Title: Citizen perceptions of fracking: The risks and opportunities of natural gas development in Canada

Authors:

Christopher D. O’Connor
Assistant Professor
Faculty of Social Science and Humanities
University of Ontario Institute of Technology (UOIT)
2000 Simcoe Street North
Oshawa, ON L1H 7K4
Email: Christopher.O'Connor@uoit.ca; christopher.oconnor1@uoit.net
Phone: 905-721-8668 ext. 5882

Kaitlin Fredericks
Ph.D. Student - Criminology and Social Justice
Faculty of Social Science and Humanities
University of Ontario Institute of Technology (UOIT)
2000 Simcoe Street North
Oshawa, ON L1H 7K4
Email: kaitlin.fredericks@uoit.ca

Keywords: Fracking, hydraulic fracturing, public perceptions, natural gas

Acknowledgements: This research was supported by the Social Sciences and Humanities Research Council of Canada.

© 2018. This manuscript version is made available under the CC-BY-NC-ND 4.0 license http://creativecommons.org/licenses/by-nc-nd/4.0/

Published article available: https://doi.org/10.1016/j.erss.2018.03.005
Abstract:

The extraction of oil and gas has increasingly shaped Canada’s economy and culture in recent years. As Canada attempts to move toward a low carbon economy, it is important to know how Canadians perceive the risks and opportunities associated with various energy sources. In particular, fracking, or hydraulic fracturing, is one such energy extraction technique that has received much media attention but little systematic research from social scientists in Canada. Drawing on survey data from a representative sample of citizens in a province that has utilized fracking extensively (British Columbia) and one that has placed a moratorium on its use (New Brunswick), this article examines public perceptions of the use of hydraulic fracturing. In particular, this paper explores the risks and opportunities people perceive from this technology in these different provincial energy contexts. The findings suggest that while New Brunswick residents saw more benefits and fewer risks from fracking than British Columbia residents, the variables shaping perceptions within each province were mostly similar. We argue that contemporary risk theorizing should more closely consider how people perceive opportunities associated with the use of this disruptive technology as well as how context shapes people’s perceptions.

Keywords: Fracking, hydraulic fracturing, public perceptions, natural gas
1. Introduction

Hydraulic fracturing, commonly known as ‘fracking’, is a method of unconventional oil and natural gas extraction (Davis & Fisk, 2014; Evensen et al., 2014; Pallise, 2012; Schafft & Biddle, 2015). The use of this technique has recently attracted much controversy and media attention due to the potential economic benefits and risks associated with its use (Ashmoore et al. 2016; Davis & Fisk, 2014; Habib & Hinjosa, 2016; Jaspal & Nerlich, 2014; Olive, 2016; Vasi et al., 2015). In Canada, hydraulic fracturing (HF) has been utilized primarily in the western provinces while moratoriums have been put in place in many of the eastern provinces of the country. Despite this, there has been little social science research conducted on how people in Canada perceive the issue or on the social impacts associated with its use.

Understanding public perceptions of HF within Canada and elsewhere is important for several reasons. First, Canada holds substantial natural gas reserves and, in comparison to other countries, ranks fifth in terms of natural gas production (Natural Resources Canada, 2016). While studies suggest that much of the world’s fossil fuel deposits must stay in the ground if we are to limit the earth’s warming to two degrees Celsius (McGlade & Ekins, 2015), it is still unclear whether the public will truly support such an endeavour. Second, as the findings from other countries suggest, the development of natural gas deposits is likely to hinge on, or at minimum be impacted by, public perceptions of fossil fuel use (Boudet et al., 2014). In particular, Canada’s heavy reliance on fossil fuels for economic growth in recent years raises questions about how seriously it will take on the issue of reorienting Canada’s economy toward less carbon intensive industries. It is likely that Canada’s move towards a less carbon intensive
economy will at least in part depend on public perceptions of the issue (Thomas et al., 2017). Finally, although there are similarities found in how the public perceives the development of shale gas, researchers have also highlighted important differences found both across and within countries (Alcorn et al., 2017; Evensen & Stedman, 2017; Stedman et al., 2016). While similarities and differences will be discussed below, these differences in public perceptions suggest that findings in one location do not easily translate into different places due to disparate histories, cultures, and economies (Ashmoore et al., 2016).

Therefore, this article adds to the literature by providing an understanding of public perceptions of HF within the Canadian context. This paper builds on research that highlights the importance of considering place and context when examining people’s perceptions of shale gas development (e.g., Ashmoore et al., 2016). Our research set out to gain a better understanding of people’s perceptions of HF as well as the variables that shaped these perceptions in a province that had utilized this technology extensively (British Columbia) and in one that had a moratorium on HF (New Brunswick). More specifically, our research questions were:

RQ1: Are there differences in how people perceive the impacts of fracking in two different provincial energy contexts (i.e., New Brunswick (NB) with a moratorium and British Columbia (BC) without one)?

RQ2: What shapes people’s attitudes toward fracking in each of these provinces?

The decision to conduct a within country comparison was guided in part by Ashmoore et al.’s (2016: 122) argument that comparisons “within the same nation could be more
useful in some ways than comparisons across nations, due to the cultural baseline across which to compare similarities and differences.”

In what follows, we first discuss the process of HF in more depth and situate its use in Canada in relation to other countries. The reasoning for comparing public perceptions in New Brunswick and British Columbia is also addressed, as is the energy contexts in both provinces. Second, drawing on theorizing on risk society, we discuss the risks and opportunities associated with the use of HF. We also examine the research that has been completed thus far on people’s perceptions toward HF and what helps to shape these perceptions. Fourth, the methods section discusses the survey instrument utilized to examine people’s perceptions. Finally, the findings and discussion sections are organized around the key differences and similarities found between BC and NB residents’ perceptions.

More specifically, this article considers public perceptions of opportunities alongside people’s perceptions of risks. We argue that risk theorizing could be enhanced by also incorporating people’s reflexive understandings of opportunities associated with disruptive technologies, not just risks. Perceptions of opportunities, as well as risks, are especially important to consider in relation to local contexts and a range of socio-demographic variables. As will be discussed in more depth in the next section, public understandings of HF appear to be filtered through multiple complex factors.

