

The Lorax Effect: A Statistical Analysis of Environmental Concern in Canada

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Abstract

As the globe continues to experience the effects of climate change, researchers must continue to investigate factors that contribute to individuals' attitudes concerning climate change. This study utilizes survey data from 1,539 Canadians gathered in 2019. The data was analyzed using ordinary least square linear regression to analyze how political ideology, gender, and level of education correlate with individuals' level of environmental concern. Approximately 83.2% of Canadians rated themselves as having a moderate level of environmental concern or higher in the collected survey data, suggesting that most Canadians express some amount of environmental concern. Canadians with a conservative political ideology have a lower level of environmental concern than their liberal counterparts. Within the Canadian context, there is no statistically significant relationship between level of education and concern for the environment. Females are more concerned, on average, about the environment, compared to males. Canadians' gender identity seems to influence their level of environmental concern. However, more representation of non-binary individuals is needed in future data-gathering to analyze non-binary individuals' level of environmental concern. The paper further discusses these variables' effects on the level of environmental concern.

Introduction

Individuals' environmental concern is an important area of interest and concern in present-day research. As the globe continues to experience the effects of climate change, researchers must continue to investigate factors that contribute to individuals' attitudes concerning climate change.

The following study will use ordinary least square regression to analyze how political ideology, gender, and level of education statistically correlate with individuals' level of environmental concern. The following hypotheses will be tested:

H1: Political ideology is negatively related to level of environmental concern.

H2: Gender influences level of environmental concern.

H3: Level of education has a positive relationship to level of environmental concern.

The sections below will discuss previous studies and guiding theories for the hypothesis. Methodology, statistical data, and results will follow, and the paper will conclude with a discussion of the findings.

Political Ideology and Environmental Concern

The literature is replete with studies that suggest there is a relationship between an individual's political ideology and their level of environmental concern (Chung & Milkoreit, 2021, p. 2; Cruz, 2017, p. 81; Franzen & Vogl, 2013, p. 1005; Jylhä et al., 2016, p. 185; Krange et al., 2019, p. 2; Lui et al., 2014, p. 80; McCright & Dunlap, 2011, p. 1163; Tranter & Booth, 2015, p. 155; Zhou, 2013, p. 453). The following analysis will focus on the relationship between the

sample of Canadians' self-recorded political ideology and level of environmental concern.

Theory of Cultural Cognition

The conclusion that individuals who identify as politically conservative have a lower level of environmental concern than individuals who identify as politically liberal has been consistently proven across multiple nations (Chung & Milkoreit, 2021, p. 2). There are several theories as to why this remains steadfast across the globe. The theory of cultural cognition suggests that individuals perceive the world through a lens of their values (i.e., conservative values include individualism and minimal government involvement), and these conservative values are challenged by the notion of environmental concern (Chung & Milkoreit, 2021, p. 3). Conservative individuals' climate denial is a psychological defense mechanism to uphold their conservative values (Chung & Milkoreit, 2021, p.3).

Environmental concern is a multi-dimensional variable that implies the currently existing social, political, and economic systems are changing (Zhou, 2013, p. 458). An individual's political ideology reflects their values and beliefs regarding the amount of government intervention permissible within a business (Lui et al., 2014, p. 80). The principles that conservative individuals value are challenged by the need for more government intervention, regulation of economic activity, and social services to combat climate change (Zhou, 2013, p. 458). Previous studies have found that individuals with a more liberal political ideology have a higher level of environmental concern than those with a conservative political ideology (Dunlap, 1975; Van Liere & Dunlap, 1981; Samdahl & Robertson, 1989; Hine & Gifford, 1991; Howell & Laska, 1992; Gamba & Oskamp, 1994; Dietz et al., 1998; Lui et al., 2014, p. 80), which are findings steadfast with the theory of cultural cognition. Thus, we expect that Canadians with a conservative political ideology will have a lower level of environmental concern than those with a liberal political ideology.

Hypothesis 1 (H1): *Political ideology is negatively related to level of environmental concern.*

Gender and Environmental Concern

Gender has been found to be a significant predictor of an individual's level of environmental concern across multiple studies (Chan et al., 2019, p. 98; Lui et al., 2014, p. 88; McCright & Sundström, 2013, p. 63; Sundström & McCright, 2014, p. 1083; Tranter & Booth, 2015, p. 161). The survey used by the following study includes male, female, and non-binary gender options and analyzes each. The decision to include non-binary individuals in the study is to encourage gender inclusivity in further studies, as well as allow for the growing number of individuals who do not identify as male or female to be included in academic studies (Medeiros et al., 2020, p. 128). While the 2019 survey administered by Lightspeed Kantar Group contained 0.8% of respondents who self-identified as non-binary, the results will be analyzed, included, and discussed below. We could not find any previous research which analyzed non-binary individuals and their level of environmental concern.

