Our House Is a Very, Very, Very, Green House: A Study of Sustainable Household Behaviors Across the Socioeconomic Spectrum in Vermont and New Hampshire

Our House is a Very, Very, Very, Green House:
A Study of Sustainable Household Behaviors across the Socioeconomic Spectrum in Vermont and New Hampshire

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Abstract

The motivators behind sustainable behaviors and practices in the American home are an important area of study for those interested in how "grassroots" change may influence broader societal transitions towards a more energy efficient and sustainable society. The goal of this study is to better understand the motivators behind behaviors broadly considered to lead to a more sustainable lifestyle in the American home. Specifically, this study will explore whether economic or financial status has a significant influence over these behaviors. Previous studies suggest that economic factors play a large role in determining whether or not an individual or household participates in behaviors considered to be environmentally sustainable behaviors (ESBs). In order to test this hypothesis, a survey was electronically distributed to 420 subjects across New Hampshire and Vermont. The questions in the survey (found in the appendix) focused on personal adoption of ESBs. The survey asked subjects to answer a series of questions about their habits in the home environment, with specific emphasis on ESBs related to energy consumption. The answers were then compared against several demographic factors also asked of the individual as they took the ESB survey, including the individual's yearly income, education level, political affiliation, religious ideology, age, gender, and state of residence. Response data from the survey were analyzed using three methods: 1) a non-parametric one-way ANOVA test assuming Gaussian distribution, 2) a sustainability index, and 3) a qualitative analysis of survey responses. The results of the ANOVA test showed that the only statistically significant demographic factor in determining likelihood of participating in ESBs among the regions sampled for this study

was gender, with a P-value of .0061, indicating that women are more likely to participate in ESBs than men. The results of the sustainability index and qualitative analyses of survey data, while not resulting in statistically significant outcomes, did reveal points of interest that suggest additional study is warranted.

The parameters of this initial study are understandably complex and, given the interconnectedness of factors and predictor variables, the results currently challenge a singular interpretation. Further research could focus on (1) streamlining survey questions, and (2) increasing the size of the survey pool to ensure greater statistical confidence in the results to both further understand the ANOVA result and potentially elucidate more statistically significant findings for other demographic factors. This field of study is of clear importance to those working to develop a better understanding of motivators for community-based engagement in environmentally sustainable behaviors.

Dedication

This thesis and the work therein is dedicated to my parents, Drs. David A. and Joanna M.K. Smith and to my sister, Celia Luterbacher - who together, in nicknaming me "Molecule", started a lifelong fascination and love of science and the environment which has brought me here today.

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Chapter I

Introduction

Climate change is one of the greatest threats the world faces today (Rosenzweig, Solecki, Hammer & Mehrotra, 2010). Global temperatures are rising by an average of 0.2°C per decade over the past 30 years. The graph below shows this trend, as the 10 warmest years in the past 136 (with the exception of 1998), have all occurred since 2000 (Figure 1). Changes in season length, weather severity, and sea levels are already measurable (IPCC, 2014) and appear to be continuing to rise. Furthermore, extreme weather patterns, droughts, floods and the increased incidence and spread of epidemic diseases may be attributed to global climate change (Rosenzweig et al., 2010).