2. The Fracking Process and Shale Gas Development

Over time, and with the development of new technologies, the term HF has come to encompass a wide range of activities and processes used to access, drill, extract, and transport gas, oil, and waste disposal (Evensen et al., 2014; Engelder, 2011). However,
Evensen et al. (2014) state that fracking has become the most commonly used word to describe natural gas extraction from shale deposits. The process of HF essentially creates fractures in rock formations to facilitate the flow of natural gas (Pallise, 2012). Furthermore, the process involves drilling vertical wells deep into land surface, then drilling horizontally into subsurface (Clary, 2015; Merrill, 2013; Pallise, 2012; Schafft et al., 2013; Schafft & Biddle, 2015). During this process, water, sand, and various chemicals are forced at high pressures to create fractures in energy-bearing rock formations, where the trapped hydrocarbons flow through the fractures and are recovered at the surface (Clary, 2015; Engelder, 2011; Evensen et al., 2014; Olive, 2016). These fluids are then forced back to the surface through the internal pressure of the rock formations (Clary, 2015). The used injection fluids, or ‘flowback’, can be recycled off-site, but are usually injected into the subsurface through a deep-injection well for disposal (Clary, 2015; Pallise, 2012). Typically, the additives associated with HF can be toxic or carcinogenic (Engelder, 2011; Habib & Hinojosa, 2016; Schafft et al., 2013).

2.1. The Canadian Context

In Canada, natural resource extraction has always played a prominent role in shaping the country’s identity, economy, and culture. For example, single-industry resource communities or boomtowns have been prominent across Canada’s vast landscape (Lucas, 2008). However, in recent years, increasing oil and gas extraction, led predominantly by the extraction of oilsands in northern Alberta, has played a particularly important role in helping to make Canada a petro-state. The increasing use of HF to extract natural gas has also contributed to this.
In comparison to other countries, Canada’s experiences with resource extraction arguably best compares to that of Australia. Both countries export large amounts of natural resources to much larger markets that control purchases (i.e., the US for Canada and China for Australia) (Australian Government, 2015; Northern Gateway, 2015; O’Kane, 2017). Further, ownership of resources in each country is vested in the crown. Mainly, it is the provinces/states that manage mining and resource development in both countries (Evensen & Stedman, 2017; Geoscience Australia, 2015). Whereas, in the United States resources are managed by each state, but individual land owners retain much of the rights over resources (Evensen & Stedman, 2017). In comparison, while countries within the European Union have various levels of regulation, resources are mostly managed across nations or at the country level (Fleming & Reins, 2016).

In terms of shale gas development utilizing HF, the United States and Canada lead the way in comparison to other locales (Thomas et al., 2017). However, Australia is readily increasing its capacity to extract unconventional gas (Bec et al., 2016; de Rijke, 2013; Espig & de Rijke, 2016). In Europe, the development of shale gas has been slow to non-existent, despite substantial available reserves (Bomberg, 2017).

2.2. Comparing British Columbia and New Brunswick

British Columbia and New Brunswick were chosen as the focus of this research for several reasons. First, these two locations allowed for a comparison of public perceptions between a province that has actively embraced HF (i.e., BC) and one that initially embraced it and had several active wells but then placed a moratorium on its use in 2014 until the risks could be examined further (i.e., NB). Second, these two provinces have a long history of oil and gas exploration and development. Thus, comparing these
two provinces helps to control for the impacts of oil and gas exploration being something novel to provincial residents. Finally, both provinces have experienced protests and controversies over HF development and potential environmental damage. In this section, we provide more context on each of the provinces.

British Columbia is Canada’s third largest province with a population of approximately 4.6 million people in 2016 (Statistics Canada, 2017a). Roughly half of British Columbians reside in the urban Vancouver area with the remainder of the population residing in substantially smaller cities or rural communities (Government of British Columbia, 2016). This leaves nearly two-thirds of the province covered in forest (60 million hectares) (Ministry of Sustainable Resource Management, 2003). Much of the shale gas development in BC occurs in the northeast portion (e.g., Montney Basin Shale) of the province. In approximately 2005, this area began producing some of the first shale gas in Canada, and by 2012, close to 1100 wells had been drilled throughout the country. However, most of these wells were drilled in BC, and to a lesser extent, Alberta (Rivard et al., 2014). In total, BC’s reserves are estimated to contain 349 trillion cubic feet of natural gas making it the second largest provincial producer of natural gas in Canada (CAPP, 2017a).

New Brunswick’s population in 2016 was approximately 747,000 people, making it Canada’s eighth largest province (Statistics Canada, 2017b). From 2011 to 2016, NB was Canada’s only province to see negative population growth. New Brunswick’s three largest urban areas (Moncton, Saint John, and Fredericton) all have populations under 100,000 people (CBC News, 2017). The remainder of NB is covered by a series of smaller communities, rural landscapes, and forests (6 million hectares) (CBC News,
New Brunswick’s shale reserves are mostly located in the southeastern portion of the province (e.g., Frederick Brook Shale) (Rivard et al. 2014). In total, NB’s reserves are estimated to contain 78 trillion cubic feet of natural gas (CAPP, 2017b). Throughout the 2000s, several new oil and gas wells were drilled across the province. However, in total there were less than 100 wells drilled and only a small proportion of these involved HF. Despite this, a moratorium was put in place in 2014 due to public concerns and protests over the use of this technology (Council of Canadian Academies, 2014; New Brunswick Department of Health, 2012; O’Brien and Hipel, 2016). The moratorium has essentially prevented further development of natural gas in NB.

Given these contexts, it was expected that there would be differences in how the public perceive HF in each of the provinces. Further, research that has made comparisons between locations at the state level in the United States has found public perceptions of HF were more favourable in states that had embraced HF (e.g., Pennsylvania) as a matter of public policy than those states that did not (e.g., New York) (Borick et al. 2014; Brasier et al. 2013; Stedman et al. 2012). Thus, it was expected that public perceptions would align with public policy:

*H1: British Columbians will hold more pro-fracking views than New Brunswickers.*

### 3. The Risks and Opportunities of Fracking

Broadly, the literature on HF frequently discusses the opportunities and risks associated with this method (Boudet et al, 2014; Clary, 2015; Council of Canadian Academies, 2014; Davis & Fisk, 2014; Kreuze et al., 2016; Olive, 2016). On the one hand, there is an argument to be made for the economic growth and development that can
occur as a result of its use (Boudet et al., 2016; Ladd, 2014; Jaspal & Nerlich, 2014; Olive, 2016; Pallise, 2012). The main attraction to HF is that it creates a number of much-needed jobs in areas where employment may otherwise be scarce (Boudet et al., 2014; Schafft & Biddle, 2015). Proponents also claim that more shale development can help lead to energy sustainability and independence in a given area (Ladd, 2014; Olive, 2016). Further, it is believed that it can help to alleviate global warming if utilized to replace more carbon intensive fuels (Engelder, 2011; Jaspal & Nerlich, 2014; Sovacool 2014).

