, media bias was most frequently cited by students. Several students believed that political affiliation as being the source of media bias, such as Chris:

Chris: … every news thing that does political news or anything like that … no matter what they say, it’s tinted with some sort of bias … I mean they’re written by people, right? So, the people have their own opinions. … for example, BuzzFeed and Breitbart. Breitbart … it’s like, super crazy right wing and all that and BuzzFeed is super crazy left wing and all that … Have you heard of “echo chambers”? … it happens most … online … for example, Youtube’s recommended videos. … all the bots that do the recommended things or show you the right ads on Facebook … will show you more of what you've been shown to click on … which happens to be what you agree … And I mean, you’re not going to click on an article that says, "Everyone who agrees with you is stupid"… So … that’s where it
becomes an echo chamber, is 'cuz … you'll just be shown a lot more things that you already agree with, which’ll slowly push you further and further because of the biases in those things.

Thus, approximately half of the participants were aware of information bias and understood how it affected the reliability of information being presented; although only two students could explain how bias affected climate change information specifically. Most participants who were aware of bias also connected it to media sources and political affiliation.

Unlike school related projects, these adolescents appear to rely on videos and online news articles on climate change in informal settings, which they access through social media or smartphone apps. Most participants said that they used academic sources to find information and avoided social media and news articles for research purposes. But when asked specifically if they saw information about climate change on social media, most students either said that they had or it became evident during the conversation. Interestingly, while several students viewed news sites as biased or untrustworthy, awareness of media bias did not seem to prevent them from accessing information on the sites for personal use. For example, Chris reported that he had read several news articles related to carbon taxes, despite believing that the articles were biased:

Interviewer: …. do you remember where you heard about carbon tax? ….  
Chris: ... I read a couple news articles about it as well, but the only reliable information I came across was in [specialized program], yeah.
Interviewer: Do you remember what news articles those were? …
Chris: The news articles … they were from regular news sites and there were a few that were super biased about, "Carbon tax is the best thing ever" and some that were like, "Carbon tax will destroy the whole country."

Thus, there appeared to be a disconnect between what sources participants reportedly rely upon for information about climate change and what came through during conversations. Despite reservations about social media, these adolescents appear to encounter a lot of information through it and other online sources but may not view them as places they would actively search for information, since they are largely perceived as less reliable.

**Trustworthy sources: the role of relationships, beliefs, and knowledge**

Trust plays a central role in these adolescents’ decision making about which sources to rely upon. Participants often used the word trust to describe why they relied on a source or when
explaining why they would choose one source over another. Although participants considered fact based and scientifically supported information to be the most reliable, a close examination of the transcripts reveals that personal relationships with the source and alignment of beliefs or attitudes also play a role in weighing trustworthiness.

Participants’ trust in teachers was the most pronounced example of how relationships and shared attitudes influence the trustworthiness of a source. Amongst the participants, there appeared to be a widespread, implicit trust in teachers and the climate change information presented by teachers was largely considered fact-based. For example, Danielle explained that her environmental program teachers, “showed us a lot of things that … you can’t deny that that’s happening … it's scientifically proven, kinda like, lessons.” The apparent trust in teachers may not be surprising given that schools were considered the most influential sources of information; however, it also seems that teachers’ trustworthiness is not only based on the information they present. Natalie, for instance, felt that her relationship with her teachers meant that she could trust the information they provided:

Natalie: …Yeah. I trust that my teachers will tell me the truth and not what they think is right … And, I, to my understanding, that’s what my relationship with my teachers have been like, is, I’ll trust that you’ll give me proper information and I will do the best I can .... to learn and improve my knowledge and then, maybe help you improve yours …

Alternatively, Mark thought that his teachers’ professional experience and education gave them credibility, which is why he considered them the most influential on his climate change views.

Mark: … I feel like teachers are people that I trust a lot...., I think I have a lot of similar views on stuff like, as teachers do. But, I also have a lot of opposite views. Not specifically on climate change, but, you know, just in general…

Interviewer: … Why do you trust teachers?

Mark: .... ‘cuz I feel like they’re … accredited and … they have all their credentials that they needed to be able to teach … the future generations information and … most of that information comes from … textbooks and stuff, which … are approved by the government, which I guess, I mean … could be wrong too, but ....

In contrast, there was an instance where a student did not appear to trust information about climate change from a teacher. Owen thought that the information that his teacher had presented was biased because alternative views were not represented in the resources she used:
Owen: It was hard… ‘Cuz um, [name of teacher] and I kinda share very polarized views … on climate change … I remember being, her like saying things and showing things that I was just like … I don’t know about that.
Interviewer: … What would be some of the things that you were skeptical of?
Owen: … I can’t remember details. I’m so forgetful when it comes to like, things like that. …Oh, she showed um, a documentary on …
Interviewer: Do you remember which one?
Owen: Ahhh, it was …
Interviewer: Inconvenient Truth?
Owen: I think so. Who’s it done by?
Interviewer: Al Gore?
Owen: Yeah … It was that one. … I get really … edgy, I guess … when I see people like Al Gore and like, Michael Moore …. people like that, that are …. so biased … they seem to only show facts on their view.

Interestingly, both Mark and Owen prefaced the discussions about teachers with comparisons between the teacher’s views and their own. This could indicate that students are more likely to trust information about climate change from teachers if they believe they share similar views with them. Overall, these adolescents trust teachers to provide them with accurate information and view them as professional, knowledgeable, and objective. For teachers, however, having a positive rapport with students and having similar views about climate change may also contribute to their students’ trust of them.

Science is another area in which beliefs may circumscribe trust. These adolescents appear to place a lot of trust in science and scientific evidence. Several students expressed appreciation for the scientific process and evidence, such as Owen:

Owen: … I like the history behind it and … looking at where everything comes from.
Mostly… just the fact that everything was found in so many different ways and I like the research that all the scientists went through … The way they were thinking about things … And it was just the fact that these researchers, like looking at all these things they did with so little equipment … the things they came up with … I was really fascinated with that.

An appreciation for science was further evident in how students felt about their science classes. Most of the participants reported that they were interested in science and enjoyed at least some of
their science classes, while none said that they disliked or distrusted science. It was also evident that in several cases, positive views of science were shared by the participants’ parents, which may further contribute to their trust in it. Yasha, for instance, explained how her parents’ attitudes towards science affected her own views:

Yasha: … they understand the importance of science … And I guess, the objectivity that it can bring to a discussion and it’s importance, when, while … it’s important to question scientific research, at the same time, it’s important to have it in the conversation … And I think they’ve … always stressed that then, whenever you’re talking about climate change or anything like that, it’s really important to have read things and … to understand scientific consequences of it.

On the other hand, when science or scientific evidence contradicted another trusted source, the scientific evidence did not appear to be given as much weight. For example, Eric seemed to trust the information from his science teachers that climate change was human caused, but also believed his father, who thought it was influenced by volcanoes. This led Eric to formulate a conclusion that incorporated the two contradictory ideas:

Eric: … I believe that like, it’s due to … gas …. cars and …greenhouse gas… But … my dad told me…, 'cuz…volcanoes, when they erupt, it releases a lot of … the same the thing that’s in … fuels …. And that … the ozone layer then traps out … global warming, right?… So…I think that’s the main … cause … of climate change.

Furthermore, science may not be trusted to the same degree when scientific facts contradict beliefs. Owen appeared to selectively trust some evidence of climate change, but rejected the evidence that it was human caused:

Owen: …the ones I watch from … BBC and Discovery and … they just show it … it’s not really … a speaker talking about … why something’s happening … they’re just showing what is happening … I believe that climates are changing and its natural … I keep going back to glaciers receding and polar ice caps melting and stuff like that. They’re just showing that … climate is changing in these places and that the terrain is literally, moving away… instead of saying … our cars and our greenhouse gases are making the terrain change.

Thus, while most of these adolescents appear to trust scientific based information, how they interpret and integrate that information into their understanding of climate change remains
unclear. According to the data, there may be some tension between participants’ trust in science and their climate change views, particularly when trusted sources contradict one another or when scientific information does not align with their beliefs.

Based on the transcripts, it also appears that these adolescents place significant trust in information from their social circle and are more likely to trust information that aligns with their own views. When asked about climate change, participants most cited information about climate change from their personal research. But, when they lacked personal knowledge, participants were much more likely to cite information obtained from those around them, such as their teachers, peers, and parents. Moreover, participants did not appear to question information from their social circle as rigorously as they did with other sources. For example, Chris believed that the information that his classmates had provided about a carbon tax was more reliable than his own research, stating, “....I read a couple news articles about it as well, but, the only reliable information I came across was in [specialized program]…” Thus, relationships may play a more significant role in determining trustworthiness when personal knowledge is lacking.

Furthermore, participants appeared to place more trust in sources that aligned with their views on climate change, which led them to selectively believe some sources over others. Owen, for example, appeared to discount opinions from his friends’ parents, who recalled how the climate had changed; however, he did believe the opinion of his father’s friend, who seemed to deny climate change:

Owen: … I’ve heard … a couple parents say that … their winters had … way more snow, but they weren't as cold … But … now we have … a very cold and very snowy winter … And … I don’t know. It’s just, it’s hard to look at … when you bring it up so close … ‘Cuz … everybody says that stuff, but then … it changes all the time. Like, there’s always that joke that … Saskatchewan’s weather … if you don’t like it, you just wait ten minutes and it’ll change… And that’s how I’ve always known it. It’s … always seemed pretty familiar to me …. and the fact that … my dad’s friend was very opinionated … on it … That’s also kinda what got me thinking about it more, is he said, ‘cuz … apparently, a lot of … weather research for … predicting the weather … is done just based on …what is the temperature and the weather been on that day, for … the last … ten years … and then they just take the average. And then, that’s what the forecast is for the day… And … those numbers are
going up and down all the time too … on every day there’s been days that are, on that same date that are extremely hot or extremely cold in relation to what that season is.

Given that students cited information that aligned with their views, even when the sources could not be identified, contradicts participants’ assertion that they rely predominantly on scientifically supported evidence. The pattern also suggests that shared attitudes about climate change may have more influence over which information is trusted than these adolescents are aware of. On the other hand, evidence about the intersection between relationships, shared views, and trust is limited and needs further exploration.

**Anatomy of Concern**

To understand how these adolescents make sense of climate change, it is necessary to examine their concerns. This section focuses on the anatomy of adolescents’ concern: how it is expressed, what characterizes it, and which factors appear to be influential. In some cases, participants explicitly stated or described their concerns, but in other cases, ideas related to concern were interpreted by weighing multiple factors such as the language used to describe the concerns and emphasis of the participants. While the researcher’s interpretation does come to bear on how student concern is assessed and presented, it is hoped that the thickness of the excerpts and corresponding analysis clearly communicates the reasons for the interpretation.

**Looking ahead: Concerns and uncertainties about the future**

These adolescents appear to be concerned about climate change and uncertain about the future because of it. All the participants assumed the existence of climate change; it appeared to be a constant presence in their lives, even if students were only partially aware of it. Although Danielle learned about climate change for the first time in her environmental science program, she acknowledged that it was something that she had heard about before, stating “… it’s something you hear about so often … I’ve heard the term global warming SO many times….” Furthermore, nine out of the ten participants reported being concerned about climate change and believed that climate change was partially or wholly caused by humans. Only one participant was not concerned about climate change and although he did acknowledge that the climate was changing, he believed it was due to natural causes. This consensus could be related to the fact that participants volunteered for the study. Nevertheless, according to participants interviewed, there is widespread awareness of climate change and it is a serious issue for these adolescents.
While participants were generally aware and expressed concern about climate change, the intensity of their concern varied. All participants, who believed that climate change was human caused, affirmed that it was a serious issue; but some students did not appear to be as worried about it as others. Most participants who were concerned about climate change appeared to experience negative emotions, such as fear and anxiousness, using words and phrases like “scary” or “very worried” to characterize their concern. For example, Danielle used negative emotional language to describe how she felt when she learned about climate change for the first time: “It was honestly really scary… I was freaked out. I know I was freaked out because like, hearing them say … "Saskatchewan can turn into a desert." … I was like, "No way!"… that’s impossible! …” Conversely, other participants did not express negative emotional reactions and therefore, they appeared less concerned. Chris, for instance, believed that the effects of climate change were serious, but still far away:

Chris: … emotionally, I don’t really have anything … most people don’t, to my knowledge … feel terrible for things that are happening far away or far in the future … Even though they’re just as real … so, I don't really feel anything in that regard … But… I think it’s very important ‘cuz I mean, it’d be best to avoid having to feel that way in the future … Participants who appeared to be the most concerned also believed that the effects of climate change were immediate, while those who seemed less concerned did not see climate change as near threat. For example, Inaya said that she was “very concerned” about climate change, based on her personal experiences in Pakistan, while Eric said that he was “quite concerned,” but thought that the worst impacts would not be felt for a long time:

Inaya: … I have … seen it first hand and a lot of people, they don’t understand … how environment works …. Because the global warming is creating so much more heat trapped and … specifically when I go back to … my personal experience … in Pakistan, there’s so much heat … I know so many people … even, to my closest who have passed away because of heat strokes and because of … lack of medical care … I have that emotional connection … personally. So, that’s why I'm … more pushing towards that.