Sociocultural Hindrance Hypothesis

The literature is replete with theories of the reasoning for the gender gap between men and women concerning their levels of environmental concern. It has been theorized that there are various sociocultural and psychological reasons that women are more environmentally concerned than men (Chan et al., 2019, p. 81). Chan et al. (2019) analyzed data from an international survey involving 32 countries and found a wider gender gap concerning the environmental level of concern in more gender-equal societies (p.98). This is steadfast with the sociocultural hindrance hypothesis, which suggests that this is due to both men and women having the ability to develop their judgments (Chan et al., 2019, p. 98). Individuals who reside in sociocultural contexts which limit their expression and must follow specific social norms (such as gender roles) are less likely to hold beliefs that align with their own personal values (Chan et al., 2019, p. 86). These results are echoed in results found by McCright and Sundström (2013), in which they used multivariate ordinary logistic regression models and found a consistent pattern of environmental concern in women across twenty-two years of representative survey data in the Swedish (a gender-equal society) public (p. 63). Thus, we expect Canadians who identify as male will have a

lower level of environmental concern than those who identify as female or non-binary.

Hypothesis 2 (H2): *Gender influences level of environmental concern.*

Level of Education and Environmental Concern

Level of education has been positively associated with environmental concern (McCright & Sundströme, 2013, p. 67; Olivos et al., 2021, pp. 156-157; Olofsson & Öhman, 2006, p. 770). A study by Olofsson and Öhman (2006) suggests that the level of education is one of the two most influential factors regarding environmental concern (p. 785). A study in China found that the level of education, both formal and informal, had a positive causal effect on the level of environmental concern of individuals surveyed (Olivos et al., 2021, pp. 156-157). Another study in Switzerland also found that educational attainment positively affects environmental concern (McCright & Sundströme, 2013, p. 67).

Educational Institutions as Agents of Progressive Knowledge

It has been theorized that education should increase an individual's knowledge of environmental problems and, therefore, their environmental concern (Franzen & Vogl, 2013, p. 1003). This is due to education level being theorized as a tool that increases an individual's awareness and concern for the environment (Olivos et al., 2021, p. 156). An individual's level of education may not directly cause them to become more concerned about the environment. Instead, it is the ideas that education can instill in an individual (such as being cognizant of using recycled paper products) that would cause them to have a higher level of environmental concern (Olivos et al., 2021, p. 157). Educational institutions are considered agents that diffuse progressive knowledge, and often pro-environmental ideas are examined and explored by students (Zhou, 2013, p. 457). While the level of education will not instill an immediate increase in concern for the environment in an individual, it has been shown to elevate the importance of environmental protection relative to economic growth (Zhou, 2013, p. 457). Thus, we expect that Canadians with a lower level of education will have a lower level of environmental concern than those with a higher level of education.

Hypothesis 3 (H3): *Level of education has a positive relationship with level of environmental concern.*

Methods

This paper uses survey data gathered in 2019 that sampled 1,539 Canadians. The survey was administered by Lightspeed Kantar Group and used an online panel to ensure various populations (age and sex) were represented in the survey data. Approval to conduct the survey was given by MacEwan's Research Ethics Board in June 2019 (File No. 101662). Funding was provided by the Social Sciences and Humanities Research Council (SSHRC) Insight Grant to Boulianne (435-2019-04-94) for the survey to be conducted.

Ordinary least square linear regression was used to analyze the data collected by the survey. Three critical assumptions are made when analyzing OLS linear regressions. The first is a linear increase in the bivariate relationship as x increases y monotonically (Boulianne, 2022). The second assumption is that there is a normal distribution of y (Boulianne, 2022). The following distribution (below) is normal of Y .

Dependent Variable

The dependent variable is environmental concern. The following question measures environmental concern: "Thinking about environmental issues, such as wildlife conservation, air or water pollution, and forest preservation, how concerned are you about the environment?". The following ordinal categories were offered: not at all concerned, low concern, moderate concern, high concern, and very high concern. In a sample of $N=1,539$, the average is 3.50 ($SD=1.12$) on a five-point scale measuring the level of environmental concern. Approximately 83.2% of Canadians rated themselves as having a moderate level of environmental concern or higher in the collected survey data, suggesting that most Canadians express some amount of concern. This paper examined various independent variables (below) to investigate factors that may influence Canadian's level of environmental concern.