Alternatively, opposition to HF focuses largely on environmental risk, calling attention to various issues with water demand and quality as well as damage to wildlife and landscapes (Howarth and Ingraffea, 2011; Merrill, 2013; Olive, 2016; Pallise, 2012; Sovacool 2014; Vasi et al., 2015). Public health, earthquakes, economic loss, and a hidden carbon footprint are also concerns when considering the impacts of shale gas development (Habib & Hinojosa, 2016; Ladd, 2014; Pallise, 2012; Sovacool 2014). Additionally, the boomtown effects or quality of life issues that accompany rapid shale developments (e.g., noise and traffic) are also key considerations for people opposing HF (Anderson & Theodori, 2009; Council of Canadian Academies, 2014).

As Sovacool (2014: 249) notes, these positive and negative impacts provide “policymakers, planners, and investors with a series of pernicious trade-offs and tough choices.” In order to better understand public perceptions of “trade-offs and tough choices”, this article draws on contemporary theorizing on risk. Risk theorizing argues that the contemporary era should be considered a risk culture (Giddens, 1990) or risk society (Beck, 1992). In contemporary society, events are no longer explained by fate and
confined locally, but instead are increasingly characterized by risk calculation, risk management, and global impact (e.g., climate change). This risk society is a society that is in constant change/flux, reflects on and critiques itself, and is preoccupied by all things risk. More specifically, late modern society is focused on addressing “manufactured risks” (Giddens & Pierson, 1998: 104) of our own making (e.g., species extinction). As Ladd (2016: 29-30) argues, “the major risks of post-industrial society are no longer naturally occurring hazards and external events beyond human control but are now largely a function of complex technologies and deliberate human decisions made by unaccountable elites.” Thus, a technology such as HF could be considered a “manufactured risk”.

Given the focus of this article is on public perceptions, risk is conceived as the subjective potential for harm rather than a measure of objective danger (Brogan, 2017; Espig & Rijke, 2016). This article adds to the literature that has found that people’s understandings of risks and opportunities tend to vary by location and context (Alcorn et al., 2017; Anderson & Theodori, 2009; Council of Canadian Academies, 2014; Choma et al., 2016; Kreuze et al. 2016), lending reason to our choice of comparing perceptions in BC and NB. In this paper, we extend risk theorizing on contemporary times by arguing that greater attention must be paid to people’s perceptions of opportunities in relation to risks, as well as the social context shaping perceptions.

3.1. Public Perceptions of Fracking

Understanding public perceptions of HF is important as the public are often directly impacted by the positive and negative repercussions of this type of extraction method. Also, determining and appreciating the perspectives of those affected by shale
gas development can help encourage critical discussion on the issue (Poole & Hudgins, 2014). Often, the consideration of public perceptions elucidates a divided debate with a number of factors shaping differing perceptions (Davis & Fisk, 2014; Ladd, 2014; Poole & Hudgins, 2014). This section provides a more in-depth examination of the variables shaping support and opposition to HF.

In terms of support for HF, males and those who hold conservative ideologies are consistently more likely to consider the use of this technique advantageous (Boudet et al., 2014; Davis & Fisk, 2014; Sarge et al. 2015). For example, Choma et al. (2016) found that individuals with conservative ideologies were less likely to deem HF as risky and more willing to live near HF sites. Similarly, Davis and Fisk (2014) found that in the United States, those who held pro-environmental attitudes and identified closely with Democratic Party (liberal) ideologies were more likely to oppose this technology. Conversely, women were more likely than men to oppose its use and valued more regulation and disclosure rules around the use of this extraction technique (Boudet et al., 2014; Davis & Fisk, 2014; Sarge et al. 2015). Therefore, similar findings were expected in Canada:

**H2:** Those holding a conservative ideology will have a more favourable view of fracking than those holding a liberal ideology.

**H3:** Women will hold a more negative view of hydraulic fracturing in comparison to men.

The impact of several other factors on people’s perceptions of HF remain less clear in the literature. For example, in terms of residential location, Davis and Fisk (2014) found that people living in rural areas held slightly more favourable opinions than their urban counterparts as the economic opportunities and job availability may be more
favoured by rural residents. Similarly, Boudet et al. (2016) found that increased support was linked to having ties locally (e.g., employment) to oil and gas development. However, Schafft and Biddle (2015) note that rural residents often hold negative views due to a diminished quality of life that comes with increased oil and gas activity (e.g., changes to the natural environment).

Additionally, education, income, and age, although rarely examined thus far in the literature, show a similar uncertainty in terms of their impact on perceptions. For example, Boudet et al. (2014) found that people with some degree of formal education were more likely to support HF, while Brasier et al. (2013) found that those with a higher income perceived fewer risks. Alternatively, Sarge et al. (2015) found that these two variables did not have a significant impact on people’s perceptions. Whereas Boudet et al. (2014) found that those older in age were more likely to support HF, Wright et al. (2016) found that older people demonstrated a more well-rounded recognition of both the risks and opportunities associated with its use.

Similarly, it is also somewhat unclear as to how familiarity with HF impacts public perceptions. For example, Boudet et al. (2014) report that a majority of individuals in their study had previously heard little to nothing about the topic. The individuals who had heard of HF were largely undecided on whether or not they supported or opposed its use (Boudet et al., 2014). Also, some of the information about HF is widely misunderstood by, or miscommunicated to, the community and public stakeholders, potentially altering people’s opinions (Choma et al., 2016; Council of Canadian Academies, 2014; Evensen et al., 2014; Ladd, 2014). Along with this, public trust in the source providing information on HF (e.g., newspapers) and those overseeing shale
developments are both important in shaping public attitudes (Choma et al., 2016; Council of Canadian Academies, 2014).

In summary, while the aforementioned factors have been found to shape public perceptions of HF, different values, beliefs, and capacities also inform how individuals weigh the costs and benefits of HF (Davis & Fisk, 2014; Weible & Heikkila 2016). That is, public perceptions of HF may inevitably be impacted by a number of interrelated factors and variables including socio-demographic variables as well as perceptions of the environment, economy, social/local context, previous experiences, and risk perceptions (Boudet et al., 2014).

Given this ambiguity in the literature, the remaining variables examined in this article do not predict the direction of the hypothesis but are expected to have an impact on people’s perceptions of HF. Therefore, this article should be considered exploratory. The forthcoming hypotheses have been developed from previous research completed on this issue and further include variables that have not been explored previously within the Canadian context:

**H4:** The age of the respondent is expected to shape people’s perceptions.

**H5:** Whether the person resides in an urban, suburban, or rural area, is expected to shape people’s perceptions.

**H6:** Household income is expected to shape people’s perceptions.

**H7:** Employment status is expected to shape people’s perceptions.

**H8:** Marital status is expected to shape people’s perceptions.

**H9:** Education level is expected to shape people’s perceptions.

**H10:** Race/ethnicity is expected to shape people’s perceptions.
H11: How the respondent learns about energy issues is expected to shape people’s perceptions.