Eric: Well, for … my generation… it’s important of course, but it won’t really effect my generation as much as … the next …
Interviewer: … So, do you think climate change is happening now or do you think it’s only something that’s going to happen later?

Eric: It’s happening now, but .... the consequences, I guess ... They aren’t gonna really, up here, and now, they’re gonna … happen in the future.

Therefore, variations in the participants’ level of concern were also evident when they discussed the immediacy of climate change. While most participants thought climate change was a serious issue, there were differences in how they described their concerns. Participants who used negative emotional language and thought that climate change was more immediate were interpreted as being more concerned than those who did not.

After comparing the individual participants’ level of concern to the larger sample, students were then placed along a continuum from least concerned to most concerned. The following table summarizes the results of this comparison:

**Table 4.1 Continuum of Participants’ Level of Concern about Climate Change**

<table>
<thead>
<tr>
<th>Least Concerned</th>
<th>Most Concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owen</td>
<td>Yasha</td>
</tr>
<tr>
<td>Chris</td>
<td>Inaya</td>
</tr>
<tr>
<td>Natalie</td>
<td>Greg</td>
</tr>
<tr>
<td>Hannah</td>
<td></td>
</tr>
<tr>
<td>Yasha</td>
<td></td>
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<tr>
<td>Inaya</td>
<td></td>
</tr>
<tr>
<td>Eric</td>
<td>Danielle</td>
</tr>
<tr>
<td>Mark</td>
<td></td>
</tr>
</tbody>
</table>

Participants’ concerns about climate change also appear to be closely connected to their views of the future. All of the students who believed in anthropogenic climate change expressed uncertainty about the future at various points in the interviews, and in most cases the uncertainty was a source of concern. For example, some participants expressed worry and anxiousness about what the future would look like as the effects of climate change worsened, as illustrated by Hannah’s account: “Where we will be in fifty years? I’m so worried about the future [laughs]” However, participants’ uncertainty about the future was not always interpreted negatively, nor was it directly correlated to their overall level of concern. Yasha, for example, seemed highly concerned but was optimistic about the future because she believed that “the next generation coming up will solve it. And then, there’s people in the generations above us who … are working on these solutions.” Thus, while students appeared uncertain about the future, the uncertainty did not always result in negative perceptions about the future. The following continuum illustrates these differences in students’ perceptions:
Table 4.2 Continuum of Participants' Level of Concern about the Future

<table>
<thead>
<tr>
<th>More Pessimistic</th>
<th>More Optimistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danielle</td>
<td>Mark</td>
</tr>
<tr>
<td>Hannah</td>
<td>Yasha</td>
</tr>
<tr>
<td>Greg</td>
<td>Inaya</td>
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<tr>
<td>Eric</td>
<td>Owen</td>
</tr>
<tr>
<td>Natalie</td>
<td>Chris</td>
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</tbody>
</table>

**Climate change: The issue of our “time”**

Time is a reoccurring theme in these adolescents’ perceptions about climate change and participants’ concerns for climate change are closely tied to the idea of generational time. All of the participants used a time span of a human generation when discussing the effects of climate change. Participants frequently used the terms, “my generation” or “future generations” to indicate whom they thought would be most affected by climate change. For example, Danielle said that she was “…worried about future generations,” because she thought climate change “…might get too extreme….” Like Danielle, most students used generational time frames when estimating the seriousness and closeness of climate change’s effects. This pattern may indicate that generational time frames allow participants to categorize the effects of climate change, from the least impactful to the most. Generational time framing was also used to emphasize the seriousness of the issue. Greg, for instance, described climate change as, “the biggest issue of…my generation’s time” and thought it was the “most pressing for my generation to deal with.” In most cases, however, participants’ use of generational time frames appeared to de-emphasize the immediacy of climate change. Most of these students described the impacts of climate change on future generations and appeared more concerned for them, rather than their own generation. For example, Natalie did not believe she would be personally affected by climate change, but she was concerned for future generations:

Natalie: … I know that nothing drastic is gonna happen while I’m here. And of course it’s a concern for future generations of mine … or just future generations of people in general, but … I don’t find it that one day I’m gonna wake up and there’s gonna be like, nothing, you know?

These examples illustrate how participants used time frames to situate the worst impacts far into the future. Moreover, most participants estimated that the worst effects of climate change would occur in fifty years or more, which is just outside of their generation’s probable lifespan. Thus,
examining the ways in which participants used generational time frames suggest that these adolescents believe that there is a temporally ‘safe’ distance between themselves and the consequences of climate change.

Future time framing also appeared when these adolescents discussed the local impacts of climate change. All of the participants were aware of the most visible and geographically distant effects of climate change, such as glacial melting or rising sea levels. But when asked how climate change was affecting Saskatchewan, most participants had difficulty listing current examples. For instance, Danielle affirmed that climate change was happening and that its effects were being felt everywhere. However, when she was asked how Saskatchewan was feeling the impact of climate change, she responded:

Danielle: … in Saskatchewan…hmm…. [pause]…. I can’t really remember. I feel like, we definitely were taught … what could it potentially look like in the future … I think the effects would be like, farming, like agriculture would change a lot I think…. So, that would change our economy a lot because agriculture’s like a really big thing …

In several cases, students deflected questions about the local effects of climate change and instead, described impacts that were temporally distant from today. Greg, for example, noted several ways that Saskatchewan would be affected by climate change, but thought that those impacts would not occur in the near future:

Greg: … The northern regions, it’s predicted that the temperatures will have greater difference compared to … the rest of the world. So, even on a low carbon future … in 90 years or a 100 years … they're still predicting 2.2 … annual average degree increase, right?…..It’s going to make my summer days nicer, but, if you think about, that's the minimum and then, you think about how it’s gonna affect different things. That’s going to change precipitation. It’s going to change … how mild our winters are, the pests we have to deal with, and then, again … we have a mild winter, that's whatever. But how’s that going to affect our agriculture? It’s a big industry …

In other words, participants commonly used future time frames to describe what could happen locally, rather than discuss what was happening. Moreover, when students did discuss current impacts, they most often described impacts that were more detrimental to areas outside of Saskatchewan. For instance, Natalie thought that Saskatchewan would not be affected because of its geographical location:
Natalie: … Saskatchewan’s kinda smack dab in the middle … it’s something that I don’t really think will impact Saskatchewan itself. More so, the provinces and states around … the outside of … the continents …. what comes to my mind is probably wrong but … if the sea level rises, then everything’s just kinda shrink … And so, places like … Victoria … are just gonna get covered over … they’re just going to be submerged under water and so, if it continues to happen and the glaciers keep melting then, soon enough … they’re just gonna get covered in water and they're not going to be there anymore …

Thus, in the participants’ accounts, the local impacts of climate change were most often presented as a future problem, rather than a current one.

**The human costs of climate change**

These adolescents also appear to be very concerned about the human costs of climate change. When asked what climate change effects they were most concerned about, participants highlighted a variety of direct human impacts including a lack of fresh water, food shortages, disease, and other health related issues. For instance, Hannah was concerned about a shortage of fresh water as she stated, “we kind of think that there’s just an endless supply and there isn’t … So … that’s a real concern to me--clean drinking water, probably for in the future,” while Yasha was concerned about a variety of impacts:

   Yasha: … when your air quality degrades and when you don’t have clean drinking water, when your power is going out and then, there’s obviously … health effects that come with it … you have spread of disease, infectious disease, which spreads so much more quicker in these type of conditions, how are you going to meet your basic needs and how are you going to help … seven billion other people meet their needs? … it’s definitely not a pleasant thought …

Several participants appeared to be concerned about our ability to survive in extreme environmental conditions. Chris, for instance, recalled how he had learned how climate change could cause large portions of the Earth to become inhabitable to humans:

   Chris: … I remember one of the big things is that the water will get redistributed really badly, so that the wet places get too wet and the dry places get too dry… I remember I saw a map, if we continue going on the same path for a hundred years and it had this one thing that really struck me … a certain … filter for the map that said that this area would be
basically an uninhabitable to humans … most of northern Africa, a huge amount of Asia, all of Australia, Mexico and the southern U.S. … that kinda startled me …

In sum, participants appear to be acutely aware of climate change’s potential impacts on humans, including its cumulative and compounding effects, and for some of these adolescents, climate change may be viewed as an existential threat to human life.

Although these adolescents appeared to be aware of the human costs of climate change, they did not appear to be as concerned about the non-human impacts. The effects of climate change on the environment and ecosystems were mentioned by only a few students, such as Danielle, who discussed how climate change would affect non-human populations:

Danielle: ... I’m really concerned for … the environment … animals and stuff because I know that the food chain … can be … greatly affected … the way that the land changes will affect ecosystems and … animals … they’re going to have to move… because land is changing … I’m mainly concerned about … animals that … live and depend on the land are going to survive because humans …. I feel like we just always a find a way to … consume and … live. But animals … they don’t have that. So, I’m mainly worried about the way that the actual environments are gonna adapt because it's happening really quickly too … And adaptation is something that doesn't just happen overnight …

In most cases, however, the non-human consequences of climate change did not appear to be a source of concern. Participants frequently referred to the environmental effects of climate change, particularly in relation to water, such as droughts and flooding; but most often students connected these environmental effects to human contexts. Inaya, for example, said, “…I’m … concerned because sea levels are rising. I lived … in Karachi. It’s a sea-port. There could be floods everywhere … I know people who lived in Bangladesh and there could be droughts there…” Likewise, Mark was concerned about the effect of global warming on the oceans, but connected most of those concerns back to humans as he described, “I remember this one saying that … if the oceans die, we all die … because … if you think about it … we depend on oceans a lot … for transportation, for food, for … CO2 absorption … for a lot of things.” Thus, participants’ repeated connections between the effects of climate change and humans suggests that adolescents may have an anthropocentric—human centered-- view of climate change. Alternatively, a lack of discussion about non-human impacts may reveal a gap in participants’ knowledge about climate change and its interrelated effects. Nevertheless, these adolescents
appeared to be most concerned about the human impacts of climate change, rather than the environmental costs, since they were most frequently discussed.

In addition to the impacts on human life, some adolescents appeared to be concerned about the economic impacts of climate change. Several participants described how climate change would negatively affect the economy, highlighting economic factors such as employment, industries, and national debt. Natalie, for example, thought that climate change could negatively affect employment, such as “jobs within … snow services and all that kind of stuff … those are going to start diminishing because we’re not going to need them anymore…Which, I mean, … it’s not that big of deal, but … it can mean somebody gets a job or somebody doesn’t …” Mark was concerned about the effect of climate change on agriculture and food security, however, he also believed that decreased food availability, in turn, could lead to higher economic costs for Saskatchewan people, since “we’d have to import [food], which would … cost us a lot of money, which means we’d have to pay more tax and it’d just be a … positive loop that would just keep … promoting negative impacts.” A few students also highlighted the economic costs of addressing climate change. Eric, for example, thought that switching to battery powered transportation was, “gonna affect the economy a lot,” and that reducing fossil fuel use would be costly and could cause job losses; however, he also stated that it was, “not a good thing, but it’s … not a bad thing either.” In contrast, Greg acknowledged that reducing fossil fuel use would result in a loss of jobs in the oil and gas sector and understood, “how it’d be scary for other people;” but, he also stated that it was not a concern “for me personally,” and was confident that, “we’d find jobs in other sectors.” In other words, students were concerned about the economic costs of climate change, including its impact on employment and key industries in Saskatchewan, like agriculture. Participants also discussed the negative economic impacts of addressing climate change, although in these cases, it was unclear if the cost of addressing climate change was a source of concern.

“Nobody’s wants to do anything about climate change”: Negative social perceptions compound concerns

Participants’ concerns about climate change appear to be influenced by their social perceptions. Social perceptions were identified by examining the transcripts for generalizations made about a group of people or society as a whole. Participants’ social perceptions were then
interpreted as negative or positive based on the discussion context and participants’ reactions when discussing these topics.

Overall, these adolescents appear to have very negative views about people and society in the context of climate change. Participants who were concerned about climate change, frequently expressed negative social views, many of which were shared amongst the participants. The most common negative social perceptions shared by participants included:

- people lack knowledge about climate change
- people are not concerned about climate change
- there is a lack of discernible collective action
- there is a lack of will or desire to change in response to climate change

Sometimes, these negative social perceptions were also underpinned by other negative beliefs. For example, underlying some of the participants’ concerns was a perception that the Western world was not feeling the effects of climate change and therefore, not worried about it. According to Inaya, the lack of public awareness about climate change was connected to its lack of tangible impacts on North American people:

Inaya: The public discussions, basically, where people are informed about … how their everyday actions are impacting the environment. That is a big thing, I think we need to talk about and we don’t. And that is really concerning … even though we have…seen how global warming is impacting the world, I don’t think in Canada or…America, we don’t see its impact a lot. Like, personally, I don’t think we see its impacts a lot, as much as people in the Middle East or people in Pakistan or people, somebody in India would see them, right?

For most students, these negative perceptions appeared to be a significant source of concern. For example, Greg’s negative social perception---that people do not know or care about climate change---seemed to be the main source of his concern:

Greg: I’d say, in my opinion, I see the vast majority, maybe they have to have basic knowledge, but, they won’t care enough to make life decisions or … change their lifestyle … from my (emphasis) point of view …climate change is kind of like the issue of our times, I think it’s a scary way to think that … the vast majority of people don’t really care.