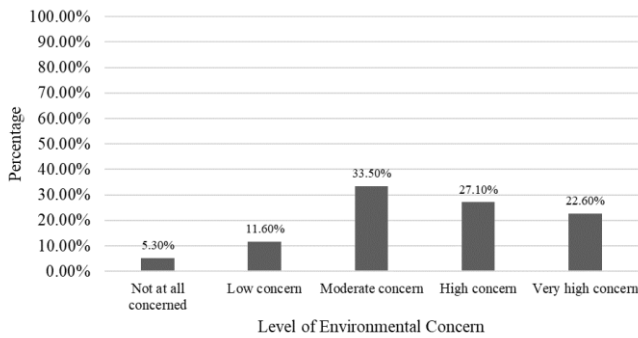


Figure 1. Level of environmental concern, n=1,539

Independent Variables

The first independent variable is political ideology. The following question measures political ideology: "In politics, people sometimes talk of left and right. Where would you place YOURSELF on this scale? Note: sometimes people refer to the left as liberal and to the right as conservative" (H1). The following relative frequencies were offered: 0 (left), 1, 2, 3, 4, 5 (moderate), 6, 7, 8, 9, 10 (right). The political ideology variable was then re-coded as either 0 (left) (originally 0, 1, 2, 3, 4) or 1 (right) (originally 5, 6, 7, 8, 9, 10) and labelled as RIGHT to explore if individuals who identify as being left-wing or right-wing have different levels of environmental concern. The average of the re-coded right political ideology variable is 0.64 (SD= 0.48) on a two-point scale.

The second independent variable is gender. Gender is measured by the following question: "Are you..." (H2). The following relative frequencies were offered: male, female, or non-binary (numerically labelled 0, 1, and 2, respectively). In the sample of 1,539 Canadians who answered this question, 52.9% were female, 46.3% were male, and 0.8% were non-binary. The gender variable was re-coded into two new variables. The first compared females to males coded 1 and 0 respectively (labelled WOMEN), and the second compared non-binary individuals to males and females, coded 1, 0 and 0 respectively (labelled NON-BINARY). The gender variable women had an average of 0.53 (SD=0.50), while the non-binary variable had an average of 0.008 (SD=0.09) on a two-point scale.

The third independent variable is level of education. Education is measured by the following question:

"What is the highest level of education you have completed?" (H3). The following relative frequencies were offered: grade school or some high school, graduated high school or GED, graduated college (associate degree, technical school, or vocational training), graduated college (bachelor's degree), or advanced degree (postgraduate or doctoral degree), numerically coded 2, 5, 6, 7, and 8, respectively. The education variable was then re-coded as GRADESCHOOL to compare individuals with grade school or some high school to those who had minimally graduated high school as 0 and 1, respectively. The average of the grade school re-coded education variable is 0.92 (SD= 0.27) on a two-point scale.

Variable	N	Range	Mean	Standard Deviation
AGEYR	1539	18,100	49.07	17.41
NONBINARY	1539	0,1	0.008	0.09
WOMEN	1526	0,1	0.53	0.49
GRADESCHOOL	1539	0,1	0.92	0.27
RIGHT	930	0,1	0.64	0.48
ENVIRON. CONCERN	1539	0,4	3.5	1.12

Table 1. Descriptive statistics of re-coded variables.

Variable	b	SE	t	p-value
NONBINARY (H2)	0.71	0.60	1.18	.237
WOMEN (H2)	0.22	0.01	3.27	.001
GRADESCHOOL (H3)	0.15	0.16	0.99	.324
RIGHT (H1)	-0.66	0.07	-9.58	<.001
AGEYR	0.001	0.002	0.34	.737

Table 2. OLS regression of level of environmental concern. (Dependent Variable: How concerned are you about the environment?)

Results

The results can be analyzed using a bivariate OLS regression. Regarding the re-coded political ideology variable RIGHT (H1), as respondents rated themselves as more right-wing (an increase of one unit), concern for the environment decreased by 0.66 units of the original metric. As political ideology increases, concern for the environment decreases by 0.29 standard deviation units ($p= <0.001$). The null hypothesis is rejected for the re-coded political ideology variable as the p-value is smaller than 0.05. Therefore, there is a

statistically significant relationship between the re-coded political ideology variable and concern for the environment.