H12: Municipal voting record is expected to shape people’s perceptions.

H13: Top of mind thought regarding fracking is expected to shape people’s perceptions.

H14: Familiarity with fracking is expected to shape people’s perceptions.

4. Methods

The data for this paper were collected in October 2016 from a sample of British Columbia and New Brunswick residents aged 18 and older. Before administering the online survey, representative quotas were set in terms of the sex and age of Canadians, as well as for each of the regions within both provinces. With these quotas in place, the survey was distributed to the Asking Canadians panel requesting participants. Once the required number of participants completed the survey for each quota, participants were disqualified from completing the survey. A total of 1713 participants were disqualified from completing this survey. Of this total, 1309 were disqualified because the set quota had been met, and a further 404 were below the age of 18 or not from either NB or BC. Once the quotas were met for both provinces, the survey was closed to further participants.

The online survey took participants approximately 15-20 minutes to complete and asked questions pertaining to people’s attitudes toward HF as well as a variety of energy related topics. In total, 1004 people completed the survey in British Columbia and 1000 people completed it in New Brunswick. Of the total survey invites deployed, 32.8% clicked on the survey link (response rate) and 83.7% of those people completed the survey (completion rate). The key limitation of this approach is that the sample obtained
was not random. Given that people opt into participating in the panel, this could skew the results. However, the benefits include the ease of use for participants, that useable data is quickly generated, and that the costs are low relative to phone or mail surveys.

4.1. Operationalization, Measurement, and Data Analysis

Two dependent variables for this article were created from a series of 16 questions asking respondents to rate their level of agreement with a variety of statements pertaining to HF. The factor analysis performed on these items provided strong evidence that these statements were capturing two different dimensions of attitudes toward HF. That is, the first factor, economic attitudes/benefits of HF, had an eigenvalue of 5.45 while the second factor, environmental attitudes/risks of HF, had an eigenvalue of 4.60. The factor loadings for each of the survey items equaled or exceeded .600. Table 1 provides a descriptive summary for each item in the two factors along with its factor loadings. Based off of the factor analysis, two new scale variables were created that added each of the items in the survey so that respondents obtained a score between 8 (low benefit or risk) and 40 (high benefit or risk). Given the high Cronbach’s alpha for the economic attitudes/benefits of HF ($\alpha = .922$, mean=25.41, SD=6.53) and the environmental attitudes/risks of HF ($\alpha = .889$, mean=29.88, SD=6.06) variables, both scales were considered reliable measures. OLS regression was utilized to determine what variables shape attitudes toward HF in each of the provinces. An independent samples t-test was also performed to examine differences between the provinces on each of the scales. Descriptions of the independent variables utilized in the analyses performed on the two dependent variables as well as how each variable was coded are presented in Table 2.
Given the limited amount of research that has been completed on people’s attitudes toward HF within the Canadian context, this article is exploratory but builds off of research that has been completed in other countries (i.e., mostly the US, UK, and Australia). While some comparisons have been completed between US states (e.g., New York, Pennsylvania, Ohio) (Ashmoore et al., 2016) and between nations (e.g., US and European Union countries) (Bomberg 2017), comparisons are still methodologically rare within the Canadian context. The following section outlines the findings from our comparison of public perceptions in BC and NB.

***Insert Table 1 about here***

***Insert Table 2 about here***

5. Findings

The results of the independent samples t-test found that there was a significant difference between British Columbia and New Brunswick residents in terms of both their perceptions of the benefits (p=.010) and risks (p=.013) associated with HF. More specifically, New Brunswick residents perceived more benefits (mean=25.79, SD=6.93) from its use than British Columbia residents (mean=25.03, SD=6.09). In terms of risks, British Columbians perceived more risks from HF (mean=30.22, SD=5.63) than New Brunswickers (mean=29.54, SD=6.44). This provides evidence that there were differences between how residents perceive HF in these provinces with two different energy contexts. In order to determine more specifically what shapes people’s perceptions, OLS regressions were performed on both dependent variables (i.e., the economic attitudes/benefits and environmental/risks scales) for each of the provinces. Table 3 presents the results from these OLS regressions.
Examining the effects of the independent variables on the economic attitudes and benefits scale for British Columbia, we found that these variables explained 22.7% (adjusted $r^2=.277$) of the variation in the dependent variable. However, the only significant variables were respondent’s sex, household income, political orientation conservative, all of the top of mind variables, and being very familiar with HF. More specifically, examining the unstandardized coefficients in Table 3, it was found that males rated the benefits of HF .925 times higher than females. Further, for every unit increase in income, people’s perceptions of the benefits of HF increased by .433 units, controlling for all the other variables in the model. Similarly, those who stated they were politically conservative rated the benefits of HF 2.193 times higher in comparison to moderates. Respondents who stated the first thing to come to mind when they thought about HF was the extraction process or that it was a good thing also rated the benefits higher (2.276 and 9.021 times higher respectively) than those who needed more information or were unsure. Alternatively, respondents who stated that concerns was the first thing to come to mind when they thought about HF rated the benefits lower (1.764 times lower) in comparison to those who needed more information on, or were unsure about, HF. Finally, those who stated that they were very familiar with HF rated the benefits 3.532 times lower than those who were not at all familiar with this technology.

For New Brunswick, the independent variables in the model explained 28.5% (adjusted $r^2=.285$) of the variation in the economic attitudes and benefits scale. For the most part, the same variables that were significant for British Columbia were significant for New Brunswick. The only exceptions for New Brunswick being that the variable
location urban was significant whereas the top of mind extraction variable was not significant. More specifically, it was found that males rated the benefits 1.115 times higher than females, while those living in an urban area rated the benefits 1.240 times higher than their rural counterparts, controlling for all other variables in the model. Further, for every unit increase in income, people’s perceptions of the benefits of HF increased by .850 units. As in BC, those with a conservative political ideology and those whose top of mind thought was that HF is a good thing rated the benefits higher than their respective counterparts (i.e., 2.651 times higher than moderates and 6.305 times higher than those who needed more information or were unsure about HF). Alternatively, those who expressed concerns as the first thing to come to mind when they thought of HF rated the benefits of HF 2.342 times lower than those who needed more information or were unsure. Similarly, those very familiar with HF rated the benefits 2.517 times lower than those who were not at all familiar with HF.