Thus, while students expressed concern about the effects of climate change, some appeared to be even more concerned about our ability and willingness to deal with it. In sum, these adolescents’
concerns about climate change appears to be closely connected to negative perceptions about society, including beliefs that people lack knowledge, concern, and the will to deal with climate change. The pervasiveness and consistency of these negative beliefs across the sample suggests that these attitudes may have a significant influence on these adolescents’ climate change concerns.

Although negative social perceptions appear to be linked to participants’ concern for climate change, they may not influence participants’ views of the future. There did not appear to be a clear connection between participants’ views of the future and negative social perceptions. For instance, Yasha was optimistic about our ability to solve the issues related to climate change, but was concerned about the general lack of acceptance and implied that there was little being done on a global scale:

Yasha: Ok, one, that people that be informed and figure out a problem. The thing about solving problems is I really think that we’re in an exciting time where we have so much technology and we have so much brain power … but my problem is that you have to start and identify the problem in the first place, otherwise you don’t go anywhere from there … So, I’d like more people to recognize the problem and face, just be informed about it. So that’s my main concern…'cuz then we can do something about it …. number two, like, real, collective global policy …on climate change because it’s not an isolated issue … a lot of countries sometimes don’t have the power to change their policy ah, because their entire economies might be dependent on it, so it's really important that global policy’s almost designed …. so that, like, real action can be taken.

In other words, some students who expressed negative social perceptions, also expressed hopefulness about the future, despite holding these negative beliefs. On the other hand, in some cases when participants expressed optimism, their hope did appear to be tempered by negative social perceptions. For example, Chris believed that there was still a chance that we could effectively deal with climate change, but a lack of collective action on a global scale increased his uncertainty:

Chris: … there’s a lot of things that are being done. Like, there’s … the Paris, whatever thing … there’s a lot more attention being drawn to it. But, on the other hand, there’s still not much actually being done in most countries, except for a few … small European
countries … I guess why I think it would be fifty fifty, is because we have the right idea, we just need to implement that. And I don’t know if we will or not.

The fact that these participants expressed both hopefulness and negative social perceptions, however, suggests that they are not mutually exclusive to one another. In contrast, a correlation did appear when comparing students’ views of the future with the prevalence of positive social perceptions. Participants who were more optimistic were more likely to express positive social perceptions than more pessimistic students. For instance, Yasha, who appeared more optimistic than other participants, also believed that people around here were informed and concerned about climate change:

Yasha: …. And I think … that when people have information … that’s like a sense of empowerment. So, I have information about climate change. I know many people around me do. So … when we find ourselves in positions of power if we do, we can make informed decisions. So, I think the amount of people that are being informed about this and correctly … gives me optimism.

This may suggest that there is a correlation between positive social perceptions and hopefulness about the future for these adolescents. Alternatively, participants could have been interpreted by the researcher as being optimistic, based on the positive social perceptions they expressed. Moreover, it is not clear if positive social perceptions were a result of participants’ optimistic outlook or if positive social perceptions reinforced their hopefulness. Therefore, the correlation between these adolescents’ socio-political perceptions and their views of the future remains tenuous.

**Personalizing Climate Change**

One of the key motivations of this study was to explore how these adolescents made sense of all the information and experiences they encountered with climate change. But the act of sense making is influenced by a variety of internal factors; information or experiences are often integrated into perspectives only after they have passed through a number of filters. Therefore, it was important to explore the factors or filters involved in adolescents’ sense making process, so that the potential barriers to concern and action could be identified. Based on previous literature, it was believed that participants who made personal connections to climate change would be more concerned and more engaged with climate change (Corner et al., 2015; McDonald, et al., 2015). It was also assumed, based on existing research, that internal filters, such as values and
personal experiences would influence how adolescents personally connect to climate change (Corner et al., 2015; Leiserowitz, 2006; McDonald, et al., 2015). The following discussion outlines how participants connect climate change with their lived experiences and how internal filters strengthen or inhibit personal connections and action.

“ Weird Weather”: Adolescents’ personal experiences and connections to climate change

One of the main goals of this study was to explore how participants’ personal experiences with climate change would affect their perspectives. As a result, adolescents were asked to reflect on their personal experiences with and connections to climate change. Most of the adolescents believed that they have had personal experiences with climate change, but experiences appear limited for these Saskatoon students. Eight of the ten participants said that they had personally experienced climate change, while two did not believe that they had experienced any effects. Students who did report experiences with climate change, however, were most likely to associate their experiences with “weird weather.” For instance, Hannah pointed to extreme temperature changes as a visible example that climate change was happening:

Hannah: … everyone's like, "Oh…this is weather is so weird! Like, we've never had this" … global warming doesn't just warm everything up …. it causes extreme temperature changes, so I was like … that's an example right there that everyone in Saskatchewan is experiencing right now … of global warming because it causes just both ends of the spectrum of extreme weather.

In contrast, only two of the ten participants said that they had experienced climate change in ways besides changing weather patterns. In both cases, the participants were from immigrant families, who had ties to western Asian countries where climate change was much more visible. Inaya, for example, explained how she had been affected by climate change when she lived in Pakistan: “in Pakistan, there’s so much heat … I know so many people … even to my closest who have passed away because of heat strokes and because of … lack of medical care.”

However, all participants identified “weird weather” and changing winter climate patterns as the most visible forms of climate change that they have experienced in Saskatchewan.

In addition to direct personal experiences, participants were asked about their personal connections to people or places impacted by climate change. Most participants did not appear to have personal experiences with climate change or know someone personally who had. But for participants who knew people who had experienced the effects of climate change, these vicarious
experiences did appear to influence their views on climate change. For example, Natalie discussed how her family members from Texas had been impacted by Hurricane Harvey and explained how her family’s experience impacted her own perspectives about climate change:

Natalie: … I have family that lives in Texas… luckily, my family actually lives on the top of a hill … So he, my uncle … helped six families. They moved into his home for a little while.

Natalie: … I honestly, I don’t … get to see them very often … but I know … that it is a huge part of their life, just because they go from sunny, warm Texas to hurricane that ruins so many homes and so many lives and all that kind of stuff. But, I think … what are we doing? Why is this happening? … Because there has to be an explanation for it.

In some cases, personal connections not only increased students’ awareness of climate change, but also appeared to heighten their concern. For example, Inaya drew upon her family’s personal experiences as proof that climate change was happening in conjunction with her own research:

Inaya: … for example … my dad, 1970's? Definitely … everybody was … similar. Like, there was poverty, but there wasn’t enough poverty … barely anybody going around and begging … 1980's … that's when it started happening. And then you go and research about global warming, that is when it kind of starting increasing … And then … pollution started increasing and then, population started increasing because there wasn’t enough space for people, because there was a lot of pollution around everywhere … where houses could be made, there're like, dumpsters there.....So, definitely, seeing those connections and seeing … what they thought and how that starting changing when … climate started changing, just seeing those connections really helps you see that, ok, it’s a big deal …

Greg, on the other hand, appeared to draw personal connections to nature, rather than people. However, he also believed that this personal connection was important to increasing awareness of and concern for climate change:

Greg: … Like, why is this happening? But then, also … learning why it’s important, why do we have to care. I think you’re never going to feel that the same way in a classroom, as you are if you're actually outside … You know, connecting with nature. Feel how important it is and understanding it that way.

Thus, personal connections to and vicarious experiences with climate change did appear to increase these students’ awareness and concern. On the other hand, most participants had limited
personal connections to and experiences with climate change, which makes it difficult to fully assess the relationship between connection and concern.

In addition to having limited personal experiences with climate change, these Saskatoon teens appeared to make a distinction between experiencing climate change and feeling the impacts of it. Although most students described personal experiences with ‘weird weather’ as evidence that climate change was happening, most participants said that they were not personally affected by it. Yasha pointed out this discrepancy between personal experiences and personal impact when describing why people do not notice the effects of climate change: “…all the things that I mentioned. They don’t directly affect me … yes, winter length is shorter or rainfall distribution, I might notice a rise in prices at the store … it’s not super harsh weather.” This distinction between personal experiences and being affected was further evident when participants were asked about the influence of climate change on forest fires. It was thought that participants may draw personal connections to the increasing occurrences of forest fires, which have been extensively covered in the local media and have resulted in decreased air quality in Saskatchewan. Most students, however, were not aware of how forest fires were affected by climate change or if they were, did not draw personal connections to it. Only a few participants, like Chris, could explain how fires were affected by climate change and connected them to their own experiences:

Chris: Drought, famine … lack of … locations to live in … flooding and … well, fire a lot. We’ve already been seeing that, though it might, it could be to any other cause, but there’s been a lot of fires in Canada already.

Interviewer: And you think that might be linked to climate change?

Chris: I think it might. I don’t have any … specific sources for that or anything. But, I’ve heard that climate change can … cause more fires and there’s been more fires …

Alternatively, these adolescents may simply not be aware of climate changes’ local impacts and as a result, are unable to make personal connections to it. Chris, for example, believed that climate change was still a distant threat for him, stating… “the people who’ve told it to me … have given me the information that leads me to believe that it … is a big deal … a distant threat, but still a big deal, essentially.” Thus, participants’ inability to identify personal connections to climate change may indicate a potential gap in education or public awareness. Nevertheless,
these adolescents appear to differentiate between personal experiences and personal impacts of climate change.

“We need to do something about climate change”: Students’ values and the morality of climate change

A key purpose of this study was to determine how participants’ values would affect their sense making about climate change. If participants’ climate change views were influenced by conservative or progressive political values, it was assumed that these values would appear in the participants’ responses to questions related to politics and climate change policy, such as carbon taxes. In a few cases, participants’ political values were readily identifiable as conservative or progressive. For example, Owen appeared to hold conservative political values, as he emphasized the need for small government and free markets:

Owen: … as far as my understanding of my own politics go, I believe that the government should be there to, um, keep us safe and regulate currency … And that's about it … I think they should stay out of business ..., places like SGI, they have monopolies on that kind of stuff ... and I think they should stay out of that because … competition is good … And … it creates more options.

However, most participants did not appear to have much knowledge about specific political issues like carbon taxes, or had not given much thought to politics, which made it difficult to assess their political orientations. Furthermore, several students appeared critical of political alignments or expressed apathy about the political process. When asked which political party he would vote for, Chris said that he would likely vote for the provincial New Democratic Party because the current conservative premier of the Saskatchewan Party had done little to address climate change. However, Chris was also critical of political labels and identifying with a particular political stance:

Chris: … I don’t like … words like conservative or liberal or even libertarian and authoritarian … Because once you align yourself and say, "Oh yeah! I’m a liberal." or, "I’m a conservative" then, you start … thinking, before you make up your mind on any issue, even if it’s subconsciously … is this liberal or is this conservative? … that’s a useless filter and it only promotes more extremism and further divisions … you start to get more people who uh, hold all [emphasis] of this set of views or all [emphasis] of this set of views … and will not listen to anything suggesting any of these views or anything
suggesting any of these views … and if people aren’t listening to each other, then there can’t be any real progress …

Thus, it was difficult to assess participants’ political values based on political affiliation or attitudes about political policies. As a whole, participants appeared to have little awareness of political parties, federally or provincially, while some appeared critical of politics in general. They also appeared to have little knowledge of policies, such as a carbon tax, but did appear to support government intervention in relation to climate change.

Although these adolescents’ political positions were not clearly identifiable, their values did appear to underpin their political beliefs. Interestingly, participants said that they would support politicians and policies that aligned with their own beliefs and values. For instance, Mark stated that he would, “look for the person that has the most similar views to me and agrees with what I think … more environmental regulations and restrictions and stuff,” while Danielle thought that she would vote for someone who, “cares for… simple things and not about all the money in the world.” More specifically, social responsibility and environmentalism were prevalent and interconnected themes in participants’ political discussions. The majority of participants stated that they would vote for political leaders who addressed climate change or other environmental issues. In a similar vein, some participants emphasized the need for both social and environmental responsibility in politics, as reflected in Yasha’s account:

Yasha: …. I think when I vote though, I’m gonna voting on a lot of … I would call it sustainability in general … So, what are you doing for the sustainability of our country and that means, in developing jobs for young people--our job market is constantly changing, so I think sustainability in that … I think it's important to have diversity of thought at the table and diversity of leaders, so how are we working towards that? … education is a very important factor. So, I guess sustainability of a healthy society is probably what I’m going to be voting on … and I don’t know right now, what political party that aligns with, but I really do hope that in this coming election, that there’s serious discussions about climate change … And it would be great to see them really prioritize environment because that gives me an indication that you might take that into your government mandate.

Thus, most participants self identified environmental issues as being an important factor in their political decision making.
Egalitarian values were prevalent in this sample of participants and appeared closely connected to their views of climate change. All of the participants expressed egalitarian views throughout the interviews, regardless of their beliefs or attitudes about climate change. But egalitarian values were most evident when examining students’ rationales for acting on climate change. Despite their claims that they would not be personally affected, most participants thought that it was best to act now to avoid future problems and to reduce the impact on future generations. Chris, for example, thought it was important to address climate change so that others around the world would not suffer and shared, “I see the world as more of my home than Canada.” Similarly, although Natalie did not think she would be personally affected by climate change, she did believe it was important to deal with climate change to ensure that people could remain healthy:

Natalie: … It is something that we’re going to have to deal with in the future. Not necessarily me, personally. But why not slow it down and make it so that it’s not a problem sooner? And do everything you can so that future generations will not have to worry about it? … I think it’s more so, just trying to be better to the environment in general … why live in a smoke filled city, when you can do your best to slow it all down and make it so that people will live longer, be healthier longer.

