Exploring Pro-Environmental Lifestyles & Values in Canada

by

Danette E.W. Moulé

B.A. (Policy Studies), Mount Royal University, 2007

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Name:	**Danette Erin Woodsworth Moulé**
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Title:	***Exploring pro-environmental lifestyles and values in Canada***
Examining Committee:	**Chair:** Nelly Bouevitch Master of Resource Management Candidate

Jonn Axsen
Senior Supervisor
Assistant Professor

Rachael Shwom
Supervisor
Assistant Professor,
School of Environmental and
Biological Sciences
Rutgers University

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Abstract

Lifestyle can be defined as distinctive patterns of related actions or practices. A pro-environmental (or “green”) lifestyle might consist of several actions, such as recycling, conserving home energy use, or buying a hybrid vehicle. Engagement in lifestyle might be related to an individual's values, as well as other factors such as income and age. I use data collected from a representative sample of 1,216 Canadians to answer the following questions: i) what is green lifestyle and how does it fit in with other lifestyle practices? ii) What are the different types of green lifestyles? and iii) how do different core values influence citizen engagement in green lifestyles? Using factor analysis on data relating to activity engagement, I find that engagement in pro-environmental activities forms a unique lifestyle—separate from other lifestyles such as outdoor recreation. A second factor analysis on respondent engagement in specific green behaviours identifies 11 distinct pro-environmental lifestyles, including home electricity conservation, recycling, and purchasing efficient technologies. Finally, I use regression analysis to find that values are linked to lifestyle, where biospheric values are positively associated with engagement in 4 of the 11 pro-environmental lifestyles. Traditional values are positively associated with engagement in 2 of the pro-environmental lifestyles, and one lifestyle is associated with egoistic values. Other personal factors also help to explain green lifestyle engagement, including income, age, and type of residence (urban, suburban or rural). Future research may seek to understand the conditions, contexts, and motivations behind behaviour more thoroughly, in addition to understanding how societal influence affects behaviour in various parts of the world.

Keywords: Lifestyle; sustainability; climate change; environmental values; pro-environmental behaviour

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List of Acronyms

PEB	Pro-Environmental Behaviour
PEL	Pro-Environmental Lifestyle

Chapter 1.

Introduction

There are many different activities that can be perceived as “pro-environmental”, including recycling, cycling rather than driving a vehicle, purchasing a hybrid or electric vehicle, buying organic food, using reusable bags, and so on. Engagement in and perceptions of these activities vary across individuals. It is useful to understand these differences in perceptions, to better understand behaviour and why certain people engage in some pro-environmental behaviours and why others do not. Understanding behaviour in this way will help clarify how Canadian citizens might broaden their uptake of pro-environmental behaviours and practices, and in turn how environmental policy might shape citizen behaviour.

In addition to perceptions, certain constraints may limit people from engaging in pro-environmental activities, such as their income level or their access to supporting infrastructure (e.g. recycling facilities). However, some subset of people demonstrate that they are willing to engage in pro-environmental behaviours (PEB), even when these behaviours are less cost-effective (at least in the short-term). The reasons for these choices are varied, which we explore in this research project.

1.1. An overview of theories of pro-environmental behaviour

A behavioural model provides a conceptual and theoretical framework for carrying out empirical research on patterns and influences of human behaviour (Jackson, 2005). A variety of models have been developed to help understand behaviour. Some models draw from the field of psychology, and focus more on characteristics of the individual. Other models draw from sociology, looking at social

influences and context. A number of behavioural models combine insights from both psychology and sociology.

One example of a social psychology-based model is the Values-Beliefs-Norms (VBN) theory (Stern et al., 1998). This model focuses on the link between values and environmental decisions. Values are theorised to influence our worldview about the environment, which in turn influences our beliefs about the consequences of environmental change, which in turn influences our perceptions of our ability to reduce threats to those things we value. These factors also influence our norms about taking environmental action (Dietz et al., 2005). Abrahamse & Steg (2011) used the VBN theory to investigate the relationship between values and energy use, and found that variables such as tradition (or security) values, power (or achievement) values, and openness to change values were statistically associated with energy use within the home. However, the VBN theory misses other potentially important explanatory variables, such as income and the greater social context.

An example of a more sociological model is the Social Practices Model, which combines a focus on the role of the individual with "proper treatment of the equally important role of social structure" (Spaargaren, 2003). 'Social practices' can be defined as a theory seeking to determine the link between practices and context in social situations. It aims to integrate the individual with his or her surrounding environment, while examining how context relates to common practices that the individual might undertake (Herndl & Nahrwold, 2000). Within the Social Practices Model, human behaviour is analysed in terms of the combination of values and social practices (i.e. lifestyle), and the responsibility of the individual for environmental action within his or her life is analysed in terms of the options available (i.e. the ease with which people can transition to pro-environmental options within different sectors of his or her life) (Spaargaren, 2003). Schelly (2014) used this model to explore the effect of various government incentives to reduce electrical usage in the home, given individuals' pre-conceived environmental values. Her goal was to see how incentive programmes affected day-to-day electrical usage (i.e. whether the programmes were sensitive enough to daily life to encourage decreased electrical usage). She found that individuals' environmental values can be reinforced, or negated, depending on the framing of the policy (Schelly, 2014).

1.2. Pro-environmental lifestyle

My research focus is on pro-environmental lifestyles (PEL). Lifestyles are clusters of related activities which might collectively correspond with a particular aspect of identity or core values. A PEL may be comprised of several related activities that are perceived to somehow be beneficial to the environment. Engagement in a PEL might be related to an individual's values, as well as other factors such as income and education. This research is guided by lifestyle theory, which posits that identities and, therefore, lifestyles are in a constant "state of negotiation" (Axsen et al., 2012), influenced by social interactions and through life experience. Lifestyle theory combines elements of the psychological and sociological approaches mentioned in the previous section.

In their 2012 study, Axsen et al. investigated whether engaging in a general PEL coincides with other lifestyle types. The authors conducted a survey of 711 households in San Diego, California and used factor analysis to investigate how engagement in PEL related to other types of lifestyle, such as activities relating to career, outdoor recreation and spirituality. According to their findings, PEL forms a unique lifestyle, separate from engagement in other lifestyles. Further, the authors demonstrate how this measure of engagement in PEL can be used to forecast which consumers may transition toward adopting and using new pro-environmental technologies, and what their motivations might be in doing so.

Whitmarsh and O'Neill (2010) looked at how often people engage in a range of PEBs, and what factors influence engagement in those behaviours. They collected data via a postal survey of 551 people in the UK, and used Principle Component Analysis and regression to explore respondents' stated engagement in various PEBs. The authors found that pro-environmental behaviours can be separated into seven different categories of PEB, which correspond with the idea of PEL explored by Axsen et al. (2012). Regression analyses indicated that having a pro-environmental identity was positively associated with engagement in waste reduction, regular water and domestic energy conservation, and eco-shopping and eating—but not associated with one-off domestic energy conservation actions, eco-driving, political actions, or reducing car use and flights. Having strong concern about climate change was associated with engagement in two of the pro-environmental lifestyles: political action and energy and water conservation. Interestingly, general pro-environmental concern (as measured by

New Environmental Paradigm (NEP) score) and income were not related to any of the pro-environmental behaviours listed above.

A study by Barr et al. (2011) also looked at the PEBs that people in the UK might undertake, and whether concern for climate change motivates these behaviours. The authors conducted a survey with 202 people in the UK, then conducted focus groups with a subset of respondents to further probe the issues, and finally conducted in-depth interviews with 12 respondents. Through cluster analysis, they identified three clusters of respondents: ii) those who undertook the whole range of environmental actions with the greatest frequency; ii) those who tended to be conscious consumers, buying organic food, composting, and buying environmentally-friendly products, but tended to recycle and conserve energy and water less often than other clusters; and iii) those who tended to save energy in the home, but tended to make environmentally-friendly purchases, compost, and buy organic less often than others. The authors found that climate change was a relatively minor motivation for pro-environmental behaviour—people tended to be motivated by factors such as "not wasting" and "using resources carefully" mentalities, as well as convenience.