Examining the standardized coefficients for the significant variables in the BC model, we found that the greatest effect on people’s perceptions of the benefits of HF was if the first thing to come to mind was that HF is a good thing (.244) followed by being very familiar with HF (-.180), the person’s top of mind thought being extraction (.152), being politically conservative (.141), their top of mind thought being concerns (-.136), household income (.108), and a person’s sex (.072). Alternatively, in New Brunswick the variables with the greatest effect on people’s perceptions of the benefits was having the first thing to come to mind about HF being that it is a good thing (.291), household income (.198), having the first thing to come to mind about HF being concerns (-.160),
being politically conservative (.150), being very familiar with HF (-.112), living in an urban area (.084), and a person’s sex (.079).

Turning to the results for the dependent variable environmental attitudes and risks of HF, it was found that in British Columbia the model explained 38.2% (adjusted \( r^2 = .382 \)) of the variation in the dependent variable. Significant variables included a person’s sex, household income, being politically conservative as well as liberal, having a top of mind thought being concerns about HF as well as it being a good thing, and being very familiar and somewhat familiar with this technology. More specifically, males rated the risks .828 times lower than females, controlling for all other variables in the model. For every unit increase in income, people’s perceptions of the risks of HF decreased by .281 units. Similarly, those who were politically conservative rated the risks lower (1.600 times) than moderates whereas liberals rated the risks higher (1.545 times) in comparison. Additionally, those who expressed concerns as the first thing to come to mind when they thought about HF rated the risks higher (4.535 times) than those who needed more information or were unsure about this technology, while those whose first thought was that HF is a good thing rated the risks lower (6.753 times) in comparison. Finally, respondents very familiar with HF and somewhat familiar rated these risks higher than those not at all familiar with HF (2.658 and 1.433 times respectively), controlling for all the other variables in the model.

Examining the effects of the independent variables on the environmental attitudes and risks of HF scale for New Brunswick, the model explained 33.6% (adjusted \( r^2 = .336 \)) of the variation in the dependent variable. Similarly to the previous examination of the economic attitudes and benefits scale, for the most part the same variables that were
significant for British Columbia were significant for New Brunswick. The only exception
for New Brunswick was that household income was not significant. More specifically,
controlling for all of the other variables in the model, males rated the risks 1.523 times
lower than females. Similarly, respondents who stated that they were politically
conservative rated the risks 1.302 times lower than those who were politically moderate,
whereas those who were politically liberal rated the risks 1.089 times higher.
Respondents whose top of mind thought about HF was concerns rated the risks 4.645
times higher than those who needed more information or were unsure about this
technology, while those who thought it was a good thing rated the risks 4.790 times
lower. Finally, those very familiar and somewhat familiar with HF rated the risks higher
(2.932 and 1.971 times respectively) than those not at all familiar with this technology.

Examining the standardized coefficients for the significant variables in the BC
model, we found that the greatest effect on people’s perceptions of the risks of HF was if
the first thing to come to mind was concerns (.390). This was followed by the top of mind
thought being that HF is a good thing (-.205), being very familiar with HF (.151), being
politically liberal (.129), being somewhat familiar with HF (.125), being politically
conservative (-.115), sex (-.072), and household income (-.078). In NB, the variable that
had the greatest impact on the dependent variable was having the first thing to come to
mind about HF being concerns (.338). This was followed by having the first thing to
come to mind about HF being that it was a good thing (-.235), being somewhat familiar
with HF (.149), being very familiar with HF (.139), sex (-.116), being politically liberal
(.081), and being politically conservative (-.079).

6. Discussion
While it was expected that British Columbians would hold more pro-HF views than New Brunswickers given each province’s policy stance on HF, this was not supported by the findings (H1 not supported). Despite the moratorium in NB, residents perceived more benefits and less risks from HF than BC residents. It was expected that the moratorium would heighten negative perceptions but it appears to have done the opposite. In attempting to explain this finding, we theorize that it is likely the economic context that has helped to shape people’s perceptions of HF in each of these provinces. For example, at the time of the survey, New Brunswick’s economy was struggling (e.g., 10% unemployment rate, 3rd highest in Canada) while British Columbia’s economy was much healthier (e.g., 6.2% unemployment rate, lowest in Canada) (Statistics Canada 2016). Within these particular contexts, the greater risk for NB would have been to not utilize HF. In other words, not utilizing this technology was likely considered a missed opportunity to create jobs and potentially attract and keep young people in a province with negative population growth. Having a relatively healthy economy likely allowed British Columbians to become more reflexive on risks rather than opportunities. This theorization could be tested in future research by examining whether local level unemployment rates impact people’s perceptions of HF. Unfortunately, the lack of municipal identifying information for participants in our dataset prevented us from examining this further. Overall, the answer to RQ1 is that yes, there are differences in how people perceive the impacts of fracking in these two different provincial energy contexts.

It also appears as though public perceptions of HF has had little impact on governments pursuing this technology in these two provinces. This raises questions about
how these decisions are being made in Canada. Our findings also suggest that the public’s impact on shaping policies in Canada might differ from that of other countries. For example, Bomberg (2017) attributed the widespread use of HF in the US to its favourable reception from the public. Whereas, Europe’s infrequent use of this technology was attributed to public backlash. While only limited to two Canadian provinces, our research suggests little public influence on public policy. This is in line with Whitton et al.’s (2017) finding that the public had little direct influence on policies regulating shale gas development in the UK and US. Therefore, future research should examine how these policies were crafted in Canada and whose voices (e.g., experts, scientists, lobby groups, citizen groups) influenced these policies.

Turning to the variables shaping economic attitudes/benefits and environmental attitudes/risks and answering RQ2, the findings showed much consistency between both provinces. More specifically, the top of mind measures were strong predictors of people’s attitudes (H13 supported). That is, if the first thing to come to mind about HF was that it was a concern, participants perceived more risks and less benefits. Whereas, if the first thing to come to mind was that HF was a good thing, participants perceived less risks and more benefits. Further, if the top of mind thought about HF was the extraction process, this helped predict people’s perceptions of the benefits in BC but this was not the case in NB. Similarly to what Evensen et al. (2014) found, this suggests that the term fracking evokes a strong emotional response in people and polarizes the debate. Holding a conservative ideology (perceiving more benefits and less risks) or a liberal ideology (perceiving more risks) was found to strongly shape people’s perceptions in both provinces (H2 supported), which is consistent with the literature (Boudet et al. 2014;
Choma et al. 2016; Davis and Fisk 2014). Similarly, women perceived more risks and less benefits of HF than men (H3 supported), which is also consistent with the literature (Boudet et al., 2014; Davis & Fisk, 2014; Sarge et al. 2015).