Even Owen, who did not believe climate change was human caused, believed that protecting human health was important:

Owen: … assuming that … we knew that these … fossil fuels and all these things for sure, are doing all these bad things, then I would want somebody that’s gonna make sure that that stuff is regulated to a degree that keeps us safe.

Thus, participants believed that everyone should have equal protection from the harms of climate change, including people in the future. Such reasoning also suggests that Saskatoon adolescents’ view climate change as a moral issue, which may explain why egalitarian values frequently surfaced when they discussed why we should act on climate change.

In contrast, communitarian values were less commonly connected to these adolescents’ climate change views than egalitarian values. Only one participant, Hannah, directly expressed a communitarian perspective, as she stated:

Hannah: And I feel like … the Earth isn’t ours … everybody’s using it to some capacity … the world has been for so long before you were here and it's just, I just feel like people
should think about that a lot more. And about how many other people there are around the world.

There were also few instances where participants expressed individualistic values in connection to climate change and even in these cases, it was unclear whether the views expressed reflected the students’ personal values. For example, Owen thought it would be difficult to transition away from fossil fuels because of our reliance on combustion powered vehicles but it was unclear whether he was expressing a personal value or the views of others:

Owen: … the biggest one that comes to me is like, um, burning fossil fuels in cars … ‘Cuz there’s … a huge niche for people that love driving like, diesel cars and … cars, the way they are, and there’s … so many people who are just against electric cars just because they like the ways cars are … those people would be hard to try to convert to something like, moving to electric cars.

Interviewer: So, you think it’s just because it would be difficult, that would be … the major negative?

Owen: Yeah … the planet was fine before we started using all those fossil fuels, so I can’t see there being any downside in um, using less of them. I just think it would be ... a social thing.

Thus, according to these results, Saskatoon adolescents have strong egalitarian values, but strong individualistic or communitarian values do not appear as prevalent.

Environmental values were also prominent in adolescents’ discussions of climate change. Promisingly, environmental values were prevalent in this sample of Saskatoon adolescents. Out of 10 participants, eight expressed explicitly communicated concern for the environment, including animals, deforestation, and air or water quality, which was interpreted as a reflection of pro-environmental values. For instance, Inaya believed that “deforestation is a big thing” and thought that it was important for future political leaders to limit it. Students’ general environmental attitudes were also highly complex and were underpinned by a wide variety of influences. For instance, Hannah’s environmental attitudes were influenced by the First Nations’ perspective of sharing the land, which she had learned about in school:

Hannah: … I’ve always looked at … Indigenous culture of sharing the land, as just … so interesting to me … we’ve lost that … worldview that they used to have before Europeans
came over and I just think that that is so interesting that it’s like, "No, like, the whole land is for everybody"

In comparison, Natalie’s environmental concern stemmed from her personal experiences with nature:

Natalie: Well, I mean, living on an acreage. I see all like, the beautiful things about like, nature and all that kind of stuff … I have this family of moose that live in like, my little tree area behind my house and every day, they come out and … the young boys just hit their heads against each other … it’s so cool to watch! And I get to see all these things out of town … all this wildlife and all this stuff and then, I come into the city and all the snow is brown. Everything. There’s smoke coming out of all these huge buildings … it's kinda funny, whenever I drive into the city … and I see it, I always think of like, the [Dr. Suess’] Lorax. And then, I think of … how when he starting cutting down all of the trees and all that kind of stuff, it looked so gross and ugly and dirty.

Generally though, participants who had strong pro-environmental attitudes appeared to be more concerned about climate change than those who did not. Six of the most concerned participants repeatedly expressed pro-environmental attitudes and their general environmental concerns seemed to transfer to a concern for climate change. Greg, for example, was highly concerned about climate change and his appreciation for nature appeared to positively influence his concern:

Greg: But, with outdoor school, we went to like, a greater understanding of why … like, the trips where we see, you know, such beautiful things. You know, kind of that preservation aspect of where, I still want to be able to do this for years.

Thus, there appears to be a close connection between these adolescents’ pro-environmental values and their concern for climate change.

“Making a big difference”: Personal responsibility and barriers to action

Although personal responsibility was not a focus of this study, how these adolescents interpreted their personal responsibility for climate change was a reoccurring theme that emerged during the interviews. Adolescents’ sense of personal responsibility was partially interpreted by examining how they discussed their own contributions to climate change. Overall, participants did not directly acknowledge that their individual actions contributed to climate change. Instead of discussing their personal contribution to climate change, participants were more likely to
discuss how our collective way of life was responsible for climate change. For example, Chris
said that he did experience negative emotions in relation to climate change because, “…most
people don’t, to my knowledge, don’t … feel terrible for things that are happening far away or
far in the future …” But he also acknowledged that Canadians’ consumption level was a source
of the climate change problem and that it should be addressed:

Chris: … I think at the very least, we should … bring our carbon consumption per capita
waaay down, to … at least the average. But .... the world as a whole, is still consuming too
much. So, preferably below what the average is now … Canada … uses about … fifteen
something of carbon per capita, whereas …. the average is around five … I think it
might’ve been metric tons per capita, per year … but in any case, waaay more than what
the average is …. 

Thus, while participants did not explicitly acknowledge their personal role in climate change,
they did appear to be aware that our way of life is a primary driver of it. This may suggest that
that these adolescents perceive some responsibility for climate change as a member of the larger
society but are less likely to acknowledge responsibility on an individual or personal level.

Although participants did not directly acknowledge their personal role in causing climate
change, they believed that individuals are partially responsible for the solutions. Most students
who believed in human caused climate change also believed that we would need to change our
lifestyles to mitigate climate change. However, when participants were asked what they could do
specifically to combat climate change, they suggested actions that did not involve major lifestyle
changes such as, recycling, reducing electricity consumption, carpooling, engaging in
conversations about climate change, and taking public transit. Moreover, most participants
thought that governments and industry bore more responsibility than individuals. Danielle for
example, thought that it was not in an individual’s power to bring about substantial change:

Danielle: … … we should obviously be held responsible too, but … it’s hard for the
individual to make differences in their lives when we’re given these things… Everybody
has gasoline or diesel vehicles, so I feel like, the companies that supply those stuff, those
things to us that … are the reason we live our lives like that, they should be the ones that
really are paying the price for what they’re causing.

In effect, the participants did acknowledge that individuals could act on climate change in small
ways, like recycling or carpooling. However, they also appeared to believe that there were limits
to how much impact an individual could have and that major lifestyle changes would involve
government intervention.

Personal responsibility can also be demonstrated by engaging in actions that help to
mitigate the problem. Participants appeared to engage in small pro-environmental actions but did
not appear to engage in behaviors that involved significant changes to their lifestyle. When asked
how they personally acted on climate change, most students said that they recycled, carpooled,
and tried to minimize the resources they used, such as Eric:

Eric: Of course, like, I turn off the lights when we go out or something … And … during
summer, if it’s not … plus … 35 or something, I usually open all the windows. Like, I
don’t really use the AC … And… We usually take one car and then my mom would drop
my sister off and then drop me off. So, we won’t have to take two … It’s just like, small
stuff that reduces … the use of fossil fuels, but it’s not … really big.

On the other hand, a few students did engage in pro-environmental behaviours that involved
significant lifestyle changes. For instance, Inaya explained how she had wanted a car but after
learning more about climate change, she decided to take public transportation instead:

Inaya: … I still don’t have a car right, ok?... I take public transport … So, valuing that and …
just using public transport … I really wanted a car until I took Environmental Science
and I was able to understand … how small, little things like, carpooling or using buses,
public transport or when walking … even … just me, one person thinking that, it can create
a big change, right?

In general, though, very few students appeared to make conscious changes to their lifestyle in
order to reduce their impact. On the other hand, given that adolescents are not in control of many
aspects of their lives such as where or how they live, mitigating factors may limit how much
these participants can engage in pro-environmental behaviours.

Based on these interviews, there appears to be several external and internal barriers to
participants’ pro-environmental actions. A number of these barriers were identified either in
direct response to questions from the researcher about participants’ actions or they arose during
conservation about other topics. For some participants, negative social perceptions about being
an environmental advocate prevented some students from speaking out more or acting, such as
Danielle:
Danielle: I don’t know, it just, and like, then the way that people who are like, super passionate about like, global warming, the way that they’re portrayed on social media is … like hippie lunatics … I feel like people who are super passionate about um, global warming can face a lot of … opposing people. People that are like, "Calm down" … I feel like it’s a really, there’s a lot of debate with it, is what I mean …

Several students expressed tragedy of the commons thinking when expressing views that their personal actions would have little impact on climate change, such as Mark, who shared: “I try to be as environmentally conscious as I can,” but also stated, “I’m not going to be able to do anything myself … you’d have to get a ton of people on board, but, I mean, the more people get on board … for reducing their … impacts on climate change I guess.” A few participants also perceived that in order to have a substantial impact on climate change, individuals had to devote all their energy or time to it. Greg, for instance, discussed the difficulty in having to choose between ‘making a big difference’ or taking small personal actions to combat climate change:

   Greg: … yes, I care about it a lot. … I think … lots of decisions coming up about my future … Do I want that to be my life goal? … You know, to really ensuring … society’s, Canada … we make changes to help on climate … Or, do I just say, you know what? I really care about that but, that’s not my life goal … I’ve other interests too, right? … Do I want it to be a try to find a way, so I can have a big influence on this, or do I just play my roles as a person?

In other words, some participants appeared to justify their future lack of environmental engagement, by citing an inability to dedicate their lives to it. In essence, most participants appeared to distance themselves from personal responsibility, as they rationalized their own inaction on climate change. Although the cause and variance in students’ perceptions remains speculative, exploring these perceptions further may be important for understanding the barriers to participants’ engagement with climate change.

Summary

In sum, the Saskatoon adolescents interviewed were all aware of climate change and generally concerned about it. Many of these adolescents engaged in in-depth environmental education and these educational experiences appeared to have a significant impact on participants’ understanding, concern, and engagement with climate change. Yet there were considerable variations in participants’ levels of concern about and responses to climate change
that cannot be explained by differences in education. Examining these variations confirms that both individual level and socio-political forces shape how these adolescents think about and respond to climate change. For example, participants experienced a variety of emotional reactions to climate change and appeared to cope with these emotions differently, which shaped their views of the future. Social factors, such as negative social perceptions, compounded concern but also encouraged disengagement. Some of these results are beyond the purview of the research questions and will not be discussed further. The results that do relate the research questions will be analyzed in more depth in Chapter 5.
Chapter 5: Connecting the Data to the Research Questions

In this chapter, I will address the research questions that were first stated on page 5 in the Introductory Chapter. This will be done by making connections between the data and the main sources in the Literature Review. The discussion will begin with the main research question, followed by the three remaining research sub-questions.

How do Saskatoon adolescents make sense of climate change?

Like adolescents around the world, these Saskatoon teens strongly believe that climate change is occurring. All of the participants interviewed acknowledged that climate change is occurring and most believed it was human caused. This high rate of belief in climate change is consistent with global research on adolescents’ climate change beliefs, which shows that younger people are more convinced of climate change than they have been in the past (Corner et al., 2015; Kuppa, 2018). These adolescents’ unanimous belief in climate change is also much higher than the 66% of Saskatchewan adults who believe climate change is happening (Mildenberger, et al., 2016). These comparisons indicate that increased education and communication about climate change is having a positive impact on young people’s climate change attitudes (Corner et al., 2015; Stevenson, et al., 2016b). This study also corroborates prior evidence that acceptance of climate change is associated with increased concern for climate change (Hornsey, et al., 2016; Stevenson, et al., 2016b). Nine of ten participants who believed climate change was happening were also concerned about it. As a result, this study supports the argument that educating adolescents about climate change may be the most effective strategy for strengthening public concern for climate change (Stevenson, et al., 2016b).

According to the results of this study, the majority of these Saskatoon adolescents were also very concerned about climate change. Over half of the students interviewed appeared very worried about climate change and only one participant did not appear worried at all. Several participants also thought that climate change was of personal importance such as Greg, who referred to climate change as the “biggest issue of my generation’s time.” The prevalence of participants’ concern for climate change is slightly higher than for teens in other countries (Corner et al., 2015; Kuppa, 2018); however, there was evidence that these results do not extend to Saskatoon students in general. Owen, for instance, suggested that some of his friends think
climate change is caused by natural forces, rather than humans, while others believe it is human caused:

Owen: I think it's pretty evenly split ... between a few of us ... I think they will share the same ... belief with me that climate change ... in itself, is natural. But I think a lot of them would ... say that ... more drastic changes that are happening, are more because of human causes

Thus, the proportion of Saskatoon teens who believed in human-caused climate change and were concerned about it may be less common than this sample reveals. A possible reason for the overrepresentation of concerned adolescents in this sample could be due to the voluntary sampling methods used to recruit participants. After all, many of the participants engaged in depth environmental education and their increased knowledge about climate change from these classes could have enhanced their concern about it (Stevenson, et al., 2014). In a larger sample of students though, there would likely be more students who had not engaged in optional environmental educational programs. As a result, the majority of Saskatoon adolescents’ may be less concerned about climate change than this study indicates.