Regarding the re-coded gender variables NON-BINARY (H2) and WOMEN (H2), the results differ. When examining the non-binary variable, it was found that as the gender variable increases by one unit, concern for the environment increases by 0.71 units of the original metric. As the re-coded non-binary gender variable numerically increases, concern for the environment increases by 0.036 standard deviation units ($p=0.237$). We fail to reject the null hypothesis for the non-binary re-coded gender variable as the p-value is larger than 0.05. Therefore, there is no statistically significant relationship between an individual's gender identification as non-binary and their level of environmental concern.

When examining the women variable, it was found that as the women gender variable increases by one unit, concern for the environment increases by 0.22 units of the original metric. As the re-coded women gender variable numerically increases, concern for the environment increases by 0.099 standard deviation units ($p=0.001$). The null hypothesis is rejected for the re-coded women gender variable as the p-value is smaller than 0.05. Therefore, there is a statistically significant relationship between the re-coded women gender variable and concern for the environment.

Regarding the re-coded education variable GRADESCHOOL (H3), as the level of education increases numerically, concern for the environment increases by 0.15 units of the original metric. As the level of education increases, concern for the environment increases by 0.03 standard deviation units ($p=0.342$). We fail to reject the null hypothesis for the re-coded grade school education variable as the p-value is larger than 0.05. Therefore, there is no statistically significant relationship between the re-coded grade school variable and concern for the environment.

Discussion

The purpose of this study was to examine the relationship between political ideology, gender, and education level with the level of environmental concern. The results of the ordinary least square regression suggest that there is a relationship between

an individual's political ideology and their level of environmental concern. Canadians who self-identify as having a right-wing political ideology tend to have a lower level of environmental concern than their left-wing political counterparts. Only 930 of 1,539 Canadians answered the political ideology question on the survey. An explanation of this discrepancy could be that while English-Canadians' ideological right is almost indistinguishable from the American political and ideological right, French Québec lacks any ideological right (Gibbins & Neviette, 1985, p. 597). The study by Gibbins and Neviette (1985) found that English-Canadian political ideology ranged across a traditional right-to-left scale, but French Québec ranged only from moderate middle to the far left (p. 597). Further research should be done to examine this phenomenon in the Canadian context to increase engagement in future Canadian surveys.

This study found a statistically significant relationship between the re-coded gender variable women and an individual's level of environmental concern. Women, on average, are more likely than men to have a higher level of environmental concern. The study found no statistically significant relationship between individuals who identify as non-binary and their level of environmental concern. Our study consisted of 0.8% of individuals who identified themselves as being non-binary, and the low number of non-binary respondents could have impacted the outcome of the study results. Further research on this subject should aim to include and investigate a more significant proportion of non-binary individuals to examine if there is a relationship between gender identity and the level of environmental concern in Canada.

This study used the grade school variable to compare individuals who had attained a high school diploma to those who had not, and there was no statistically significant relationship between the re-coded variable and level of environmental concern. The results show that in the Canadian context, the level of education is not a predictor of an individual's level of environmental concern. These findings contradict other studies that have been done in other nations on this subject. Further research should be done to investigate this and identify what differentiates the Canadian results from those of other nations.

The empirical results reported herein should be considered in light of some limitations. The limitations of this study include a small sample size in relation to the total population of Canada (N=1,539), specifically in the number of non-binary individuals represented in this survey (0.8%). This study was conducted within the scope and knowledge of the author during a 4-month advanced quantitative research methods undergraduate course. Future studies should use a larger sample size of Canadians and include a more significant proportion of non-binary individuals.

Conclusion

The majority of Canadians (83.2%) described themselves as experiencing a moderate level or higher concern for the environment, meaning that Canadians generally are concerned for the environment. This study aimed to investigate this further through variables traditionally analyzed as factors that predict the level of environmental concern in other studies. The Canadian context examination of these variables differed in some ways from previous studies of other nations. The level of education does not predict the level of environmental concern in Canada, even though other studies have found it to be a significant predictor of environmental concern in other nations. Females are more likely, on average, to be concerned about the environment when compared to men. Non-binary individuals' level of environmental concern has not been investigated in other studies, and we hope that in future studies, gender identities beyond male and female will be included and investigated. Political ideology was found to be a predictor of environmental concern, but there was a lower number of survey respondents in comparison to other questions administered. Further investigation should be done on this matter, particularly if the socio-political differences between English-Canada and French-Québec correlate to this phenomenon.

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