Familiarity with HF also impacted people’s perceptions in both provinces. Interestingly, if respondents claimed to be familiar with HF, they perceived more risks and less benefits (H14 supported). Being very familiar with HF was also a much stronger predictor of the perceived benefits of HF in BC than it was in NB. This raises questions about how exactly respondents learn about HF in each of the provinces (H11 not supported). In particular, did New Brunswickers hold a more favourable view of HF simply because they were less familiar with the issue? Unfortunately, while in this study we controlled for people receiving their information about HF from one source versus multiple sources, it is still unclear from this research and the literature as to how specific types of information shape perceptions of HF. Therefore, more research is needed on how people learn about shale gas development. One key question left to answer for future research is whether people can critically discern information about risks and opportunities presented on shale gas development as well as other types of energy. This is especially important in an age of ‘fake news’ and social media (see Hopke and Simis [2017] for an interesting analysis of HF hashtags on Twitter) and in a risk society where experts are distrusted (Beck 1992).

The remaining significant variables showed less consistent results. This study found that as a person’s income increased, the more benefits they perceived from HF in both provinces. Similarly, the respondents perceived less risks in BC as their income increased but income did not predict perceptions of risk in NB (H6 was mostly
Income was also a much stronger predictor of people’s perceptions of benefits in NB than it was in BC. Further, living in an urban area helped predict NB residents’ perceptions on the economic attitudes/benefits scale (i.e., New Brunswickers perceived more benefits) but this was not the case in BC (H5 mostly not supported). These two variables are worthy of further examination in future studies. The remaining hypotheses examined in this study were not supported (H4, H7, H8, H9, H10, H12). Further, given that the maximum variation explained by any of the models was 38%, it is likely that several additional variables not included in the models explain people’s perceptions of HF in Canada.

These differences in provinces, although somewhat minor, provide support for further comparison between regions within the same country. While this study was the first to examine similarities and differences within regions of Canada, it would be useful to compare other regions within the country to add to these preliminary findings. That is, examining additional regions within Canada that have different histories, and varying levels of oil and gas development, would further help to contextualize how people perceive HF. For example, comparing provinces, such as Alberta with its long history and widespread oil and gas development, to Ontario which has little oil and gas development, to Newfoundland and Labrador which has a moratorium on HF but extensive offshore oil development, could yield more complete understandings of how the public perceives HF. Further, examining similar oil plays across country borders (e.g., Saskatchewan, Canada and North Dakota, US) could further enhance our understandings.

Examining similarities and differences in public perceptions of HF in BC and NB demonstrates that risk theorizing could be enhanced by incorporating people’s reflexivity
on opportunities. That is, it was clear from the findings that it was not just risks that framed people’s perceptions of disruptive technologies in contemporary times but also the potential opportunities associated with technologies such as HF. The social context in which HF perceptions were formed also helped to shape people’s perceptions.

7. Conclusions

In summary, despite different energy contexts, it appears as though for the most part that variables shaping people’s perceptions of HF in British Columbia and New Brunswick were very similar. However, this risk-opportunity perception nexus also appears to at least in part be filtered through the social contexts in which people live as there were differences found (e.g., New Brunswickers perceived more benefits and less risks associated with HF). This finding, and others, point to the importance of considering the locales in which people live when examining public perceptions of this issue. While some consistencies are beginning to emerge across the literature in several countries as to the variables shaping perceptions (e.g. sex, political orientation), the research thus far suggests there are local/contextual variations in perceptions that are shaped by place.

Therefore, while surveying people at the provincial level provides some insight and provides further context to understanding public perceptions in Canada, it is also important that future research continues to be conducted at the micro-level. In particular, public perceptions in communities directly impacted by HF, or with the potential to be directly impacted, need to be more fully examined. More specifically, our understandings on this issue could be greatly enhanced by building off of the important work of several qualitative researchers (e.g., de Rijke 2013; Espig & de Rijke 2016; Rasch & Kohne 2016; Willow et al. 2014). The local context is where the direct HF benefits and risks
play out and yet, we know little about such micro-level impacts in Canada. Inevitably, it will be these experiences and perceptions that will impact future public policies pertaining to shale gas development.

Overall, this article has attempted to add nuance to theorizing on risk in contemporary times. That is, we argue and demonstrate that it is not just risks that prompt/influence reflexivity on HF, it is also the potential opportunities associated with this disruptive technology that shape people’s perceptions. It has also been demonstrated that public perceptions of risks and opportunities must also be understood through the context from which perceptions are formed. Given the importance of locality/context, this article adds an important Canadian contribution to the already existing literature on shale gas development in other countries. These considerations have helped to link macro level risk theorizing to more local/contextual level understandings of risk (i.e., public perceptions).
References


The opposing forces of political conservatism and basic knowledge about fracking. *Global Environmental Change, 38*, 108-117.


Council of Canadian Academies (2014). *Environmental impacts of shale gas extraction in Canada: The expert panel on harnessing science and technology to understand the environmental impacts of shale gas extraction*. Ottawa, ON: Council of Canadian Academies.


gas development in Pennsylvania and local perceptions of risk and opportunity.
*Rural Sociology, 78*(2), 143-166.

Sovacool, B.K. (2014). Cornucopia or curse? Reviewing the costs and benefits of shale
gas hydraulic fracturing (fracking). *Renewable and Sustainable Energy Reviews.*
37, 249-264.

Canada Catalogue no. 11-001-X.


relationship between residents of the United States and the United Kingdom.
*Energy Research & Social Science.* 20, 142-148.