Climate change was an emotionally laden topic for these Saskatoon adolescents. Similar to other young people, these Saskatoon adolescents described a variety of negative emotional reactions to climate change, such as worry, fear, and anxiousness (Corner et al., 2015; Hibberd & Nguyen, 2013; Ojala, 2012). Notably, these negative emotional reactions were particularly pervasive in the most concerned participant accounts. Danielle, for example, described the negative emotions she experienced when learning about climate change for the first time:

Danielle: Oh my God. It was honestly really scary ... I was freaked out. I know I was freaked out because like, hearing them say like, "Saskatchewan can turn into a desert." I was just like, "What?!!" ... "No way!" ... that's impossible!

In contrast, participants who were categorized as least concerned about climate change did not appear anxious or upset about climate change. Chris, for example, stated: “Emotionally, I don’t really have anything ... most people don’t, to my knowledge ... feel terrible for things that are happening far away or far in the future.” These patterns suggest that the adolescents who are affectively engaged with climate change are more concerned about it (Corner et al., 2015; Leiserowitz, 2006). Therefore, educators should use strategies that encourage students to emotionally connect with climate change in order to foster adolescents’ concern (Hu & Chen,
2016; Monroe, et al., 2017). But as previous research forewarns, educators also need to be mindful of adolescents’ negative emotional responses to climate change and use strategies that explicitly address adolescents’ emotional needs (Ojala, 2015b; Ojala & Bengtsson, 2018; Stevenson & Peterson, 2015).

In addition to varying levels of concern, there were also notable differences in Saskatoon adolescents’ views of the future with climate change. Most of the adolescents interviewed were optimistic about the future, believing that experts and technology will save us from the most calamitous effects of climate change. According to previous studies, this high rate of hopefulness is common among young people and is more prevalent in younger generations than older ones (Corner et al., 2015). Although some scholars have suggested that this prevalent sense of hopefulness among young people could be the result of increased psychological distance from climate change (Corner et al., 2015), these hopeful reactions may also be a positive sign that most of these Saskatoon adolescents have not succumbed to despair about climate change (Ojala, 2012; Stevenson & Peterson, 2016a). Conversely, a few participants were much more pessimistic about the world’s ability to mitigate and adapt to climate change. For example, when Danielle was asked whether she was confident that we would be able to deal with climate change, she responded, “Not in my lifetime… No, I don’t think so.” Although these pessimistic reactions are not common among young people (Corner et al., 2015; Hibberd & Nguyen, 2013), feelings of helplessness and despair can pose a significant barrier to adolescents’ engagement with climate change (Ojala, 2012; Stevenson & Peterson, 2015). Therefore, to address despair and denial among Saskatoon teens, educators should model positive coping strategies and emphasize hope-based solutions when communicating about climate change (Ojala, 2012; Ojala, 2015b; Stevenson & Peterson, 2015).

Results also reaffirm that these adolescents interpret and internalize similar information about climate change in different ways; information that galvanizes one student may lead to despair for another (Ojala, 2012; Stevenson & Peterson, 2015). Participants’ views of the future did not align with their knowledge of climate change or level of concern about it; the adolescents who were the most concerned and knowledgeable about climate change were just as likely to express pessimism as those less concerned and knowledgeable. Since participants’ responses about the future appear to be independent from their level of knowledge about climate change, this pattern suggests that other factors, besides education, are influencing their climate change
views (Corner et al., 2015; Ojala, 2015a; Stevenson, et al., 2014; Stevenson & Peterson, 2015). Some of the confounding influences could include perceptions of self efficacy and coping mechanisms, since these factors have been shown to influence young people’s hopefulness about climate change (Corner et al., 2015; Ojala, 2012; Ojala, 2015a). Indeed, differences in perceived self efficacy or use of coping mechanisms could be seen in the disparate responses between some of the most concerned and knowledgeable participants in this study. Inaya, for example, described feeling empowered to act on climate change after learning about it in her Environmental Science class:

Inaya: I really wanted a car until I took Environmental Science and I was able to understand … how small … things like, carpooling or using buses, public transport or when walking … even … just me, one person thinking that, it can create a big change, right?

Danielle, in contrast, described feeling helpless about climate change and frustrated by her inability to act as an individual:

Danielle: … I’d say that I talk about it a lot less now. I used to be pretty passionate about, like, right after learning about it.

Interviewer: Why do you think that is?

Danielle: I think it’s because it’s scary … Not like, so scary that I’m like, "Arghh!", but, scary enough that it’s kinda like, uncomfortable … And it’s just kinda frustrating to talk about it because it’s like, it’s happening. It’s happening because humans are doing all this stuff on like a huge, global scale and like, as one person … It’s just like, with anything, like, huge, global issues, like, they’re hard to talk about, it’s because like, what am I gonna do? Like, it’s awful!

Interviewer: So, there’s sort of like, a helplessness in it.

Danielle: Yeah. Helplessness, yeah, exactly.

Based on these responses, it appears that these participants used different coping mechanisms to deal with the information they had learned and had opposing perceptions about their ability to act on climate change. On the other hand, these instances were limited and the effect of these factors on participants’ climate change views is beyond the scope of this study. Therefore, further research would be needed to investigate the effect that coping mechanisms and self efficacy have
on Saskatoon adolescents’ climate change perspectives. The discussion now turns to one of the sub research questions that addressed the personal experiences of participants.

**How do personal experiences influence adolescents’ perspectives on climate change?**

Results from this study reveal that participants’ personal experiences with climate change can positively impact their views. Promisingly, it appears that these Saskatoon adolescents are correctly perceiving the effects of climate change in their personal lives (McDonald, et al., 2015). When prompted about their personal experiences with climate change, most participants described experiences with changing weather patterns or extreme weather events. Several participants also cited personal experiences as evidence that climate change is happening, while others, viewed their personal experiences as influential on their concern for climate change, like Inaya:

Inaya: … specifically when I go back to like, my personal experience, like, in Pakistan, there’s so much heat … I know so many people, like even, to my closest who have passed away because of heat strokes and because of … lack of medical care … I have that emotional connection … personally. So, that’s why I’m like, more pushing towards that.

These results suggest that when these adolescents draw connections between their personal experiences and climate change, it can reinforce their belief in climate change and lead to increased concern (McDonald, et al., 2015). Moreover, education appears to play an important role in helping participants draw personal connections to climate change. Inaya, for instance, described how her experiences in Environmental Science made climate change personally relevant to her:

Inaya: … because Environmental Science, it was more how our everyday lives are … going on, what’s going on in our environment and how it’s impacting us … So, … it helped me understand, rather than just do research on how, what’s going on in the world … I could relate to it and I could understand it.

Therefore, educators should strive to make climate change education personally relevant for students by connecting it to local contexts as much as possible (Monroe, et al., 2017).

Despite evidence that personal experiences can have a positive effect on participants’ climate change views, most Saskatoon adolescents interviewed appear to lack personal connections to climate change. Although eight of the ten participants were able to describe personal experiences with climate change, many said that they have not been affected by climate
change. Additionally, only three participants said they had personally experienced direct and harmful climate change impacts or knew someone who had. Even participants, who had experienced direct impacts of climate change, believed that climate change was less visible in Saskatchewan, as Yasha explained:

Yasha: …. the biggest barrier is that, a lot of, we don’t feel the effects of climate change, or we don’t feel [emphasis] it, right? … even Saskatchewan’s winters, we’ve been living here for … eleven, twelve years, they’ve been changing drastically, but we don’t notice it in the same way … but, if you did go to countries that are facing like, the effects of climate change head on, you’d be like, "This is a real problem. We need to tackle it."

In other words, it appears that these Saskatoon adolescents lack highly salient experiences with climate change in comparison to those living in severely impacted areas (Corner et al., 2015; Wolf & Moser, 2011). As several scholars have pointed out, however, for those who live in northern industrialized countries, far from coastal areas, like Saskatoon adolescents, climate change is still a relatively innocuous threat (Corner et al., 2015; McDonald, et al., 2015; Milfont, et al., 2014). Therefore, these Saskatoon adolescents may lack highly salient examples and vivid images of climate change because of their geographical context (McDonald, et al., 2015). On the other hand, the lack of personal experiences with climate change could have a negative impact on adolescents’ perceptions of risk and make it difficult for them to emotionally connect to climate change (Leiserowitz, 2006).

In addition to lacking personal connections to climate change, most adolescents interviewed appear psychologically disconnected from the climate change. Similar to teens in other countries (Corner et al., 2015; Hibberd & Nguyen, 2013), the majority of the participants expressed temporal and spatial distance from the climate change (McDonald et al., 2015). Eight out of ten participants believed climate change is still a distant and nonexistent threat to themselves or the place where they live, like Eric who said, “It’s happening now, but ... the consequences, I guess ...They aren’t gonna really, up here, and … they’re gonna … happen in the future.” The consistency of these results across countries could suggest that the temporal and spatial aspects of climate change may be particularly difficult for these adolescents to grasp, as some scholars have suggested (Fløttum, et al., 2016). It is also possible that these patterns reflect gaps in the way climate change is presented in schools, as some participants alluded to. In several cases, students recalled having learned about the potential impacts of climate change on
Saskatchewan, but did not seem to learn about its current, local effects. Chris, for instance, stated: “the people who’ve told it to me … have given me the information that leads me to believe that it … is a big deal … a distant threat, but still a big deal, essentially.” In any case, emphasizing the local and current impacts of climate change may be particularly helpful for reducing adolescents’ temporal and spatial distance from the climate change (Corner et al., 2015; McDonald, et al., 2015).

Evidence from this study also suggests that some Saskatoon adolescents may be psychologically distancing *themselves* from climate change. This self distancing could explain why a few participants described having experienced direct and salient impacts from climate change, but still did not believe they were being affected by it. For example, Natalie believed that she would not be personally affected by climate change, but recalled the impact that nearby fires had on the local air quality:

Natalie: … that might’ve been 2015--I'm not too sure—but … just the fact that we had no rain for so long and then, these small fires blew up into … huge fires and covered the city in smoke, just because there was no moisture or anything … It just was hot and everything was just dry … So, I don’t really know exactly how that ties in, like, scientifically with climate change and all that … But, I think it does have some, like it keys in at some point with just the lack of rain and all that.

Instances such as these could indicate that some adolescents are motivated to psychologically distance themselves from climate change in order to avoid the difficult realities of climate change (Norgaard, 2011). Participants’ willingness to draw personal connections to climate change may also depend on other factors, such as the individual’s pre-existing beliefs and values or the severity of the impacts (McDonald et al., 2015). One participant, for example, did not believe in climate change and unlike the other participants, he did not view variable weather patterns in Saskatchewan as evidence of climate change:

Owen: 'Cuz it’s, everybody says that stuff, but then it like, it changes all the time … there’s always that joke that um, Saskatchewan’s weather... if you don’t like it, you just wait ten minutes and it’ll change … And that’s how I’ve always known it. It’s, it’s always seemed pretty familiar to me.

Thus, it seems that Owen’s previous disbelief in climate change prevented him from drawing connections between climate change and changing weather patterns, even when others were
making those connections. These examples further illustrate the difficulties in encouraging adolescents to draw personal connections to climate change.

Regardless of the reasons for participants’ psychological distance from climate change, however, a more important consideration is how this psychological disconnect impacts their sense making about climate change. Existing research involving adults suggests that psychological disconnection can negatively impact concern and willingness to take action (McDonald, et al., 2015). Such negative effects could explain why the less concerned participants did not believe that climate change was an immediate or significant personal threat or why most participants did not engage in significant pro-environmental actions, despite being concerned about climate change (McDonald et al., 2015; Wolf & Moser, 2011). Given the limited scope of this study though, further research into the impact that psychological distance has on Saskatoon adolescents’ climate change views is needed to clarify these conclusions. The discussion will turn to the role that personal values play in how participants make sense of climate change.

**How do values influence adolescents’ climate change views?**

According to the results of this study, the majority of these Saskatoon adolescents hold pro-environmental values. Most of the participants interviewed appeared to hold pro-environmental values, which contrasts with findings and predictions from previous studies (Corner et al., 2015; Wray-Lake, et al., 2010). The prevalence of pro-environmental values within this sample could indicate that young people are becoming more environmentally concerned than older generations, as Whitmarsh (2011) proposed. However, this trend could reflect a sampling bias and may not be representative of Saskatoon adolescents as a whole. Many of the participants who voluntarily took part in this study also engaged in optional, in depth environmental education. Thus, this sample of participants may contain a disproportionately high number of adolescents with pro-environmental attitudes and values. In contrast, a more diverse and randomized sampling process would likely yield a much lower representation of strong pro-environmental values. Therefore, more research is needed to verify the prevalence of pro-environmental values among Saskatoon youth.

This study also confirms that pro-environmental values are positively correlated with participants’ concern for climate change. Results reveal that six participants who were the most concerned about climate change, also expressed strong pro-environmental attitudes. In contrast,
participants who appeared to have weaker pro-environmental values were less or not at all concerned about climate change. This substantiates previous conclusions that individuals with pro-environmental values are more concerned about climate change than those with weak values (Hornsey, et al., 2016; Ojala, 2015a; Whitmarsh, 2011). Findings also suggest that these Saskatoon adolescents are more likely to seek out and accept information about climate change because of their environmental values. Out of the seven participants who had voluntarily engaged in environmental education programming, six expressed strong pro-environmental values and were highly concerned about climate change. Thus, the participants with strong pro-environmental values appear to be more concerned and engaged with climate change.