These studies confirm the idea that people can combine related PEBs into different lifestyle types. Results also suggest that there is not just a singular PEL, but potentially several versions across a given population. We want to understand what these different types of PELs are amongst Canadians, and how they relate to pro-environmental motivations (or core values).

1.3. Relating values to pro-environmental lifestyle

This study explores engagement in different PELs, and explores the different motivations behind these lifestyles – which pro-environmental behaviours and lifestyles are associated with environment-oriented values? Values can be defined as "(a) concepts or beliefs, (b) about desirable end states or behaviours, (c) that transcend specific situations, (d) guide selection or evaluation of behaviour and events, and (e) are ordered by relative importance" (Schwartz and Bilsky, 1987, p. 551). Values are typically invoked by the individual when making difficult choices; however, once a decision becomes routine, individuals may not continue to consult their values, rather operating in

the realm of habit (Dietz et al., 2005). We focus on values instead of attitudes because, by definition, values are more stable across a variety of contexts and decisions. In particular, biospheric and altruistic values tend to be correlated with pro-environmental behaviours, though this can vary by context.

In their 1995 study, Stern et al. explored the relationship between values and pro-environmental behaviour by conducting a survey of 199 Virginian (U.S.A.) residents, chosen randomly from the phone book. The authors asked questions about respondents' environmental values, and whether respondents would be willing to undertake certain pro-environmental actions, such as pay extra tax to protect the environment or take political action. Factor analysis was used to group correlated environmental beliefs, then regression was used to gain insight into the relationship between beliefs and behaviour. They found that individuals with biospheric values, as well as individuals who scored highly on the NEP scale, were more likely to undertake certain PEBs, such as writing a letter to the government supporting policies that stop the loss of tropical forest, and policies that reduce the use of fossil fuels. NEP score was also associated with willingness to pay a tax to protect tropical forests.

In contrast to Stern et al.'s (1995) findings that pro-environmental values are correlated with PEB, there can be other motivations for engagement in PEBs. Evans and Abrahamse (2009) concluded that some PEBs are undertaken for more practical reasons. They conducted a survey of English citizens who see themselves living more "sustainably" than the average citizen, and found that motives for PEB engagement often have nothing to do with environmental values or concern. Frugality and practicality were two of the reasons respondents gave for reducing consumption, and health concerns led some people to learn about sustainable living practices.

In summary, research suggests that engagement in some PEBs can be associated with individual characteristics such as pro-environmental identity, environmental concern, and biospheric and altruistic values. We also see that some PEBs are motivated by non-environmental concerns, such as health and financial savings. Further, PEB engagement can be affected by income and convenience. We seek to further explore these patterns among Canadian citizens by analyzing data collected through a web-based survey instrument.

1.4. Research objectives

As explained above, we use lifestyle theory to explore the idea of lifestyle among Canadian citizens. In particular, we focus on the following research objectives:

(i) How do pro-environmental lifestyles fit with other lifestyle practices?

(ii) What are the different types of pro-environmental lifestyles?

(iii) How do different core values influence citizen engagement in pro-environmental lifestyles?

Chapter 2.

Methods

The research team designed a survey to explore the research questions stated in Chapter 1. The survey built upon a survey previously designed by Axsen et al. (2012), borrowing some questions from that survey, adapting some, and adding new questions authored by the research team. Questions were also included based on the New Environmental Paradigm (Dunlap & Van Liere, 1978) and the Schwartz Value Survey (Schwartz & Bilsky, 1987).

2.1. Survey sample

My sample included 1,216 Canadians, drawn from every province and territory except Nunavut .The survey was administered through the aid of a market research company, Decision Analyst. Respondents were individuals who were pre-registered in Decision Analyst's Web-panel to periodically complete surveys. This limited our sample to those with access to a computer and the internet. British Columbia & Alberta were intentionally over-sampled in order to allow for regional comparisons. A French version of the survey was made available for French-speaking Canadians.

The sample was collected in February 2013, and data was delivered by Decision Analyst to researchers via a spreadsheet. Survey respondents are anonymous to the researchers, and are identified in the database with a unique ID number. In total, approximately 17,400 individuals from Decision Analyst's Web-panel were invited to complete the survey. Of the 17,400, 1,220 completed it. Finally, 4 were deleted from the sample due to poor quality data, leaving our final sample of 1,216. The regional split of these respondents is as follows: 239 respondents were British Columbia residents, 175 from Alberta, 30 from Saskatchewan, 39 from Manitoba, 337 from Ontario, 307 from

Quebec, 27 from New Brunswick, 31 from Nova Scotia, 4 from Prince Edward Island, 16 from Newfoundland, 1 from the Yukon, and 1 from the North West Territories.

Table 2.1 shows the representativeness of our sample, depicting distributions by province of residence, age, gender, education and income compared to 2011 Canadian population statistics. Ontario is under-represented, while BC and AB are over-represented, but as mentioned above, this oversampling was done purposefully in order to allow for regional comparisons. The sample is biased in several other ways: males are slightly over-represented; the age-group 19-29 is under-represented, while the age-groups between 30 & 70 are all over-represented; College and University Grads are slightly under-represented, while those with degrees above a Bachelor's (Master's, Doctorate, or Professional degree) are over-represented; and lower income individuals are under-represented, while higher income is over-represented. Despite these slight biases, the degree of variation in this sample seems to be sufficient for this study's exploratory statistical analyses.

Table 2.1. Representativeness of our survey sample versus Canadian population statistics

Category	Canadian Census Data	Our Survey
Province of residency		
Alberta	11.1%	14.4%
B.C.	13.3%	19.7%
Manitoba	3.6%	3.9%
New Brunswick	2.2%	2.4%
Newfoundland	1.5%	1.4%
N.W.T.	0.1%	0.1%
Nova Scotia	2.7%	2.6%
Nunavut	0.1%	0.1%
Ontario	38.7%	27.8%
P.E.I.	0.4%	0.3%
Quebec	23.1%	25.3%
Saskatchewan	3.1%	2.5%
Yukon	0.1%	0.1%
Sex		
Male	49.5%	57%
Female	50.5%	43%
Age		
19 to 29	14.0%	8.5%
30 to 39	13.5%	17.7%
40 to 49	13.5%	18.8%
50 to 59	14.7%	24.6%
60 to 69	10.6%	22%
70 or older	10.1%	8.5%
Education Level[1]		
HS Graduate	23.2%	21.2%
Uni and College Grad	46.2%	38.5%
≥ Masters, Prof Degree	2.7%	7.3%
Income		
Less than $10,000	14.5%	1.8%
$10,000 - $20,000	18.9%	5.6%
$20,000 - $49,000	37.1%	31.4%
$50,000 - $99,000	22.5%	36.2%
$100,000 or more	6.9%	14.7%

[1]http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/2011001/tbl/tbl01-eng.cfm

2.2. Survey instrument and questions

The survey enquired into Canadians' lifestyles, values, opinions on various environmental issues and policies, and attitudes toward pro-environmental technology; however, only certain questions – detailed in Table 2.2 – were used to answer my research questions. The survey was divided into six sections:

1. Household activities
2. Other activities
3. New technologies
4. Global issues
5. Values
6. Household details

Lifestyle questions built upon a survey previously designed by Axsen et al. (2012) and are summarized in Table 2.2. Each of the lifestyle engagement questions stated an activity, and asked the respondent to indicate their frequency of engagement (a five point scale ranging from "never" to "very frequently"). There were 47 questions relating to general lifestyle, including activities relating to career, hobbies, and personal development. Five of these questions related specifically to environment, including "thinking about protecting the environment," "trying to help the environment through daily actions," "attending environmental meetings," "engaging in environmental conservation activities," and "promoting environmental conservation." The survey also included 45 questions relating specifically to different pro-environmental activities or behaviours (PEBs), which are summarized in the second row of Table 2.2.