Stedman, R.C., Jacquet, J.B., Filteau, M.R., Willits, F.K., Brasier, K.J., and McLaughlin,


<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Survey Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Factor Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Attitudes/Benefits of Fracking</td>
<td>The use of fracking to extract natural gas creates jobs.</td>
<td>15.3</td>
<td>45.6</td>
<td>29.2</td>
<td>6.6</td>
<td>3.4</td>
<td>.814</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas is good for the economy.</td>
<td>10.0</td>
<td>27.5</td>
<td>36.1</td>
<td>16.2</td>
<td>10.1</td>
<td>.812</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas will reduce Canada’s reliance on imported fossil fuels.</td>
<td>9.2</td>
<td>32.2</td>
<td>37.5</td>
<td>14.5</td>
<td>6.6</td>
<td>.799</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas promotes energy independence.</td>
<td>7.7</td>
<td>28.5</td>
<td>40.5</td>
<td>15.3</td>
<td>8.0</td>
<td>.798</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas will have long term economic benefits for the province.</td>
<td>11.1</td>
<td>26.3</td>
<td>36.9</td>
<td>16.5</td>
<td>9.3</td>
<td>.793</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas will increase tax revenue for the provincial government.</td>
<td>12.8</td>
<td>40.1</td>
<td>35.0</td>
<td>7.8</td>
<td>4.3</td>
<td>.767</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas reduces energy costs for consumers.</td>
<td>5.5</td>
<td>21.8</td>
<td>45.4</td>
<td>18.6</td>
<td>8.7</td>
<td>.732</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas will reduce Canada’s carbon footprint.</td>
<td>3.4</td>
<td>13.6</td>
<td>45.7</td>
<td>24.3</td>
<td>12.9</td>
<td>.616</td>
</tr>
<tr>
<td>Environmental Attitudes/Risks of Fracking</td>
<td>The use of fracking to extract natural gas causes environmental damage.</td>
<td>29.9</td>
<td>32.2</td>
<td>29.4</td>
<td>6.2</td>
<td>3.4</td>
<td>.836</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas causes damage to local water supplies.</td>
<td>28.3</td>
<td>31.0</td>
<td>30.9</td>
<td>7.3</td>
<td>2.5</td>
<td>.833</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas causes human health problems.</td>
<td>18.8</td>
<td>25.8</td>
<td>41.3</td>
<td>11.6</td>
<td>2.6</td>
<td>.733</td>
</tr>
<tr>
<td></td>
<td>A moratorium on fracking should be put into place until it can be scientifically proven to be safe</td>
<td>28.9</td>
<td>28.7</td>
<td>27.2</td>
<td>10.7</td>
<td>4.5</td>
<td>.710</td>
</tr>
<tr>
<td></td>
<td>Companies should have to disclose to the public the chemicals they use in the fracking process.</td>
<td>53.2</td>
<td>29.7</td>
<td>13.7</td>
<td>2.0</td>
<td>1.5</td>
<td>.669</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas causes earthquakes.</td>
<td>14.5</td>
<td>25.7</td>
<td>41.3</td>
<td>14.5</td>
<td>4.1</td>
<td>.634</td>
</tr>
<tr>
<td></td>
<td>The use of fracking to extract natural gas is a safe form of energy extraction.</td>
<td>4.1</td>
<td>12.0</td>
<td>37.3</td>
<td>27.3</td>
<td>19.4</td>
<td>.624</td>
</tr>
</tbody>
</table>
Less regulation is needed on companies involved in fracking.

|               |   1.6 |   4.5 |  21.9 |  30.6 |  41.3 |   0.600 |

**Note:** Percentages may not add to 100% due to rounding. Factor loadings refer to principal component factors.
Table #2: Descriptive statistics for independent variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coding/Response/Percentage</th>
<th>British Columbia</th>
<th>New Brunswick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Aged 18-24</td>
<td>(3.7%)</td>
<td>1 - Aged 18-24</td>
<td>(5.4%)</td>
</tr>
<tr>
<td>2 - Aged 25-34</td>
<td>(22.3%)</td>
<td>2 - Aged 25-34</td>
<td>(15.6%)</td>
</tr>
<tr>
<td>3 - Aged 35-44</td>
<td>(16.3%)</td>
<td>3 - Aged 35-44</td>
<td>(18.4%)</td>
</tr>
<tr>
<td>4 - Aged 45-54</td>
<td>(19.7%)</td>
<td>4 - Aged 45-54</td>
<td>(20.5%)</td>
</tr>
<tr>
<td>5 - Aged 55-64</td>
<td>(17.7%)</td>
<td>5 - Aged 55-64</td>
<td>(21.4%)</td>
</tr>
<tr>
<td>6 - Aged 65+</td>
<td>(20.2%)</td>
<td>6 - Aged 65+</td>
<td>(18.7%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - Female</td>
<td>(50.7%)</td>
<td>0 - Female</td>
<td>(54.5%)</td>
</tr>
<tr>
<td>1 - Male</td>
<td>(49.3%)</td>
<td>1 - Male</td>
<td>(45.5%)</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Urban</td>
<td>(50.4%)</td>
<td>1 - Urban</td>
<td>(34.2%)</td>
</tr>
<tr>
<td>1 - Suburban</td>
<td>(35.3%)</td>
<td>1 - Suburban</td>
<td>(30.5%)</td>
</tr>
<tr>
<td>RC - Rural</td>
<td>(14.3%)</td>
<td>RC - Rural</td>
<td>(35.3%)</td>
</tr>
<tr>
<td>Household Income¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Under $20,000</td>
<td>(5.6%)</td>
<td>1 - Under $20,000</td>
<td>(8.0%)</td>
</tr>
<tr>
<td>2 - $20,000-$39,999</td>
<td>(16.3%)</td>
<td>2 - $20,000-$39,999</td>
<td>(17.1%)</td>
</tr>
<tr>
<td>3 - $40,000-$59,999</td>
<td>(20.5%)</td>
<td>3 - $40,000-$59,999</td>
<td>(20.2%)</td>
</tr>
<tr>
<td>4 - $60,000-$79,999</td>
<td>(17.2%)</td>
<td>4 - $60,000-$79,999</td>
<td>(16.2%)</td>
</tr>
<tr>
<td>5 - $80,000-$99,999</td>
<td>(13.9%)</td>
<td>5 - $80,000-$99,999</td>
<td>(14.4%)</td>
</tr>
<tr>
<td>6 - $100,000+</td>
<td>(26.4%)</td>
<td>6 - $100,000+</td>
<td>(24.0%)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - Not working</td>
<td>(37.1%)</td>
<td>0 - Not working</td>
<td>(40.6%)</td>
</tr>
<tr>
<td>1 - Working</td>
<td>(62.9%)</td>
<td>1 - Working</td>
<td>(59.4%)</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 - Not married/partnered</td>
<td>(39.5%)</td>
<td>0 - Not married/partnered</td>
<td>(29.5%)</td>
</tr>
<tr>
<td>1 - Married/partnered</td>
<td>(60.5%)</td>
<td>1 - Married/partnered</td>
<td>(70.5%)</td>
</tr>
<tr>
<td>Education¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 - Less than high school</td>
<td>(0.9%)</td>
<td>1 - Less than high school</td>
<td>(1.2%)</td>
</tr>
<tr>
<td>2 - High school</td>
<td>(14.7%)</td>
<td>2 - High school</td>
<td>(21.7%)</td>
</tr>
<tr>
<td>3 - Some college/university</td>
<td>(22.8%)</td>
<td>3 - Some college/university</td>
<td>(19.9%)</td>
</tr>
<tr>
<td>4 - College diploma</td>
<td>(20.4%)</td>
<td>4 - College diploma</td>
<td>(24.8%)</td>
</tr>
<tr>
<td>5 - Bachelor’s degree</td>
<td>(28.7%)</td>
<td>5 - Bachelor’s degree</td>
<td>(21.6%)</td>
</tr>
<tr>
<td>6 - Graduate degree</td>
<td>(12.5%)</td>
<td>6 - Graduate degree</td>
<td>(10.9%)</td>
</tr>
</tbody>
</table>