On the other hand, pro-environmental values may only indirectly influence participants’ climate change views. Research shows that adults and teens alike, more readily accept information that aligns with their pre-existing views (Kahan, et al., 2012; Ojala, 2015a). Therefore, adolescents who had strong pro-environmental values could have been ‘primed’ to be concerned about environmental issues in general, while the environmental education they engaged in specifically enhanced their concern for climate change (Ojala, 2015a). This would imply that there is a correlational relationship between adolescents’ environmental values and their climate change views rather than a causal one. Moreover, while it seems that participants with pro-environmental values are more concerned about climate change, a close examination of the results suggests that environmental concerns are not at the forefront of participants’ minds when it comes to climate change. Participants rarely cited environmental concerns as reasons to act on climate change and they seemed less concerned about the environmental effects of climate change than the human impacts. As a result of these inconsistencies and omissions, it is unclear how much influence environmental values directly exert over participants’ climate change views. Therefore, further research is needed to clarify the relationship between participants’ environmental values and how they make sense of climate change.

Egalitarian values also appear to be connected to participants’ climate change perspectives; but similar to environmental values, questions remain about the relationship between egalitarian values and participants’ climate change views. In comparison to the other values examined in this study, egalitarian values were the most apparent and widespread value across the sample, with all of the participants expressing egalitarian views. Protecting the health, wellbeing, and safety of other people, including future generations, figured prominently in
participants’ accounts and underpinned most of their rationalizations for acting on climate change. Since participants seemed to view climate change as a moral issue, this could mean that egalitarian values are particularly influential on participants’ climate change views, much like Norwegian youth (Fløttum, et al., 2016). However, the opposite relationship could also be true, whereby discussing the implications of climate change activated adolescents’ egalitarian values (Leiserowitz, 2006). To further complicate the matter, egalitarian values were not strongly associated with belief and concern for climate change, in contrast to previous studies (Hornsey, et al., 2016; Ojala, 2015a). Participants who were highly concerned about climate change expressed strong egalitarian values, as did those who were less concerned. This result could reflect the limitations of the interviewer’s interpretation since participants’ values were not assessed using a valid measurement tool. Nevertheless, these Saskatoon adolescents seemed to view climate change predominantly through a moral frame. As a result, framing climate change as a moral issue, in addition to an environmental one, may appeal to a broader scope of Saskatoon adolescents and reduce the possibility of frame clashes (Apslund, 2016; Monroe, et al., 2017).

Findings from this study also support the argument that adolescents’ political views are less solidified than adults (Stevenson, et al., 2014; Ojala, 2015a). Although some of these teens expressed political views, their views were inconsistent and did not seem to fall into distinct ideological positions. Even in cases where a participant did have distinct political views, such as Owen, these views did not preclude him from supporting government controlled, environmental regulations. In other words, these adolescents did not rely on political arguments as rationalizations for action or inaction on climate change. These patterns lend support to the argument that adolescents’ political views are still forming and suggests that these adolescents may be less politically polarized on climate change issues than their adult counterparts (Ojala, 2015a; Stevenson, et al., 2014). It was also noteworthy that some students appeared to shun political values altogether. In fact, most participants expressed little interest in formal politics, while several expressed negative views of traditional political identities. These results could indicate that some Saskatoon teens, like other young people, are disillusioned with traditional politics (Corner et al., 2015; Turcotte, 2015). Alternatively, the participants’ disinterest in politics could reflect deeper perceptions of “societal powerlessness,” which could negatively impact their concern and engagement with climate change (Ojala, 2015a, p. 1147). Nonetheless,
future research would be needed to understand the reasons for participants’ ostensible apathy towards politics. The discussion turns to the social influences on the participants’ climate change views.

**How do outside influences shape teens’ climate change perspectives?**

For these Saskatoon teens, schools are important sources of information about climate change. Most participants said that school was a primary source of climate change information and students who took an optional environmental education classes reported that these programs deepened their awareness and concern for climate change. Contrasting the continuum of concern (Table 4.1) with climate change education further reveals that students who received in-depth environmental education are more concerned than those who did not. These results confirm that increased knowledge about climate change can lead to increased concern for youth (Stevenson, et al., 2014) and supports the argument that their climate change views have not yet solidified (Ojala, 2015a; Stevenson, et al., 2014). Based on participants’ accounts, the strategies used in these environmental classes are also consistent with best practices for encouraging student engagement with climate change, such as structured peer discussions and project or experiential based learning (Monroe, et al., 2017). Thus, as several participants asserted, these environmental education classes made climate change a more relevant and salient issue for them and increased their concern for climate change.

On the other hand, this segment of adolescents may have been predisposed to concern, which could have amplified the effect of education. Several participants confirmed that they were already aware and concerned about climate change before taking the additional environmental classes and most expressed a general concern for environmental and societal issues. Research suggests that participants’ pre-existing values or belief in climate change may have encouraged them to seek out more information (by taking an optional environmental education class) and could have made them more receptive to education (Kahan et al., 2012; Ojala, 2015a; Stevenson, et al., 2016b). But teens may not respond as positively to climate change education if they do not have strong pro-environmental values, have pre-existing skeptical beliefs, use denial based coping strategies, or do not feel that their views will be heard and respected (Ojala, 2015a; Ojala, 2015b; Ojala & Bengtsson, 2018). Thus, for heterogenous groups of teens, climate change educators should ensure that the classroom is an emotionally
supportive environment, where discussions are encouraged, and expressing diverging views are welcomed.

Although these Saskatoon teens believed that education was the most important influence on their climate change views, parents also appear to play a key role in shaping their perspectives. As predicted, participants’ climate change views closely align with their parents’ views (Mead, et al., 2012) and their perceptions of their parents’ climate change attitudes are a strong predictor of their own attitudes (Ojala, 2015a; Stevenson, et al., 2016b). Most participants also contended that their parents were not primary sources of information about climate change; however, studies indicate that parental influence occurs primarily through socialization and modelling, rather than direct transmission of information or views (Mead, et al., 2012; Ojala, 2015a; Ojala & Bengtsson, 2018; Valdez, et al., 2018). This explains why most participants who were concerned about climate change also reported that their parents valued science, encouraged conversations about social and environmental issues, or were receptive to climate change information. As a result, parents who modelled concern for environmental or social issues and positive coping strategies could have tacitly encouraged their children to seek out more information by taking optional environmental educational classes (Mead et al., 2012; Ojala & Bengtsson, 2018). Therefore, parents appear to indirectly influence participants’ perspectives about climate change by encouraging or discouraging concern and information seeking behaviours.

When concerned participants believe that others share their views on climate change, these perceptions can have a positive impact on their own climate change perspectives. Most participants who were highly concerned believed that their parents were also aware and concerned about climate change. Thus, parental descriptive norms appear to influence how these adolescents make sense of climate change, as previous studies indicated they would (Ojala, 2015a; Ojala & Bengtsson, 2018; Stevenson, et al., 2016b). In contrast, participants’ perceptions of their friends’ attitudes did not appear to influence their own climate change perspectives. Over half of the participants did not think their friends shared their attitudes or concern for climate change, while only a few participants said that their friends did or could share their attitudes. Therefore, participants’ perceptions of their friends’ attitudes are not strongly correlated with their own level of concern. At first glance, this contradicts findings from previous research (Ojala, 2015a; Stevenson, et al., 2016b). However, participants also differentiated between
classmates and friends, while previous studies did not (Ojala, 2015a; Stevenson, et al., 2016b).

Most participants believed their classmates would share their concern for climate change, especially those in environmental education classes, and several reported that these peers were important influences on their climate change views. Thus, these adolescents’ concern for climate change may be less influenced by perceptions of friends’ attitudes and more influenced by peers, who share their views about climate change (Stevenson, et al., 2016b). This finding also suggests that it may be important to distinguish between classmates and friends when studying the influence of descriptive norms on adolescents’ perspectives.

For participants who are concerned about climate change, discussions with others who share their views may positively influence their views about climate change. The participants who were concerned about climate change spoke enthusiastically about conversations they had with peers, parents, or teachers who shared their concern. For some participants, like Greg, conversations with classmates were particularly influential on their perspectives about climate change:

Greg: You know, whether it’s just because we’re having a class discussion about it …
Or…more people are thinking about it, so … you’d have more casual conversations about it … And as well, I think, because you kinda think similarly, it’s easier for your ideas to grow…Build on each other, I guess

These patterns support the conclusion that discussions about climate change with ‘trusted messengers’ can positively influence adolescents’ climate change concern and engagement (Corner et al., 2015; Mead et al., 2012; Stevenson, et al., 2016b).

On the other hand, participants’ personal acceptance of climate change may be more consequential to their concern for climate change than discussions (Stevenson, et al., 2016b). Owen, for example, recounted discussions with friends who did not share his view that climate change was naturally occurring; but these conversations did not seem to increase his concern for climate change or alter his views. Consequently, the participants’ level of concern for climate change did not appear to be positively influenced by discussions, regardless of the others’ climate change views (Mead et al., 2012; Stevenson, et al., 2016b). However, there was also evidence that participants’ climate change beliefs and concerns are not negatively influenced by discussions either (Stevenson, et al., 2016b). Chris, for example, recounted how he and his
classmates had conversations about climate change, even though they held diverging views on climate change:

Chris: …. well pretty much mostly everybody at [specialized program] would ah, think mostly the same … about what climate change … not necessarily agree about what should be done about it …. there are a few people who think that the benefit … isn’t worth giving up oil or a few people who think we should cut out everything immediately, right now. Like, mostly about how urgent it is and what we should do about it and where it falls on priorities for … the government to do things about it or people.

Interviewer: … But you guys talked about it as a group, quite a bit?

Chris: Mmhmm … And it never got … angry or anything.

Although participants’ discussions with others who did share their views were rare, this pattern suggests that these Saskatoon adolescents may be less influenced by social pressures than some scholars have predicted (Ojala, 2015a). If so, this could mean that educating these adolescents about climate change may be “more straightforward than among adults … because adolescents are not unduly influenced by peer pressure in regard to [climate change]” (Stevenson, et al, 2016b, p. 8). Conversely, it could also impede educational efforts if individuals, who are already skeptical about climate change, do not readily alter their views when presented with contrasting opinions (Kahan et al, 2012).

Results from this study further indicate that participants’ negative perceptions of others’ attitudes influences their willingness to discuss climate change. Several students reported that they purposefully refrained from discussions about climate change with friends and parents whom they believed did not share their views. Inaya, for example, said that she was hesitant to share her experiences with climate change with others: “I do know that what I’ve experienced first hand is true and I can’t be wrong about that, but I don’t know if I’ll hurt somebody else with that.” In other words, negative descriptive norms discouraged some of these adolescents from discussing climate change with others outside of school. Therefore, negative descriptive norms may have a greater effect on participants’ perspectives than discussions, in contrast to findings from previous studies (Mead et al., 2012; Stevenson, et al., 2016b). On the other hand, participants’ willingness to discuss climate change could be influenced by their perceptions of how others will respond to their own views, rather than others’ specific climate change attitudes (Ojala & Bengtsson, 2018; Valdez, et al., 2018). This would explain why Owen felt comfortable
discussing climate change with his friends, who “all have this understanding that learning isn’t just confirming your biases … It's looking at the other side;” but he did not feel comfortable expressing his ideas in his Science 10 class and commented, “I wish it was a little bit more open, sometimes to … other opinions.” Nevertheless, negative descriptive norms may make it more difficult for these adolescents to openly share ideas about climate change (Matthes, Knoll, & von Sikorski, 2018). Moreover, participants seemed more likely to discuss climate change when there was an external catalyst, such as a class initiated discussion, and are more willing to do so, when they perceived that it was a safe place to share ideas (Monroe, et al., 2017; Ojala, 2015b; Ojala & Bengtsson, 2018).

Finally, this study suggests that some of these adolescents may be selectively trusting or discrediting information, based on their pre-existing views and biases. Almost all participants asserted that they predominantly rely on information that is scientifically supported when seeking out information about climate change. However, the interviews reveal that much of the participants’ decisions making about information is related to their perceptions about the source of the information, rather than the accuracy of the information itself. Chris, for example, said that he had come across news articles that both supported and questioned the efficacy of a carbon tax in reducing carbon emissions. Nonetheless, he believed that the anti-carbon tax information that his peers shared in a class presentation was more reliable than his own research. Thus, information that comes from teachers, family members, and those within a participants’ social circle does not appear to be held to the same level of rigorous questioning as information from an unconnected source.