Table 2.2. Questions used to examine lifestyle

Question title	Question as stated in the survey	List of activities	Choices
General Lifestyle Activities	*We are interested in understanding how you use your time and what types of activities you are typically involved in. Think of how you spend your waking hours in a given month.* *How frequently do you engage in the following activities?*	47 total, including: Career, Studying, Managing Money, Travelling, Time With Family and Animals, Shopping, Preparing Food, Sports, Hobbies, Time With Friends, Personal Development or Religious Activities, Volunteering, Gardening, Housework, New Technology, Politics, and Environmental Activities	"Never", "Rarely", "Occasionally", "Frequently", "Very Frequently", and "N/A" ("N/A" was recoded to "Never" prior to data analysis)
Pro-environmental Lifestyle Activities	*How often do you engage in each of the following activities?*	45 total, including: Buying High Efficiency Household Items, Buying Local and Organic Food or Growing Your Own, Buying Locally-Produced Goods, Buying Used or Recycled Goods, Recycling and Composting, Buying Environmentally Friendly Products, Reading Product Labels Prior to Purchasing, Avoiding Excess Packaging, Fixing Something Rather Than Buying New, Sharing Products With Others, Minimising Water Use, Minimising Energy Use, Reducing Vehicle Use, Supporting Pro-Environmental Candidates in Elections, Donating to Charities, Participating in Environmental Activities, and Talking to Children about Food & Environmental Issues	"Never", "Rarely", "Occasionally", "Usually", "Always" and "I never have the opportunity" ("I never have the opportunity" was recoded to "Never" prior to data analysis)

The survey also measured two potential determinants of pro-environmental behaviour: environmental concern and values (Table 2.3). Environmental concern was elicited in the survey by including a brief, eight-item version of the New Environmental Paradigm (NEP) scale (Cordano et al., 2003) and a shorter, more environmentally-relevant version of Schwartz's value scale (Stern et al., 1998). The NEP scale is widely used as a measure of acceptance of a pro-environmental worldview, and has been found to be most accurately described as a measure of environmental concern or awareness of consequences (Stern et al., 1995).

We elicited respondent values with a shortened version of Schwartz's value scale, which includes twelve value statements asking respondents to "indicate how important each value is as a guiding principle in your life." The twelve statements relate to four core value categories that have been found to be particularly important in relation to pro-environmental behaviour: biospheric, traditional, altruistic, and egoistic values (Stern et al., 1998). The full question statements are depicted in Table 2.3.

Table 2.3. Questions that enquired into values

Question	List of activities	Choices
NEP scale (environmental concern): Please indicate your level of agreement with the following statements. (Cordano et al., 2003)	When humans interfere with nature, it often produces disastrous consequences The so-called "ecological crises" facing humankind has been greatly exaggerated The balance of nature is very delicate and easily upset Humans are severely abusing the environment Humans have the right to modify the natural environment to suit their needs If things continue on their present course, we will soon experience a major ecological catastrophe Plants and animals have as much right as humans to exist Humans were meant to rule over the rest of nature	"Strongly Disagree", "Disagree", "Undecided or Neutral", "Agree", and "Strongly Agree"
Stern et al.'s value scale: Consider each set of the items below and indicate how important each value is as a guiding principle in your life. (Stern et al., 1998)	Traditional values Family security, safety for loved ones Honouring parents and elders, showing respect Self-discipline, self-restraint, resistance to temptation Biospheric values Respecting the earth, harmony with other species Protecting the environment, preserving nature Unity with nature, fitting into nature Altruistic values Equality, equal opportunity for all -Social justice, correcting injustice, care for the weak - A world at peace, free of war and conflict Egoistic values Being influential, having an impact on people and events Being authoritative, leading or commanding Wealth, material possessions, money	"Not At All Important," "A Little Important," "Somewhat Important," "Very Important"

Finally, the survey also included a number of demographic questions to use as additional explanatory variables in the regression analysis, including income, education, type of area in which one lives (rural, urban, or suburban), and political party affiliation.

2.3. Factor Analysis

I use factor analysis to achieve my first two research objectives. Factor analysis can identify patterns in empirical data by grouping correlated variables into a smaller number of factors, and has been used in previous analyses of lifestyle practices seeking to identify groupings of practices, such as the importance of lifestyle variables to residential neighbourhood choice (Bagley and Mokhtarian, 1999), and the links between lifestyle (reflective of socio-environmental values and attitudes) and environmental action in and around the home (Barr and Gilg, 2006). Factor analysis can also help to reveal if engagement in pro-environmental practices is significantly associated with other lifestyle practices, or is independent, thus representing a unique "pro-environmental" lifestyle sector (Axsen et al., 2012).

Here, factor analysis was used to a) assess how a pro-environmental lifestyle (PEL) generally fits in with other lifestyle practices, and b) characterise different types of PELs. Both groups of questions (general lifestyle activities and pro-environmental lifestyle activities, as summarised in Table 2.2) were analysed independently. We first conducted oblique and orthogonal extraction, and compared results. Oblique extraction allows for correlation of the factors (the angle between the axes is not fixed during rotation) while orthogonal extraction does not allow for correlation of factors (the angle between the axes is fixed at 90 degrees during rotation) (Timmerman, 2005). Oblique is argued by some to be a superior method due to allowing for correlations (Costello & Osborne, 2005; Fabrigar et. al, 1999), but results can be more difficult to interpret. Comparing results from both extraction methods, the results were similar enough to justify using orthogonal rotation (the literature supports this if results from both extraction methods are similar – see Fabrigar et. al, 1999 and Leandre et. al, 1999). For both factor analyses I used orthogonal extraction--specifically I utilized the Principal Axis Factoring with Varimax rotation specification in SPSS 17.0. Factor rotation means that each factor has been rotated until it defines a distinct cluster of interrelated variables (Rummel, 1970).

I used a number of tests to determine the appropriate number of factors, including the scree plot test, eigenvalues > 1, and interpretability of factors (Costello & Osborne, 2005). The scree plot test involves examining the scree plot and finding the point where the scree plot straightens out (i.e. there is a marked change in the line's pattern). This point indicates the maximum number of factors to extract (Child, 1990, Fabrigar et al., 1999). The eigenvalues greater than 1 test involves choosing to retain as many factors as there are eigenvalues equal to or greater than 1 (Fabrigar et. al, 1999). And the interpretability test involves examining different factor results and choosing the solution that makes the most sense. All three tests were used together in order to choose the appropriate number of factors, however given the exploratory nature of this project, I focused most on interpretability.

2.4. Regression Analysis

I use linear regression analysis to address my third research objective. Linear regression is a method of analysis that models the relationship between a dependent variable, and one or more independent, explanatory variable(s). Data are modelled using linear predictor functions, and model parameters are estimated from the data.

I use the factors that resulted from the PEL activity questions as dependent variables in a series of multiple regression analyses—these factors can also be described as pro-environmental lifestyles (PELs) or "lifestyle sectors". Table 2.4 details the independent variables that were used in those regressions, as well as how we treated each variable, and what the hypothesised relationship is between each variable and with engagement in PEBs more generally. In particular, my analysis focuses on the four core values (biospheric, altruistic, egoistic and traditional) as key independent variables to see which values are associated with engagement in different PELs, when controlling for other factors. In other words, performing this multiple regression analysis allows me to identify which motivations (values) and contextual factors (demographics) correspond with engagement in different PELs.