¹ The variables are coded as follows: 1 = British Columbia, 0 = New Brunswick.
<table>
<thead>
<tr>
<th>Political Orientation</th>
<th>1 - Conservative (22.2%)</th>
<th>1 - Conservative (18.4%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 - Liberal (32.8%)</td>
<td>1 - Liberal (35.8%)</td>
</tr>
<tr>
<td></td>
<td>RC - Moderate (45.0%)</td>
<td>RC - Moderate (45.7%)</td>
</tr>
<tr>
<td>Racial/Cultural Group</td>
<td>0 - White (71.2%)</td>
<td>0 - White (94.2%)</td>
</tr>
<tr>
<td></td>
<td>1 - Visible minority (28.8%)</td>
<td>1 - Visible minority (5.8%)</td>
</tr>
<tr>
<td>Sources of information on energy issues</td>
<td>0 - Multiple sources (50.2%)</td>
<td>0 - Multiple sources (51.8%)</td>
</tr>
<tr>
<td></td>
<td>1 - One source (49.8%)</td>
<td>1 - One source (48.2%)</td>
</tr>
<tr>
<td>Municipal Voting</td>
<td>0 - Vote never (13.4%)</td>
<td>0 - Vote never (13.7%)</td>
</tr>
<tr>
<td></td>
<td>1 - Vote at all (86.6%)</td>
<td>1 - Vote at all (86.3%)</td>
</tr>
<tr>
<td>Fracking Top of Mind</td>
<td>1 - Concerns (57.9%)</td>
<td>1 - Concerns (64.9%)</td>
</tr>
<tr>
<td></td>
<td>1 - The extraction process (23.5%)</td>
<td>1 - The extraction process (13.7%)</td>
</tr>
<tr>
<td></td>
<td>1 - Generally a good thing (2.6%)</td>
<td>1 - Generally a good thing (11.1%)</td>
</tr>
<tr>
<td></td>
<td>RC - Need more information/Not sure (16.0%)</td>
<td>RC - Need more information/Not sure (10.6%)</td>
</tr>
<tr>
<td>Familiarity with Fracking</td>
<td>1 - Very familiar (9.9%)</td>
<td>1 - Very familiar (10.8%)</td>
</tr>
<tr>
<td></td>
<td>1 - Somewhat familiar (45.7%)</td>
<td>1 - Somewhat familiar (52.0%)</td>
</tr>
<tr>
<td></td>
<td>1 - Not very familiar (28.9%)</td>
<td>1 - Not very familiar (26.1%)</td>
</tr>
<tr>
<td></td>
<td>RC - Not at all familiar (15.6%)</td>
<td>RC - Not at all familiar (11.1%)</td>
</tr>
</tbody>
</table>

**Note:** RC = Reference Category. Percentages may not add to 100% due to rounding.

1 Treated as a continuous variable.

2 Sources of information included: Online/traditional news sites; Family/friends/word of mouth; Reading up on topic; Corporate websites; Environmental organizations; Public service announcements/advertisements. Multiple sources include two or more of these categories being mentioned.

3 Respondents were asked to state the first thing to come to mind when they think of fracking. Concerns included environmental issues (e.g. water, earthquakes), unknown consequences/risks, human health issues, and protests/controversy. The extraction process included drilling and references to oil and gas. Generally a good thing included references to jobs and the economy.
Table #3: OLS regression results

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Economic Attitudes/Benefits of Fracking (unstandardized)[standardized]</th>
<th>Environmental Attitudes/Risks of Fracking (unstandardized)[standardized]</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>New Brunswick</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Age</td>
<td>-.027 [-.006]</td>
<td>.025 [.005]</td>
</tr>
<tr>
<td>Sex</td>
<td>.925 [.072]*</td>
<td>1.115 [.079]*</td>
</tr>
<tr>
<td>Location Urban</td>
<td>.650 [.051]</td>
<td>1.240 [.084]*</td>
</tr>
<tr>
<td>Location Suburban</td>
<td>.828 [.063]</td>
<td>.067 [.004]</td>
</tr>
<tr>
<td>Household Income</td>
<td>.433 [.108]***</td>
<td>.850 [.198]***</td>
</tr>
<tr>
<td>Marital Status</td>
<td>.113 [.009]</td>
<td>-.373 [-.024]</td>
</tr>
<tr>
<td>Education</td>
<td>-.091 [-.018]</td>
<td>.289 [.055]</td>
</tr>
<tr>
<td>Political Conservative</td>
<td>2.193 [.141]***</td>
<td>2.651 [.150]***</td>
</tr>
<tr>
<td>Political Liberal</td>
<td>-.761 [-.057]</td>
<td>-.277 [-.019]</td>
</tr>
<tr>
<td>Racial/Cultural Group</td>
<td>-.578 [-.040]</td>
<td>-1.588 [-.052]</td>
</tr>
<tr>
<td>Sources of Information</td>
<td>.261 [.020]</td>
<td>.333 [.024]</td>
</tr>
<tr>
<td>Voting</td>
<td>-.529 [-.027]</td>
<td>-.537 [-.025]</td>
</tr>
<tr>
<td>Top of Mind Concerns</td>
<td>-1.764 [-.136]*</td>
<td>-2.342 [-.160]***</td>
</tr>
<tr>
<td>Top of Mind Extraction</td>
<td>2.276 [.152]**</td>
<td>1.130 [.057]</td>
</tr>
<tr>
<td>Top of Mind Good Thing</td>
<td>9.021 [.244]***</td>
<td>6.305 [.291]***</td>
</tr>
<tr>
<td>Very Familiar with Fracking</td>
<td>-3.532 [-.180]***</td>
<td>-2.517 [-.112]*</td>
</tr>
<tr>
<td>Somewhat Familiar with Fracking</td>
<td>-.922 [-.072]</td>
<td>.323 [.023]</td>
</tr>
</tbody>
</table>

Adjusted R² | .227 | .285 | .382 | .336

*p ≤ .05, **p ≤ .01, ***p ≤ .001