Although research suggests that teens views may be less influenced by ideologically supported beliefs (Ojala, 2015a; Stevenson, et al., 2014), there was also evidence that some participants are using ‘motivated reasoning’ and other mental heuristics to decide which information they trust (Wolf & Moser, 2011). For instance, Owen believed his father’s friend, who thought that variations in weather were due to natural causes rather than others causes, believed that changing weather patterns were the result of climate change. Incidentally, Owen also believed that climate change was due to natural causes. The danger in using mental shortcuts to discern trustworthy information, however, is that students may be more likely to, “get information from and trust those that think like them … leading to over-reliance on politicized and scientifically inaccurate news sources … and selective acceptance of new information that
reinforces ideologically supported beliefs” (Valdez, et al., 2018, p. 183). For students who are concerned about climate change, this could have a positive effect by heightening their concern; but for students who are not as concerned or harbour skeptical attitudes, these heuristic driven decisions may decrease the effectiveness of educational strategies or negatively impact students’ receptivity to climate change education (Kahan et al., 2012; Monroe, et al., 2017). This was also illustrated in the example of Owen, who responded negatively to the information that his science teacher presented about climate change. Therefore, it may be important to encourage Saskatoon adolescents to critically reflect on their own perspectives and assumptions when learning about climate change (Monroe, et al., 2017).
Chapter 6: Conclusion

At the time this research was undertaken, there was a lack of relevant Canadian data on teens’ attitudes towards climate change; therefore, the study’s primary aim was to explore Saskatoon adolescents’ general climate change views. According to this study, there are several reasons to be optimistic about Saskatoon adolescents’ beliefs and attitudes towards climate change. Promisingly, climate change seems to be common knowledge among these Saskatoon adolescents and many of the teens interviewed were highly concerned about it. Although it is uncertain whether Saskatoon adolescents outside of this sample are equally concerned about climate change, these results could indicate that public opinion in Saskatchewan is shifting towards greater awareness and concern with younger generations (Corner et al., 2015; Mildenberger, et al., 2016; Whitmarsh, 2011). For the most part, the participants also believed that climate change is a serious issue that needs to be addressed and were hopeful that solutions can be found. In other words, most did not appear to have succumbed to apathy and despair, unlike some youth in other countries (Corner et al., 2015). Thus, there were numerous indications that these Saskatoon adolescents were largely concerned about and committed to addressing climate change.

However, this study also reveals that there are reasons to be concerned about Saskatoon adolescents’ climate change attitudes. According to the results, there are significant disparities in participants’ level of knowledge and concern about climate change, particularly between those who engaged in voluntary environmental education programs and those who did not. And although most of the adolescents interviewed were hopeful about the future with climate change, there were also signs that some participants may be suffering from climate change related despair. But most concerning perhaps, is that climate change appears to be an ‘invisible’ and distant threat for most of the participants, even for those who have substantial knowledge about it. Thus, there are several reasons to believe that current climate change education in Saskatchewan may not be effectively addressing the barriers to Saskatoon adolescents’ concern and engagement with climate change.

The secondary aim of this study was to examine some of the factors shaping participants’ climate change views. The purpose of examining the psychological and social factors was to understand how and to what extent they may be shaping adolescents’ perspectives on climate
change (Corner et al., 2015; Hornsey, et al., 2016). It was further hoped that if the influencing factors were identified, they could be leveraged to increase teens’ concern and engagement with climate change.

Of the many influencing factors, this study has highlighted the significant role that climate change education plays in shaping adolescents’ perspectives about climate change. Results suggest that learning about climate change in schools can have a positive impact on adolescents’ views by strengthening their knowledge, deepening their concern, and encouraging personal connections to climate change (Corner et al., 2015; Stevenson, et al., 2014). Additionally, environmental education classes and teachers are, for the most part, primary sources of information about climate change for the adolescents interviewed. This lends credence to the argument that schools and educators are ‘trusted messengers’ of information about climate change for young people (Corner et al., 2015). However, according to participant accounts, most climate change education appears to occur in optional environmental educational courses. Thus, contrary to recent research on Canadian climate change education (Wynes & Nicholas, 2019), many Saskatoon adolescents may not be receiving adequate climate change information from the sources that they trust most.

Studying the variations in participants’ responses further reveals that psychological factors also play a role in shaping adolescents’ perspectives on climate change. While increased education appears to have the greatest impact on participants’ beliefs and concern for climate change, several psychological factors may also positively influence their climate change views. Pro-environmental values, for example, may encourage some Saskatoon teens to seek out information about environmental issues, which can enhance their concern for climate change (Hornsey, et al., 2016; Ojala, 2015a; Whitmarsh, 2011; Wolf & Moser, 2011). Similarly, other psychological factors, such as personal experiences, may indirectly influence adolescents’ climate change views by encouraging them to connect to climate change on an emotional level (Leiserowitz, 2006; McDonald et al., 2015). Taken together, these patterns suggest that pre-existing psychological factors may enhance the positive effects of climate change education for some Saskatoon adolescents.

In contrast to these positive effects, results also suggest that psychological factors can act as barriers to adolescents’ concern and engagement. More specifically, adolescents’ ability to personally and emotionally connect to climate change may be stymied by pre-existing
psychological factors such as perceptions of self efficacy, negative coping strategies, skeptical beliefs about climate change, and weak environmental values (Kolmuss & Agyeman, 2002; McDonald et al., 2015; Ojala, 2012; Ojala, 2015a). These factors may not only undermine the effectiveness of climate change education, but if left unaddressed, they may result in despair, perpetuate denial of climate change, or lead to disengagement for some adolescents (Mead et al., 2012; Ojala, 2012; Ojala, 2015a; Stevenson & Peterson, 2015). Therefore, climate change education should involve the use of specific and targeted strategies that address the psychological barriers to adolescents’ concern for and engagement with climate change (Ojala, 2012; Ojala & Bengtsson, 2018; Stevenson, et al., 2014; Stevenson & Peterson, 2015; Stevenson, et al., 2018; Wolf & Moser, 2011). Educational approaches that may be helpful in addressing the needs and context of Saskatoon adolescents will be discussed in the Recommendations section.

In addition to education and psychological factors, this study has shed light on the relationship between social factors and participants’ climate change perspectives. Results suggest that parents may tacitly encourage or discourage participants’ concern for climate change and information seeking behaviors, most likely through behaviour modelling and passing on of values (Mead, et al., 2012; Stevenson, et al., 2016b; Valdez et al., 2018). In comparison to parents and education about climate change, however, other social factors do not appear as influential on participants’ climate change views. While discussions with peers may deepen concern and knowledge for Saskatoon adolescents who have pro-climate change beliefs, in general, the participants’ beliefs about climate change did not appear to be influenced by their friends’ attitudes or opposing views. Thus, contrary to predictions, these Saskatoon adolescents’ climate change views may not be significantly shaped by peer pressures (Ojala, 2015a; Stevenson et al., 2016b). Promisingly, this suggests that climate change education may be more effective for Saskatoon adolescents than adults, since their views may not be as heavily influenced by skeptical social attitudes (Stevenson, et al., 2016b). On the other hand, this could also mean that skeptical adolescents may not readily alter their views when presented with contrasting information. Educational strategies that may address the influence of social factors will also be discussed in the Recommendations section.

**Recommendations**

Results from this study suggest that more mandatory climate change education is needed in Saskatoon high schools. This study has revealed that education can have a significant and
positive impact on adolescents’ concern for climate change (Corner et al., 2015; Ojala, 2015a; Stevenson, et al., 2014). Therefore, educating Saskatoon youth about climate change may be the best path forward to building public consensus on climate change (Ojala, 2015a; Stevenson, et al., 2016b). Results further suggest Saskatoon teens may be more open to climate change information than their adult counterparts, since their climate change views do not appear to be as solidified or politically polarized (Ojala, 2015a; Stevenson, et al., 2014). Despite the potential to deepen adolescents’ knowledge and concern for climate change through education, however, most climate change education in Saskatoon appears to occur in optional environmental education programs. Thus, this study recommends incorporating more climate change education into a greater number of compulsory science curricula to ensure that all Saskatoon adolescents receive adequate information about climate change.

To further encourage Saskatoon adolescents’ concern and engagement with climate change, a cross-disciplinary approach to education is needed. One way to increase the amount of climate change information that Saskatoon adolescents receive is to increase the number of outcomes that explicitly address climate change within the Saskatchewan science curricula. But limiting climate change education to science classes gives students the impression that climate change is primarily an environmental and scientific issue, rather than a socio-political one as well (Stevenson, Nicholls, & Whitehouse, 2017). Therefore, it is also recommended that climate change education be incorporated into other curricula as they are renewed. Indeed, non-science classes may be more appropriate spaces for adolescents to grapple with the exigencies of climate change, rather than in science classes where climate change education has traditionally occurred (Enoch & Eaton, 2019). Unlike science classes, which tend to focus on the science of climate change, incorporating climate change into Social Sciences and Humanities classes could provide Saskatoon teens with opportunities to critically examine its social and political implications (Enoch & Eaton, 2019; Stevenson, et al., 2017). In essence, expanding climate change education to non-science classes would help to deepen Saskatoon adolescents’ understanding of climate change and its associated issues.

Then again, Saskatoon teachers do not have to wait for curricular changes to address the issue of climate change in their classrooms. There are many areas in existing curricula in both the elementary and high school levels, where climate change could be addressed or incorporated. For example, several of the current Saskatchewan Social Studies curricula—namely, Social
Studies 5, 6, 7, and 8, include outcomes that address environmental stewardship and sustainability (Saskatchewan Curriculum, n.d.). Although these outcomes do not explicitly refer to climate change, many of the underlying themes, such as consumerism, could be linked to it. In classes that contain skill-based outcomes rather than content driven ones, like English Language Arts, climate change could be included as a topic for projects and products, particularly for outcomes related to social responsibility and action. By rethinking existing curricula in these ways, Saskatoon teachers could take up the issue of climate change in their classes, while still meeting the existing curricular outcomes.

Although addressing climate change in more subject areas can help to deepen Saskatoon adolescents’ understanding of climate change, educators also need to consider how climate change education is addressed in their classrooms. According to educational research, climate change education is most effective when it is meaningful and relevant to students (Monroe, et al., 2017). Findings from this study further suggest that when adolescents draw personal connections to climate change, these connections can strengthen their beliefs and concern for climate change. Thus, this study, along with existing research, highlight the importance of personal connection to teens’ concern and engagement with climate change (Corner et al., 2015; McDonald, et al., 2015; Wolf & Moser, 2011). However, results also suggest that some Saskatoon students may lack personal connections to climate change. While some of this disconnection may be the uncontrollable result of contextual factors such as geographical location (McDonald, et al., 2015; Wolf & Moser, 2011), some of this disconnection may be due to a lack of knowledge about the effects of climate change in their local communities (Fløttum, et al., 2016). Therefore, educators should create opportunities for adolescents to explore the issue of climate change within their personal and local contexts.

On the other hand, contrasting evidence from this study and prior research indicates that adolescents may not readily draw personal connections to climate change because of underlying psychological barriers (Corner et al., 2015; Ojala, 2012; Ojala, 2015a; Norgaard, 2011). Therefore, Saskatoon educators should also use pedagogical strategies that address the barriers specific to their students. For example, negative emotions can act as a barrier to engagement if adolescents lack positive emotional coping skills (Ojala, 2012; Norgaard, 2011). But educators can address teens’ emotional needs by openly discussing common emotional reactions to climate change, modelling positive coping strategies, and ensuring that the classroom is a safe place for
students to express dissenting views (Ojala, 2012; Ojala & Bengtsson, 2018; Stevenson & Peterson, 2015). Educators can also address the affective needs of their students by providing opportunities for students to emotionally connect to climate change (Ojala, 2015b; Stevenson & Peterson, 2015). Place-based learning, for instance, cannot only decrease the psychological distance between young people and climate change, but can encourage affective connections to the immediate environment (Hu & Chen, 2016; Monroe, et al., 2017). Furthermore, although it is beyond the scope of this study to offer specific examples, educational approaches such as inquiry, experiential, and place-based learning, can allow students to construct meaning about climate change in personally relevant ways. These approaches will also provide students with opportunities to develop the critical and creative thinking skills needed to navigate climate related challenges in the future (Stevenson, et al., 2017; Monroe, et al., 2017). Developing these skills and competencies, in turn, could help to address other potential barriers, such as feelings of “social powerlessness” (Ojala, 2015a). Thus, educators can help to ameliorate the barriers to concern and engagement by utilizing pedagogical strategies that encourage adolescents to personally connect to climate change.

In addition to broad educational approaches, encouraging more discussions about climate change may be important for Saskatoon adolescents. A reoccurring theme in the participants’ accounts was the lack of discussions they had about climate change, especially outside of a classroom environment. This lack of engagement in discussions is somewhat alarming, given the positive impact that discussions can have on adolescents’ concern for climate change (Mead et al., 2012; Stevenson, et al., 2016b). Although discussions did not appear to be as influential on participants’ climate change attitudes as previous research indicated (Mead et al., 2012; Stevenson et al., 2016b), the results did suggest that discussions about climate change can strengthen the adolescents’ climate change knowledge through information sharing (Stevenson et al., 2016b). Furthermore, climate change education research has suggested that encouraging discussions among adolescents may have a deeper and more lasting impact on adolescents’ engagement with climate change than direct instructional approaches (Monroe, et al., 2017; Wolf & Moser, 2011). For educators, encouraging informal discussions about climate change outside of the classroom may also counteract the effects of social factors outside of an educator’s control, such as parental influences (Mead et al., 2012; Valdez, et al., 2018). Therefore,
Saskatoon educators should create opportunities for teens to engage in discussions about climate change both inside and outside of the classroom.