Table 2.4. Independent variables used in regression analysis

Variables	Type of variable	Categories or explanation	Hypothesised relationship with engagement in PEL
Age	Continuous		?
Education	Nominal	Categories: College or University Graduate; Grad School; Other	+
Income	Continuous		+
Sex	Nominal	Categories: Male; female	?
Number of people in the household	Continuous		-
Province of origin	Nominal	Categories: AB; BC; ON; QC; Other	BC: + AB: -
Type of area in which one lives (urban, suburban, rural)	Nominal	Categories: Urban; Suburban; Rural	?
Work status	Nominal	Categories: Student; Employed; Retired; Other	Student: + Employed: ? Retired: + Other: ?
Values	Continuous	Four composite variables: Biospheric; Traditional; Altruistic; Egoistic Calculation: adding the totals in each category to achieve a total sum out of 12 (12 representing the highest level for that category).	Biospheric: + Traditional: - Altruistic: + Egoistic: -
New Environmental Paradigm (NEP) score	Continuous	Composite variable Calculation: assigning a value between -2 and 2 to each question option, from most environmentally-friendly answer to least environmentally-friendly answer. The score was the sum of all 8 questions.	+
Opinions on global warming	Nominal	1 = Believe “global warming is a serious problem, and immediate action is	+

Variables	Type of variable	Categories or explanation	Hypothesised relationship with engagement in PEL
		necessary"; 0 = Anything else	
Liminality score (openness to change)	Continuous	Composite variable Calculation: sum of scores across 9 questions, similar to NEP score.	+
Self-proclaimed climate change knowledge	Continuous		+
How often one votes	Continuous		+
Political party affiliation	Nominal	Categories: Conservative Party; New Democratic Party; Liberal Party; Bloc Québécois; Green Party	Conservative: - NDP: + Liberal: + Bloc Québécois: + Green: +

2.5. Study limitations

There are several limitations to this study. Data was collected via an internet survey, which limits our sample to people with computers, with internet access, and who are proficient enough to complete a survey online. Our sample also only included people who are already pre-registered to participate in surveys through a marketing research company. In addition, certain regions were not well represented in our study (i.e. the territories). Another limitation was the use of self-reported behaviours, which implies that people know themselves well enough to accurately report on lifestyle engagement and values, and that people are being honest. As with any method of data analysis, exploratory factor analysis has limitations, such as the subjectivity of researcher decisions in running and interpreting a factor analysis (Beavers et al., 2013; Henson & Roberts, 2006; Tabachnick & Fidell, 2001). In addition, there is debate in the literature about using orthogonal versus oblique rotation, and the different methods of rotation (Costello & Osborne, 2005; Fabrigar et al., 1999; Bryant & Yarnold, 1989; Beavers et al., 2013). We utilised the most widely used and most interpretable method, but it is not necessarily the method that will provide the most accurate results. Finally, the treatment of variables will affect results, such as treating age or income as continuous variables, which does not allow for non-linear relationships to emerge.

Chapter 3.

Results

This section details the results of all three analyses conducted with this sample of Canadian citizens: a) using factor analysis to learn how pro-environmental lifestyle fits with other lifestyle practices, b) using factor analysis to show the different types of pro-environmental lifestyles, and c) using regression analysis to explore how different core values are associated with citizen engagement in different pro-environmental lifestyles.

3.1. General lifestyle sectors

As explained in Section 2.3., I use several tests to determine the number of factors. The "eigenvalue greater than one" test and the scree plot both suggests 12 factors. However, after running a number of analyses and analysing multiple solutions, I chose 10 factors based on interpretability—which was my primary criterion for the factor solution (Table 3.1). Two variables, "Travelling other than work" and "Playing video games", do not load onto any factors.

I label these factors according the variables that they strongly load onto, that is, where the factor loading is generally greater than 0.4. I summarise these factors below:

- Factor 1: Technology – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to researching, shopping, talking about, and working with or using new technologies.
- Factor 2: Spirituality and Giving – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to religion, meditation, exploring spirituality, personal development, volunteering, or giving to charity.
- Factor 3: Career and Success – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to their career and developing career skills, studying, and commuting to and travelling for work. This group also spends significant time focusing on other sources of income generation and personal development.

- Factor 4: Environmental – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to helping the environment through daily actions, thinking about how to protect the environment, and engaging in and promoting environmental conservation. They spend some time attending environmental meetings, although this loading was relatively low at .320.
- Factor 5: Home-improvement – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to gardening (for food and aesthetic reasons), renovating the home, and decorating the home.
- Factor 6: Recreation – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to partaking in outdoor and indoor sports and recreation, spends time in nature, and spends time with friends (likely because they tend to do these activities with friends).
- Factor 7: Home-making – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to shopping for the home, doing housework, decorating the home, and preparing food.
- Factor 8: Active in Social Issues – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to following current events, discussing politics, taking part in politics, and attending environmental meetings (higher loading than the Environmental Practice factor at .376).
- Factor 9: Family – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to family, and taking care of family.
- Factor 10: Indoor Home Leisure – Respondents with high engagement in this lifestyle (factor) more frequently engage in activities relating to indoor hobbies such as arts and crafts, reading for leisure, watching TV & movies, and using the internet. Spending time with friends also grouped here, but was low at .306.

The general lifestyle categories (factors) seen in this factor solution are consistent with those found by Axsen et al. (2012), including technology-, spirtuality- and career-oriented lifestyles. Similar to Axsen et al. (2012), I find that the pro-environmental factor (lifestyle) emerged as a factor that was separate from other lifesyles and activities, which four of the five variables strongly load onto as expected. Interestingly, the “attending environmental meetings” variable is not strongly associated with other pro-environmental activities, and has a slightly stronger association with being active in social or plolitcal issues (Factor #8).

Table 3.1. Rotated Factor Matrix solution for General Lifestyle Sectors

Activities relating to:	#1: Tech.	#2: Spirit/ Giving	#3: Career	#4: Enviro.	#5: Home-Improve-ment	#6: Recrea-tion	#7: Home-making	#8: Social Issues	#9: Family	#10: Indoor Home	Communalities
Researching New Tech.	.790										.697
Shopping for New Tech.	.819										.773
Using New Tech.	.792										.710
Talking About New Tech.	.810										.758
Working With New Tech.	.703										.579
Personal Development		.374	.322								.398
Religion		.728									.554
Meditation		.723									.581
Exploring Your Spirituality		.840									.751
Volunteering		.505									.407
Giving To Charity		.470									.327
Main Career			.675								.487
Other Sources Of Income			.404								.200
Developing Career Skills			.774								.653
Studying			.538								.354
Commuting To Work			.614								.401
Travelling For Work			.601								.427
Thinking About Enviro.				.788							.705
Trying To Help the Enviro.				.733							.622
Attending Enviro. Meetings				.320				.376			.516
Engaging In Enviro.				.535							.479
Promoting Enviro. Conservation				.674							.634
Gardening Decoration					.776						.706
Gardening Food					.723						.594
Renovating House					.598						.496

Activities relating to:	#1: Tech.	#2: Spirit/ Giving	#3: Career	#4: Enviro.	#5: Home-Improve-ment	#6: Recrea-tion	#7: Home-making	#8: Social Issues	#9: Family	#10: Indoor Home	Communalities
Doing Housework							.529				.430
Decorating Home					.496		.358				.510
Spending Time In Nature						.575					.511
Outdoor Sports and Recreation						.776					.699
Indoor Sports and Recreation						.599					.451
Shopping for Food							.778				.644
Shopping (Non Food)							.554				.436
Preparing Food							.474				.305
Following Current Events								.440			.317
Taking Part in Politics								.627			.614
Discussing Politics								.696			.591
Taking Care Of Family									.742		.649
Spending Time With Family									.849		.796
Indoor Hobbies										.325	.272
Reading For Leisure										.346	.243
Watching TV & Movies										.581	.381
Using Internet Leisure										.582	.409
Spending Time With Friends						.331				.306	.309
Travelling Other Than Work											.200
Playing Video Games											.193
Total Variation	**8.136**	**6.562**	**6.474**	**5.581**	**4.938**	**4.623**	**4.223**	**3.784**	**3.266**	**3.014**	

3.2. Pro-enviromental lifestyle sectors

I conducted a second factor analysis to investigate the different types of pro-environmental lifestyles (PELs) that may exist, this time using the 45 PEL sectors questions. The eigenvalues and scree plot tests suggested that the 11 factor solution was optimal. This 11-factor solution also made the most sense intuitively so I consider it to also be interpretable (although the 9 factor solution was a close second in terms of interpretability). One variable, “Hang clothes to dry”, did not load onto any factor.

Table 3.2 depicts the 11 factor solution, where I labelled each factor according to the variables that it strongly loads onto.

- Factor 1 – Home Conservation: Activity variables that grouped here include turning off the tap when doing dishes, soaping up, brushing teeth, minimising the number of baths and showers, reducing air conditioning use, reducing hot water temperature, turning down the heat, turning off lights when not in use, shutting off electrical appliances when not in use, and minimising water use in the yard. Using the washer and dryer only when full and avoiding excess packaging both loaded here as well, but only weakly so (.338 and .304, respectively). This PEL includes activities that are targeted at general water and electricity conservation.
- Factor 2 – Food Conscious: Variables that grouped here include buying organic food, buying fair-trade food, buying food from a farmer’s market, buying local food, eating a veggie diet, eating organic, free-range food, buying environmentally-friendly cleaners, reading product labels, avoiding excess packaging, and supporting environmental politicians.
- Factor 3 – Avoid New Purchasing: Variables that grouped here include avoiding excess packaging, buying used products, making own products instead of buying, fixing something rather than buy new, and trading or sharing with others instead of buying own.
- Factor 4 – Electricity Conservation: Variables that grouped here include using the washer and dryer only when full, turning off lights when not in use, and shutting off electrical appliances when not in use. Using a reusable bag and preparing one’s own food also loaded here, but only weakly (0.424 and .307 respectively). These activities are primarily concerned with electricity conservation, whether for environmental or financial reasons (motivation cannot be determined by the factor analysis).
- Factor 5 – Political Environmental: Variables that grouped here include supporting environmental politicians, attending pro-environmental meetings, and participating

in environmental activities. This factor represents social environmentalism, especially through politics, and being active in getting involved.

- Factor 6 – Nature Educator: Variables that grouped here include growing one's own food, talking to kids about how food grows and where it comes from, and discussing environmental issues with kids. Buying food at a farmer's market also grouped here, but only weakly (.306). This group of activities represents a concern with educating younger ones, through discussion and demonstration (growing one's own food).
- Factor 7 – Efficiency Purchasing: Variables that grouped here include buying high efficiency lights, buying energy efficient appliances, and buying an efficient vehicle. This factor represents either concern about energy use, or concern about saving money associated with energy use.
- Factor 8 – Charitable Donator: Variables that grouped here include donating furniture and clothing to charity. This consistently came out as its own factor. This factor represents either a) trying to reduce waste through donating to charity, or b) trying to help out those less fortunate.
- Factor 9 – Recycling: Variables that grouped here include reusing paper and glass, using recycling bins, composting, and buying recycled products. These activities are primarily concerned with minimising waste production, at least in theory.
- Factor 10 – Reduce driving: Variables that grouped here include more often using transit or carpooling, or walking or cycling instead of driving.
- Factor 11 – Buy local: Variables that grouped here include buying local foods, buying environmentally-friendly cleaners, buying recycled products, buying from a local store, and turning off the tap when doing dishes and soaping up. Buying food from a farmer's market also loaded here, but only weakly (.303). These activities are concerned with buying local and water conservation, but also with waste reduction (buying recycled products) and toxin reduction (environmentally friendly cleaners).

This analysis showed that there are 11 different pro-environmental lifestyle sectors that Canadians may engage in. The variables within a given factor are strongly related with one another, but engagement in the different lifestyles (factors) are not correlated with one another. Therefore, these results support the notion that there are a variety of PELs across Canadian citizens, and we have identified 11 of these lifestyles.

Table 3.2. Rotated Factor Matrix solution for Pro-environmental Lifestyle Sectors

	#1: Home con-serve.	#2: Food cons-cious	#3: Avoid new purchase	#4: Electric con-serve.	#5: Politic-al enviro.	#6: Nature educator	#7: Efficiency purchase	#8: Do-nate	#9: Re-cycling	#10: Reduce driving	#11: Buy local	Comm-unalities
Turn Off Tap Soaping Up	.599										.321	**.528**
Turn Off Tap Brushing Teeth	.593											**.427**
Min # Baths Showers	.566											**.397**
Reduce Air Cond	.484											**.314**
Reduce Hot H_2O Temp	.610											**.508**
Turn Down Heat	.596											**.481**
Min H2O Use Yard	.450											**.391**
Turn Off Tap Dishes	.501										.444	**.525**
Washer Dryer Only Full	.338		.344									**.349**
Buy Organic Food		.766										**.668**
Buy Fair Trade Food		.550										**.456**
Eat Veggie Diet		.555										**.395**
Eat Org Free Range Food		.809										**.739**
Buy Env Cleaners		.387									.380	**.574**
Read Product Labels		.346										**.336**
Buy Food Farmers Market		.356				.306					.303	**.466**
Avoid Excess Packaging	.304	.351	.347									**.492**
Buy Used Products			.651									**.505**
Make Own Products			.670									**.612**
Fix Rather Than Buy New			.546									**.451**
Trade Or Share Instead Of Buy			.611									**.539**
Turn Off Lights	.342			.652								**.598**
Shut Off Elec Appliances	.369			.467								**.399**

	#1: Home con-serve.	#2: Food cons-cious	#3: Avoid new purchase	#4: Electric con-serve.	#5: Politic-al enviro.	#6: Nature educator	#7: Efficiency purchase	#8: Do-nate	#9: Re-cycling	#10: Reduce driving	#11: Buy local	Comm-unalities
Use Reusable Bag				.424								**.365**
Prepare Own Food				.307								**.264**
Support Env Politicians		.342			.374							**.466**
Attend Pro Env Meetings					.768							**.773**
Participate In Env Activities					.701							**.688**
Talk To Kids About Food						.777						**.736**
Discuss Env With Kids						.605						**.602**
Grow Own Food						.361						**.334**
Buy High Efficiency Lights							.587					**.442**
Buy Energy Efficient Appliances							.705					**.624**
Buy Efficient Vehicle							.443					**.333**
Donate Furniture To Charity								.684				**.634**
Donate Clothes To Charity								.745				**.673**
Reuse Paper Glass									.420			**.392**
Use Recycling Bins									.412			**.418**
Compost									.539			**.446**
Use Transit or Carpool										.744		**.600**
Walk or Cycle										.585		**.423**
Buy Recycled Products									.347		.360	**.578**
Buy Local Foods		.330									.449	**.503**
Buy From Local Store											.339	**.336**
Hang Clothes To Dry												**.256**
Total Variation	**8.289**	**7.028**	**5.759**	**4.048**	**4.034**	**3.759**	**3.727**	**3.479**	**3.050**	**2.898**	**2.894**	

3.3. Pro-environmental lifestyles and biospheric values

To achieve the third research objective, I estimated a total of 11 regressions – one for each of the PELs (factors) identified in the previous section. I used the independent variables explained in Section 2.4. Table 7 shows comprehensive results from the 11 regressions. Table 8 shows the number of times that each independent variable was significant across the 11 regressions, and whether the relationship in lifestyle engagement was positive or negative.