Based on existing research, there are several reasons why using strategic information framing may also be beneficial when educating Saskatoon adolescents about climate change. As previous research has shown, using a variety of frames can appeal to different values systems and can reduce the possibility of triggering negative responses, especially in skeptical audiences (Stevenson, King, Selm, Peterson, & Monroe, 2018; Wolf & Moser, 2011). Accordingly, Saskatoon educators may need to use a variety of frames to appeal to a diversity of students’ values, especially in classes outside of environmental education programs. In particular, information frames that appeal to egalitarian values, such as moral frames, may appeal to a greater number of Saskatoon students and may be more effective for engaging skeptical adolescents than environmental ones. Utilizing moral frames may further encourage disconnected or disengaged Saskatoon adolescents to emotionally connect to climate change, provided that the frames do not overly emphasize the negative impacts of climate change (Wolf & Moser, 2011). Finally, using frames that emphasize the local and current aspects of climate change, like its effects on health and agriculture, may help to decrease the psychological distance for Saskatoon adolescents (Stevenson, et al., 2018; Wolf & Moser, 2011). In sum, using a variety of frames like the ones suggested could allow educators to reach a greater variety of students, while also helping educators address some of the psychological barriers to adolescent concern and engagement.

Finally, Saskatoon educators who wish to take up climate change in the classroom should also consider the socio-political milieu surrounding climate change. Although results from this study suggest that Saskatoon adolescents may not be as politically polarized on climate change as their adult counterparts, it remains a politically divisive issue in Saskatchewan (Mildenberger et al., 2016). In Saskatchewan, for example, there is much public and political support for the fossil fuel industries. In several cases, teachers and school divisions across the province have faced significant public backlash for initiating or encouraging student activities that have been perceived as “anti fossil fuel” (Drinkwater, 2019; MacPherson, 2016). On a topic as important as climate change, however, glossing over its impacts is not in the public interest. Therefore, teachers need to be mindful of the social norms of the community where they teach and design their climate change instruction accordingly.
Limitations of the Study

Drawing upon thick and rich interview transcripts, this study has highlighted several important findings about how these Saskatoon adolescents make sense of climate change and the factors influencing their views. These findings can, in turn, inform broad and specific educational approaches to address the needs and context of these participants. However, there are also inherent limitations to what can be interpreted or concluded about adolescent climate change views based on these findings.

A significant limitation of this study involves the internal validity of the sample. Despite my efforts to establish a heterogenous sample, the teens interviewed reflect a relatively homogenous group. Since I relied on voluntary participation and convenience sampling, the sample likely contains a disproportionately high number of students with pro-environmental values and higher than average knowledge about climate change (Robinson, 2014). As previous research has shown, these factors are often associated with higher rates of climate change concern and engagement (Hornsey, et al., 2016). Thus, Saskatoon teens in general may not share the same views about climate change, nor demonstrate the same level of concern as the results of this study suggest. Moreover, the internal validity of the study is negatively impacted by the small sample size (Creswell, 2014). Therefore, to strengthen the internal validity of these findings, it would be important to include more adolescents from a greater variety of educational, socioeconomic, and cultural backgrounds.

The findings from this study may also not apply to adolescents outside of Saskatoon. Prior research has noted that adults residing in urban areas on the prairies show higher rates of belief in climate change than those residing in rural areas or those living in areas in close proximity to the oil and gas industry (Mildenberger et al., 2016). In parallel, there were clues in the interviews that the climate change views expressed by this sample of adolescents may not reflect the views of adolescents outside of Saskatoon. For instance, one participant alluded to a potential rural-urban divide in climate change beliefs among adolescents when recounting a discussion he had had with a friend who did not share his views about climate change:

Chris: I mean, he's grown up in like, a, this small town ... in Saskatchewan … Um, but a very conservative environment…So, I think that… we both have the same information, right? But it's passed through different filters by the people telling it to us.

Interviewer: … You said, he's receiving information from them. Who's them?
Chris: … like his family … his neighbors and friends. Uh, he, uses a lot of news sites like, the “Rebel” and stuff. So, some right, some more, moderately right wing uh, news sites.

In other words, there are strong indications that the findings from this study may not extend to Saskatchewan students in rural areas or municipalities outside of Saskatoon. Thus, further research would be needed to determine the transferability of this study’s findings to adolescent populations outside of Saskatoon.

Finally, the results of this study are significantly limited by the timing of the research. The interviews for this study were conducted in the spring of 2018. Since then, global public attitudes have moved towards greater concern for climate change, some of which may be due to its worsening effects (Fagan & Huang, 2019). Similarly, the school climate strikes, led by teen climate activist Greta Thunberg and others, may be an indication that adolescent climate change attitudes are shifting toward greater concern (Mackay, 2019). In conjunction with changing climate change attitudes, research is also rapidly evolving and has continued to deepen our understanding of how adolescents make sense of and engage with climate change (Lawson, Stevenson, Peterson, Carrier, Strnd, & Seekamp, 2019; Stevenson, et al., 2018). As a result of these changing conditions, the findings and recommendation of this study are bound by a specific time frame and therefore, may not be directly transferable to today (Creswell, 2014).

**Future Areas of Study**

Although this study has highlighted a number of important findings in relation to participants’ climate change views, there are also several findings that could be strengthened with further research. First and foremost, further research could determine if the awareness and concern for climate change reflected in this sample of Saskatoon adolescents is representative of Saskatoon teens more generally. Similarly, future research would be needed to verify the prevalence of pro-environmental and egalitarian values among Saskatoon teens and their potential influence on adolescent climate change views. Finally, additional research would be needed to determine if adolescents’ psychological distance from climate change is as pervasive as this study suggests.

In addition to validating findings, future research could explore several areas that could not be sufficiently addressed within the scope of this study. Although this study has highlighted several psychological factors as being influential to participants’ sense making about climate change, future studies could explore the effects that negative emotions, coping mechanisms, and
perceptions of self efficacy have on adolescents’ climate change views in more detail. Since psychological distance figured prominently in these results, further investigating the impact that psychological distance has on adolescents’ concern and engagement with climate change may also be important. Similarly, adolescent apathy towards politics in general was a prevalent theme throughout the interviews. Since adults’ perceptions of climate change are intimately tied to political views and values (Wolf & Moser, 2011), further research could help us to understand the roots of adolescent political apathy and determine if Saskatoon adolescents are experiencing feelings of “social powerlessness” as previous research has intimated (Ojala, 2015a).

Finally, using alternative methodological approaches in future research could further illuminate the factors influencing adolescent’s climate change perspectives. Existing research clearly demonstrates that for adults and teens alike, one’s climate change views are influenced by the larger socio-political context in which they live (Corner et al., 2015; Wolf and Moser, 2011). However, it was difficult to assess the extent of socio-political influences on participants’ climate change views from a single interview and without a basis of comparison. Comparative studies, in contrast, could explore the influence of socio-political factors on adolescents’ perspectives by comparing the similarities and differences in climate change views between various adolescent populations (Brinkmann & Kvale, 2015). Findings from comparative studies, in turn, could allow for a greater precision of educational interventions (Wolf and Moser, 2011).
Appendix A

Interview Questions

1. What do you think are some of the main causes of climate change?

2. a) How important do you think it is?
   b) What kind of concerns do you have about climate change?
   c) Do you think it’s something we should be worried about?

3. What do you think are some of the main challenges in dealing with climate change?

4. How confident are you that we will be able to effectively deal with climate change?

5. a) Do you think Saskatchewan is feeling the effects of climate change?
   b) Have you personally felt the effects of climate change?

6. There’s been a lot of news about extreme events like the wildfires in Alberta and BC. Some people think that these forest fires are influenced by climate change. What do you think?

7. a) Who else do you know that thinks the same way you do about climate change?
   b) What do your friends think about climate change?

8. a) Who do you talk to about climate change?
   b) What was the last conversation you had about climate change? What did you talk about?

9. a) Where do you get your information about climate change from?
   b) What do you think are the most reliable sources of information on climate change?
   c) What do you look for when you assessing the reliability? Do you consider the source of the information?

10. What has most influenced your thinking about climate change?

11. There’s been a lot of discussion in Saskatchewan about a carbon tax. Have you heard about it and if so, what are your thoughts?

12. a) How do you think the Saskatchewan and Canadian governments should address climate change?
   b) What role should Saskatchewan play in combatting climate change?
   c) When creating climate change policies what should the Saskatchewan government prioritize?

13. Many people believe that we should lessen our dependency on fossil fuels to fight climate change. Do you agree or disagree? Why?
Appendix B

Recruitment Advertisement

Barriers and Beliefs: How does the socio-political milieu influence adolescents’ understanding and risk perception of climate change

Are you a Grade 11 or 12 student interested in sharing your thoughts about climate change?

My name is Kerry Anderson with the College of Education at the University of Saskatchewan. I teach high school science with Saskatoon Public Schools and am completing a Master’s in the Department of Educational Foundations.

Purpose of this research

I am conducting research on teens’ perceptions of climate change. There has been very little research on how teens understand climate change and its impacts on the environment and society, but this is an important area to study because teens will engage in political and social decision making when enter into adulthood. This research, therefore, will help teachers understand how students make sense of climate change, so that they can design their instruction to better address students understanding, concerns and attitudes towards climate change.

I would like to ask you to participate in a 30-minute (maximum 1-hour) interview. There is also a voluntary follow up focus group interview of approximately 30 minutes. You are not obligated to participate in the focus group, even if you participate in the interview. If you are interested, please contact me at the email address below.

Participation is completely voluntary and research participants can withdraw from the study at any time.

Any information you are willing to provide will be much appreciated.

Sincerely,

Kerry Anderson

Email: kaa946@mail.usask.ca

Research Ethics

- This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board.

- You may also contact the primary researcher: Dr. Orlowski at paul.orlowski@usask.ca or 306-966-1350
Appendix C

Department of Educational Foundations

Participant Consent Form

You are invited to participate in a research study entitled: Barriers and Beliefs: How does the socio-political milieu influence adolescents’ understanding and risk perception of climate change

Researcher(s):
Kerry Anderson
Graduate Student
Department of Educational Foundations, University of Saskatchewan
Phone: (306) 966-1350
Email: kaa946@mail.usask.ca

Supervisor:
Dr. Paul Orlowski (Associate Professor)
Department of Educational Foundations, University of Saskatchewan
Phone: (306) 966-1350
Email: paul.orlowski@usask.ca

Purpose(s) and Objective(s) of the Research:
The purpose of this study is to explore how teens make sense of climate change, what they are most concerned about and what influences their concerns.

Procedures:
• You will be asked to participate in a 30-minute interview (maximum 1 hour) about your thoughts on climate change.
• There will be a follow up focus group interview, approximately 30 mins in length, in which you are invited to participate without obligation.
• The interviews will be recorded and transcribed.
• The recording will not be shared with anyone outside of the researcher. After a period of 5 years, the recording and transcript will be deleted.

Please feel free to ask any questions regarding the procedures and goals of the study or your role at any time.
Potential Risks:

- There are no known or anticipated risks to you by participating in this research. You will not be evaluated according to your responses, nor will your answers be shared with anyone, including your teachers.
- At the end of the interview, you can indicate whether or not you wish to receive a copy of the final report.
- Talking about climate change may be distressing for some people. The following is a list of resources and people you can access if you are feeling any distress regarding the content of the interview:
  - Kid’s Help Phone: https://kidshelpphone.ca/ or 1-800-668-6868
  - Saskatoon Health Region Youth Services: 306-655-4900
- You can withdraw from this research at any time.

Potential Benefits:

- There has been very little research on how teens understand climate change and its impacts on the environment and society, but this is an important area to study because teens will engage in political and social decision making when enter into adulthood. This research, therefore, will help educators understand how students make sense of climate change, so that they can design their instruction to better address students understanding, concerns and attitudes towards climate change.

Confidentiality:

- Your name will not appear in any of the published information, nor will any information that may identify you in any way (e.g. your school’s name). I will use pseudonyms when quoting or referring to specific individuals. Only Dr. Orlowski and I will know the real names and personal contact information of specific participants involved in this study.

Storage of Data:

- The interview transcriptions will be stored on University of Saskatchewan servers for a period of 5 years as per research ethics guidelines.
- All consent forms will be stored in a locked filing cabinet and kept separate from the digital transcriptions.
- At the end of 5 years, the data will be deleted using the most current tools available for doing so at the time and the consent forms will be shredded.

Right to Withdraw:

- Your participation is voluntary and you can answer only those questions that you are comfortable with. You may withdraw from the research project for any reason, at any time without explanation or penalty.
- Whether you choose to participate or not will have no effect on your grades or how you will be treated.
- Should you wish to withdraw, you can contact me and I will remove your survey and interview data from the database.
• Your right to withdraw data from the study will apply until the data analysis has been completed. After this date, it may not be possible to withdraw your data.

Follow up:
• To obtain results from the study, please email me and I will provide you with a digital copy of the final paper.

Questions or Concerns:
• Contact the researcher(s) using the information at the top of page 1;
• This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

Continued or On-going Consent:
• There may be times when I will need to clarify ideas in the initial interviews and may consult you for clarification during the focus group. If this is needed, I will ask you for verbal consent to use the most recent responses.

SIGNED CONSENT
Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

______________________________      _______________________
Name of Participant                  Signature                  Date

______________________________      _______________________
Researcher’s Signature                Date

A copy of this consent will be left with you, and a copy will be taken by the researcher.

______________________________      _______________________
Name of Participant                  Researcher’s Signature    Date
References


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