Of the four value categories, the Biospheric values variable is most frequently found to be statistically significant among the 11 regressions models, and is found to be a positive predictor of respondent engagement in four lifestyles: Home Conservation, Food Conscious, being a Nature Educator, and Recycling. It is a negative predictor of engagement in the Buy Local lifestyle (at a 95% confidence level). Interestingly, the New Environmental Paradigm (NEP) score (a measure of environmental concern) is a positive predictor of Buy Local. Biospheric Values is unrelated to respondent engagement in the other six PEL sectors.

Traditional Values is significant four times, and Egoistic and Altruistic Values both appear significant three times. Traditional Values is positively associated with the Electricity Conservation lifestyle and Efficiency Purchasing lifestyle, and negatively associated with Food Conscious and Political Environmental lifestyles. Egoistic Values is positively associated with the Political Environmental lifestyle, while Altruistic Values is negatively associated with that factor. Egoistic Values is, in contrast, negatively associated with the Efficiency Purchasing lifestyle and the Recycling lifestyle. Altruistic Values is also negatively associated with Avoid New Purchasing, and positively correlated with Buy Local. Efficiency Purchasing is positively correlated with higher income and liminality.

Across the 11 regressions, income is the demographic variable that is most frequently found to be statistically significant among the regression models, followed by voting frequency, and age. Among the least statistically significant variables are education level and political party association.

In particular, income seems to be an important contextual variable. It is a positive predictor of respondent engagement in four lifestyles: Home Conservation, Nature Educator,

Efficiency Purchasing, and Recycling. Income is also a negative predictor of four lifestyles: Avoid New Purchasing (indicating that higher income purchases new more often), Electricity Conservation, Political Environmental (higher income is less environmentally politically active), and Reduce Driving.

Voting frequency and age are both positively associated with the PEL factors four times and negatively associated once. Knowledge Level of Climate Change appears significant three times (positive in all three cases). Environmental concern, as indicated by the New Environmental Paradigm (NEP) score, is positively associated with two PELs. Province of residence is not clearly positively nor negatively associated with any PELs, although living in British Columbia did appear negatively associated in two models, and only positively correlated once.

Table 3.3. Pro-environmental lifestyles regression results

Model	1. Home conserve. (R^2 = .097)	2. Food conscious (R^2 = .136)	3. Avoid new purchase (R^2 = .075)	4. Electric conserve (R^2 = .134)	5. Political Enviro. (R^2 = .137)	6. Nature Educator (R^2 = .216)	7. Efficiency Purchase (R^2 = .111)	8. Donator (R^2 = .113)	9. Re-cycling (R^2 = .068)	10. Reduce Driving (R^2 = .254)	11. Buy Local (R^2 = .113)
Values (Continuous)											
Biospheric Values	0.203**	0.257**	0.021	-0.035	0.035	0.092*	-0.02	0.084	0.111*	0.021	-0.087*
Traditional Values	0.02	-0.164**	0.031	0.137**	-0.122**	0.02	0.141**	-0.035	0.016	-0.018	0.038
Altruistic Values	0.012	-0.036	-0.105**	0.039	-0.077*	-0.028	-0.035	0.008	-0.055	-0.017	0.096*
Egoistic Values	0.014	0.033	0.064	-0.054	0.16**	0.024	-0.093**	0.008	-0.08*	0.036	0.059
Environmental variables											
NEP Score *(cont.)*	-0.024	-0.025	0.014	0.065	-0.062	-0.065	0.062	0.025	-0.037	0.07*	0.12**
Liminality Score (cont.)	-0.025	0.171**	0.046	-0.011	0.054	0.008	0.075*	0.042	-0.017	0.018	0.093**
Believe global warming is a serious problem *(dummy)*	0.11**	0.002	-0.039	-0.056	0.076*	-0.037	0.066	0.009	0.043	-0.044	-0.007
Believe air pollution is a serious problem *(dummy)*	0.066	0.009	0.035	-0.025	-0.037	0.043	-0.055	0.016	0.031	0.063	0.004
Climate Change Knowledge *(cont.)*	-0.045	0.066*	0.014	0.089**	0.061	0.041	0.044	-0.016	0.001	0.086**	0.04
Demographics											
Income (continuous)	0.096**	0.04	-0.105**	-0.13**	-0.079*	0.074*	0.208**	0.036	0.072*	-0.136**	0.057
Voting Frequency (cont.)	0.009	-0.09**	0.029	0.077*	0.078*	-0.028	0.034	0.106**	0.034	0.037	0.075*
Respondent Age (cont.)	-0.017	0.123**	-0.077	0.152**	0.122**	-0.066	0.002	0.092*	0.032	-0.302**	0.072
Sex *(male = 0; female = 1)*	-0.036	0.052	0.053	0.084**	-0.058	0.02	-0.058	0.184**	0.028	0.046	-0.01
# In Household (cont.)	-0.022	0.02	-0.03	-0.032	0.039	0.356**	-0.036	0.069*	0.093*	-0.099**	-0.044
Student *(Dummy)*	-0.027	0.084**	-0.003	0.003	0.031	-0.1**	-0.049	-0.091**	0.049	-0.024	-0.082*
Employed (*Dummy*)	-0.05	-0.002	-0.011	0.049	0.111**	-0.1**	-0.001	0.015	0.064	-0.002	-0.116**
Retired *(Dummy)*	-0.006	-0.052	-0.056	-0.016	0.088	-0.067	0.038	0.038	0.068	-0.019	-0.031
University Grad *(dummy)*	-0.025	0.063*	0.031	-0.001	0.037	-0.03	0.003	0.016	0.027	-0.008	-0.055
Grad School *(dummy)*	0.06	0.007	0.056	-0.029	0.046	-0.012	-0.026	0.008	-0.002	0.078**	-0.053

Model	1. Home conserve. (R^2 = .097)	2. Food conscious (R^2 = .136)	3. Avoid new purchase (R^2 = .075)	4. Electric conserve (R^2 = .134)	5. Political Enviro. (R^2 = .137)	6. Nature Educator (R^2 = .216)	7. Efficiency Purchase (R^2 = .111)	8. Donator (R^2 = .113)	9. Re-cycling (R^2 = .068)	10. Reduce Driving (R^2 = .254)	11. Buy Local (R^2 = .113)
Region (dummy)											
Alberta	0.004	-0.015	0.04	0.105**	0.001	-0.029	-0.053	0.074*	-0.021	0.039	-0.013
British Columbia	-0.01	0.017	-0.029	0.174**	0.033	-0.093*	-0.09*	0.035	0.055	0.049	-0.044
Ontario	0.03	-0.036	-0.005	0.188**	0.069	-0.112**	-0.021	0.046	0.135**	0.072	-0.098*
Quebec	0.028	-0.044	-0.124**	0.129**	-0.008	0.01	-0.086	0.088	0.043	0.017	-0.056
Urban	-0.097*	0.064	-0.073	-0.066	-0.07	-0.077*	0.022	0.171**	-0.022	0.35**	-0.072
Suburban	-0.019	0.059	-0.063	-0.048	-0.102*	-0.038	0.041	0.164**	0.063	0.127**	-0.164**
Political affiliation (dummy)											
Conservative	-0.037	-0.006	0.094**	-0.074*	0.027	-0.028	0.006	0.006	0.032	-0.054	0.032
NDP	-0.01	0.04	0.051	0.031	0.05	0.071*	0.034	-0.058	-0.032	0.018	-0.002
Liberal	-0.041	0.02	0.032	0.009	0.104**	0.011	-0.012	-0.009	0.048	0.034	0.003
Bloc Québécois	-0.032	0.016	0.05	0.022	0.014	0.016	0.067*	0.003	-0.067*	0.031	0.028
Green Party	-0.034	0.115**	0.102**	0.006	0.049	0.017	-0.016	0.028	-0.017	0.015	-0.013

*Sig. < .05 **Sig. < .01

Table 3.4. Independent Variables found to be significantly correlated with the 11 Lifestyle Factors

Independent Variable	Number of times appeared positively significant	Number of times appeared negatively significant	Total times appeared significant
Income (continuous variable)	4	4	8
Biospheric Values	4	1	5
Voting Frequency	4	1	5
Age (continuous variable)	4	1	5
Urban Living	2	2	4
Suburban Living	2	2	4
Student	1	3	4
# of People in the Household	3	1	4
Traditional Values	2	2	4
Living in Ontario	2	2	4
Egoistic Values	1	2	3
Altruistic Values	1	2	3
Knowledge Level of Climate Change	3	0	3
Liminality Score	3	0	3
Employed	1	2	3
Living in BC	1	2	3
Living in Quebec	1	1	2
Sex	2	0	2
Believe that Global Warming is a serious problem	2	0	2
Association with the Conservative Party	1	1	2
Association with the Bloc Québécois	1	1	2
Association with the Green Party	2	0	2
NEP Score	2	0	2
Live in Alberta	2	0	2
Grad Degree or Higher	1	0	1
College or Uni Grad (undergrad)	1	0	1
Association with the Liberal Party	1	0	1
Association with the NDP	1	0	1

Chapter 4.

Discussion

This section discusses the results of analysis in relation to the literature, broken down according to my three research questions:

1. How does pro-environmental lifestyle (PEL) fit with other lifestyle practices?
2. What are the different types of PELs? and
3. How do different core values influence citizen engagement in PELs?

4.1. General lifestyle sectors

My results from the General Lifestyle Sectors section of analysis indicate that engagement in pro-environmental activities forms a unique lifestyle—a general PEL that is separate from other lifestyles, which is consistent with the exploratory findings of Axsen et al. (2012). Therefore, living a PEL in general does not necessarily fit in with other Canadian lifestyle practices. The general PEL I identify with this Canadian sample includes five types of activities: thinking about protecting the environment, trying to help the environment through daily actions, promoting environmental conservation, engaging in environmental conservation activities, and, to a lesser extent, attending environmental meetings. Interestingly, the "attending environmental meetings" activity variable loaded quite low on the pro-environmental factor in all factor solutions that I explored. This finding suggests that attending environmental meetings may be more politically-motivated, undertaken by those engaged in political activities and lifestyles (as represented by Factor #8 in Table 3.1). Factor #8 describes those who are active in political-oriented activities, and it is this lifestyle that is associated with attendance at pro-environmental meetings. It is also interesting that the "recreation" lifestyle (Factor #6 in Table 3.1), was not associated with the PEL, showing no evidence that there is an

association between engagement in lifestyles relating to spending time in nature and lifestyles relating to protecting nature.

The other (non-environmental) lifestyle factors identified in this study are generally consistent with Axsen et al. (2012), including the “Tech-explore” and “Outdoor-active” factors, which correspond with the “Technology” and “Recreation” factors identified in the present study.

4.2. Pro-environmental lifestyle sectors

Within the general PEL identified in the first factor analysis, there are several different subcategories of PEL sectors, indicating that one universal PEL does not exist. In other words, there are a variety of different lifestyles that might be perceived as “pro-environmental” by Canadian citizens. Specifically, we identify the following PELs :

- Factor 1: “Home conservation” encompasses activities that are oriented toward general water and electricity conservation.
- Factor 2: “Food conscious” represents activities related to buying organic and environmentally-friendly household food and products.
- Factor 3: “Avoid new purchasing” includes activities that avoid the need to purchase “new” products, such as purchasing used products, or fixing broken products.
- Factor 4: “Electricity conservation“ includes activities relating to electricity conservation, such as turning off lights when not in use.
- Factor 5: “Political environmental” includes activities such as attending environmental meetings and taking part in environmental activities.
- Factor 6: “Nature educator” represents activities relating to educating children about food and environmental activities.
- Factor 7: “Efficiency purchasing“ activities include the purchase of energy efficient appliances, light bulbs and vehicles.
- Factor 8: “Charitable donator” includes activities relating to donating furniture and clothes to charity.
- Factor 9: “Recycling” activities include recycling materials, reusing, and composting.

- Factor 10: “Reduce driving” represents engagement in transportation methods other than driving a vehicle alone, including taking transit, carpooling, walking, or cycling.
- Factor 11: “Buy local” includes activities related to buying “local” products, as well as several other activities such as water conservation, buying recycled products, and buying environmentally friendly cleaners.

Studies by Whitmarsh and O’Neil (2010) and Barr et al. (2011) support my general finding that what is considered to be a PEL can vary across respondents . In particular, Whitmarsh & O’Neill (2010) conducted a factor analysis with U.K. survey data and found seven groupings of Pro-Environmental Behaviours (PEBs). Their “Regular water and domestic energy conservation” factor corresponds with my “Home Conservation” factor; their “Eco-shopping and eating” factor closely corresponds with my “Food Conscious” factor; their “Political actions” factor corresponds with my “Political Environmental” factor; their “One-off domestic energy conservation actions” coincides with our “Efficiency Purchasing” factor ; their “Waste reduction” factor corresponds with “Recycling”, “Home Conservation”, and “Avoid New Purchasing” factors; and their “Reducing car use and flights” somewhat corresponds with my “Reduce Driving” factor. My present analysis finds four additional factors, which are Electricity Conservation, Nature Educator, Donate, and Buy Local. I likely find these additional factors because my survey instrument specified 45 different PEBs, whereas Whitmarsh and O’Neil (2010) specified only 26 activities in their survey.

4.3. Linking engagement in pro-environmental lifestyles to values

Much literature finds that engagement in PEBs is generally associated with biospheric and altruistic values, including Stern et al. (1995). After estimating regression models for respondent engagement in each of the 11 pro-environmetal lifestyle factors that we identify, I discover that Biospheric Values are only positively associated with engagement in a subset of these PELS, namely Home Conservation, Food Conscious, being a Nature Educator, and Recycling. However engagement in several of the PELs I identify are not associated with Biospheric Values--Avoid New Purchasing, Electricity

Conservation, Political Environmental, Efficiency Purchasing, Charitable Donator, and Reduce Driving.

This pattern is similar to Whitmarsh & O'Neill (2010), who found that pro-environmental self-identity and environmental concern (NEP) is associated with engagement in only some PELs. They found that pro-environmental identity is associated only with eco-shopping and eating, waste reduction, and regular water and domestic energy conservation, but a pro-environmental identity was not associated with one-off domestic energy conservation actions, eco-driving, political actions, or reducing car use and flights. Clearly, engagement in PEL can be associated with a variety of motivations—not just an interest in protecting the environment.

I find that several other values can be significant predictors of PEB. Traditional values is positively associated with engagement in Electricity Conservation and Efficiency Purchasing lifestyles—both of which are not associated with biospheric values or environmental concern. Interestingly, engagement in these lifestyles can also correspond to cost savings, suggesting that respondents may engage in such activities for financial reasons and not likely for pro-environmental reasons. Traditional values are negatively correlated with Food Conscious and Political Environmental lifestyles. In contrast, Stern et al. (1995) found that Traditional Values were negatively related to all pro-environmental behaviours, although not significantly.

Egoistic Values is positively associated with Political Environmental lifestyle, while it is negatively correlated with Efficiency Purchasing and Recycling. The latter two results are not surprising, as egoistic values are generally found to have a negative or non-significant association with pro-environmental behaviours. It is interesting that political environmental lifestyles are found to be correlated with egoistic values. Stern et al. (1995) found that egoistic values are negatively correlated with taking political action for the environment, but positively correlated with willingness to write a letter to the government supporting policies to reduce the use of fossil fuels, and to stop the loss of tropical forests. The present finding is a novel one that probably warrants future research attention.

The New Environmental Paradigm (NEP) score is a measure than can represent the respondent's level of environmental concern. I found NEP score to be only significantly associated with engagement in the Buy Local lifestyle. Similarly, Whitmarsh & O'Neill (2010) found NEP did not predict engagement in any PEBs. Rather, they found that pro-environmental self-identity is a stronger motivation for behaviour than environmental concern. It seems that in both studies, once the stronger predictor is controlled for (biospheric values or pro-environmental identify), the NEP variable becomes insignificant.

4.4. Linking engagement in pro-environmental lifestyles to contextual factors

While I find that values and environmental concern can help to explain citizen engagement in some PELs, clearly there are other important factors that matter, such as context. For example, Whitmarsh & O'Neill (2010) comment that individuals may be "unable to translate their pro-environmental self-identity into consistent pro-environmental behaviours due to lack of available options" (Whitmarsh & O'Neill, 2010, p. 312). For this reason, my regression models also controlled for several contextual factors, some of which helped to explain engagment in pro-environmental lifestyles.

Income is the variable that is most frequently significant across the models that were estimated. Having a higher income was positively associated with several PELs: Home Conservation, Nature Educator, Efficiency Purchasing, and Recycling. In the case of Efficiency Purchasing, energy efficient appliances and devices typically have greater up-front costs, which would likely deter lower income households from purchasing them. With regard to Recycling, it could be that higher income households tend to live in homes and neighbourhoods with more accessible recycling facilities.

Where income was negatively correlated with the dependent variable included Avoid New Purchasing (indicating that higher income households purchases new products more often), Electricity Conservation, Political Environmental (higher income household are less engaged in environmental meetings and activities), and Reduce Driving. It seems to make sense that lower income households are more likely to focus

on conserving energy, and also more likely to use transportation alternatives other than driving a single occupancy vehicle. These findings on the importance of household income are consistent with previous literature (Whitmarsh, 2009; Evans & Abrahamse, 2009). For example, Whitmarsh (2009) concluded that, in Hamsphire, England, energy conservation is likely motivated more by financial or health considerations than out of concern for climate change. However, Sanquist et al. (2012) found that, in the United States, income is not a good predictor of energy consumption--rather, other contextual factors accounted for the greatest variation in electricity consumption, such as climate, household size, and computer or television usage.

Chapter 5.

Conclusion

This study demonstrates that engagement in pro-environmental activities forms a unique lifestyle—separate from other lifestyles. Moreover, there are many different versions of pro-environmental lifestyles—I identify 11 categories. Individual values can be associated with lifestyle, where engagement in 5 of the 11 pro-environmental lifestyles is positively associated with biospheric or altruistic values. Egoistic and Traditional Values are also related to 3 pro-environmental lifestyle categories. Other personal factors also help to explain pro-environmental lifestyle engagement, including income, age, and type of residence (urban, suburban or rural). Therefore, changes in Canadians' values are not necessarily the only way to increase engagement in pro-environmental lifestyles—nor is it likely to be the best way. Future research may seek to understand the conditions, contexts, and motivations behind consumer behaviour more thoroughly, in addition to understanding how societal influence affects behaviour in various parts of the world.

References

Abrahamse, W. & Steg, L.(2011). Factors related to household energy use and intention to reduce it: The role of psychological and socio-demographic variables. Human Ecology Review, 18(1), 30-40.

Axsen, J., TyreeHageman, J., & Lentz, A. (2012). Lifestyle practices and pro-environmental technology. Ecological Economics, 82, 64–74.

Bagley M. & Mokhtarian P. (1999). The role of lifestyle and attitudinal characteristics in residential neighborhood choice. Transportation and traffic theory: Proceedings of the 14th International Symposium on Transportation and Traffic Theory. Pergamon Press, Oxford, pp 735–758.

Barr, S. & Gilg, A. (2006). Sustainable lifestyles: Framing environmental action in and around the home. Geoforum, 37, 906-920.

Barr, S., Shaw, G., & Coles, T. (2011). Sustainable lifestyles: sites, practices, and policy. Environment and Planning, 43(12), 3011–3029.

Beavers, A., Lounsbury, J., Richards, J., Huck, S., Skolits, G., & Esquivel, S. (2013). Practical Considerations for Using Exploratory Factor Analysis in Education Research. Practical Assessment, Research & Evaluation, 18(6), 1-13.

Bryant, F. B., & Yarnold, P. R. (1989). A measurement model for the student version of the Jenkins Activity Survey. Journal of Personality Assessment, 53, 188-191.

Child, D., 1990. The essentials of factor analysis, second edition. London: Cassel Educational Limited.

Cordano, M., Welcomer, S., & Scherer, R. (2003). An analysis of the predictive validity of the new ecological paradigm. Journal of Environmental Education, 34, 22–28.

Costello, A. B. & Osborne, J. W. (2005). Best Practices in Exploratory Factor Analysis : Four Recommendations for Getting the Most From Your Analysis. Practical Assessment, Research & Evaluation, 10(7), 1-9.

Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. Annual Review of Environment and Resources, 30, 335-372.

Dunlap, R. & Van Liere, K. (1978). The “New Environmental Paradigm": A proposed measuring instrument and preliminary results. The Journal of Environmental Education, 9, 10-19.

Evans, D. & Abrahamse, W. (2009). Beyond rhetoric: The possibilities of and for 'sustainable lifestyles'. Environmental Politics, 18, 486-502.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. Psychological Methods, 4(3), 272-299.

Henson, R.K. & Roberts, J.K. (2006). Use of exploratory factor analysis in published research: common errors and some comment on improved practice. Educational and Psychological Measurement, 66, 393-416.

Herndl, C. G., & Nahrwold, C. A. (2000). Research as social practice: a case study of research on technical and professional communication. Written Communication, 17(2), 158-296.

Jackson, T., 2005. Motivating Sustainable Consumption: A Review of Evidence on Consumer Behaviour and Behavioural Change. Sustainable Development Research Network, University of Surrey, Guildford, Surrey, UK.

Rummel, R., 1970. Applied Factor Analysis. Northwestern University Press.

Sanquist, T. F., Orr, H., Shui, B., & Bittner, A. C. (2012). Lifestyle factors in U.S. residential electricity consumption. Energy Policy, 42, 354–364.

Schelly, C. (2014). Implementing renewable energy portfolio standards: The good, the bad, and the ugly in a two state comparison. Energy Policy, 67, 543-551.

Schwartz, S. H. & Bilsky, W. (1987). Toward a Universal Psychological Structure of Human Values. Journal of Personality and Social Psychology, 53, 550-562.

Spaargaren, G. (2003). Sustainable consumption: A theoretical and environmental policy perspective. Society & Natural Resources, 16, 687-701.

Stern, P. C., Dietz, T., & Guagnano, G.A. (1995). The New Ecological Paradigm in Social-Psychological Context. Environment and Behavior, 27(6), 723–743.

Stern, P.C., Dietz, T., & Guagnano, G.A. (1998). A brief inventory of values. Educational & Psychological Measurement, 58, 984–1001.

Tabachnick, B. & Fidell, L. (2001). Using multivariate statistics. Needham Heights: Allyn & Bacon.

Timmerman, M. (2005). Factor Analysis. Paper published at Heymans Institute for Psychology, Rijksuniversiteit Groningen, Netherlands, February 5, 2005.

Whitmarsh, L. (2009). Behavioural responses to climate change: asymmetry of intentions and impacts. Journal of Environmental Psychology, 29, 13–23.

Whitmarsh, L. & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. Journal of Environmental Psychology, 30(3), 305–314.

Wilson, C. & Dowlatabadi, H. (2007). Models of Decision Making and Residential Energy Use. Annual Review of Environment and Resources, 32, 169-203.