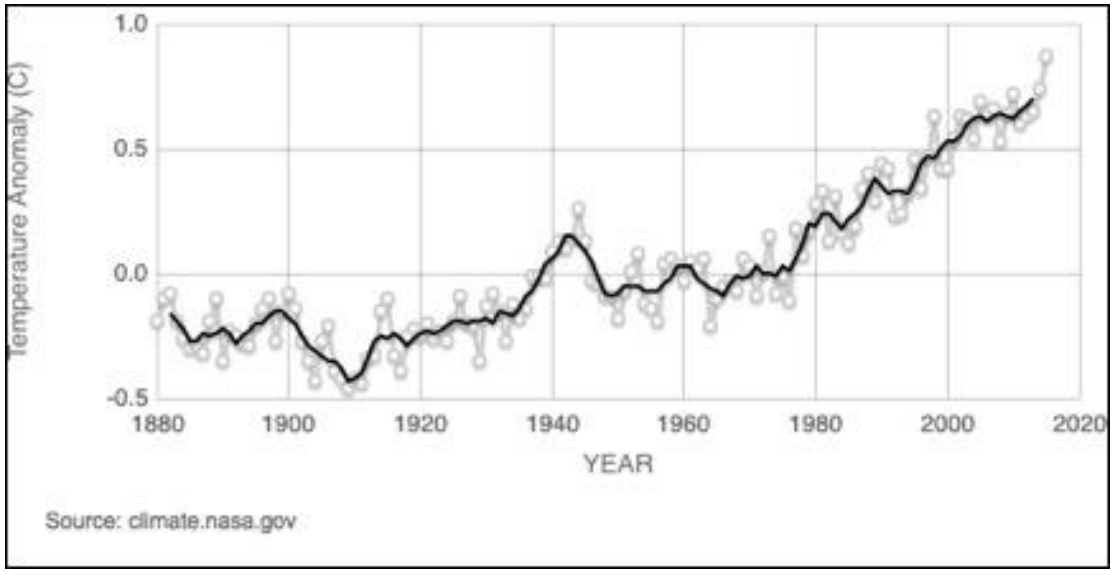

Figure 1. Global land-ocean temperature index since 2000 (NASA's Goddard Institute for Space Studies, 2010).

Global climate change is largely driven by the presence of greenhouse gas emissions in the atmosphere, particularly methane (CH_4) and carbon dioxide (CO_2) (IPCC, 2014). The concentration of CO_2 in the atmosphere has risen dramatically over the past century, increasing at a rate of 1.5 parts per million (ppm) per year from 1980-1999 to 2.2 ppm/year in 2007 (IPCC, 2014). The majority of climate change policy attention has addressed long-term resolution options aimed at restricting greenhouse gas emissions by industries, taxing CO_2 emissions and mandating renewable energy protocols (Lutsey & Sperling, 2008). International efforts to curtail global climate change are varied and depend on the perceived threat in each country. Previous research has shown that the average American does have the capacity to enact measurable environmental change at the household level by adopting or participating in regular environmentally sustainable behaviors, or ESBs (Dietz, Gardner, Gillian, Stern, & Vandenbergh, 2009) that may or may not be related to financial incentive. ESBs are defined as "the set of actions aimed at protecting the socio-physical resources of this planet" (Corral-Verdugo, 2011). By simply modifying a few daily behaviors – typically those with high plasticity standards– sustainable habits can be adopted to great effect (Dietz et al., 2009).

The science is irrefutable; global climate change is real and humans are the most likely source of the problem. Given humans are a large part of the problem, so too must we be a part of the solution. However, engraining change on the global level is a monumental task. In order to curtail global climate change, it is necessary to change human behavior, function and industry; a monumental and potentially impossible task.

There are many solutions to this global climate change problem to be found all across the human experience and existence spectrum. From how a person eats and drinks to how and where they live, how they move above, how they interact with the world around them all have an impact on global climate change. In order to tackle this herculean effort of quantifying human impact, it is necessary to break it down into smaller, more manageable and specific chunks.

Research Significance and Objectives

The significance of this study is it looks at both the psychological and sociological aspects of the human impact on global climate change ((Dietz, Gardner, Gilligan, Stern & Vandenbergh, 2009). Given the enormous potential for shifts in human behavior to significantly influence global climate change, understanding how and why humans currently behave the way they do is necessary to influence and change these habits.

The goal of this study is twofold; firstly, to lay initial ground work for further research into larger populations. Secondly, to inform further research into policy needs, educational design and incentive program options focused on adoption of environmentally sustainable behaviors at the local level: the American household. It is my hope that the results of this work will be a first attempt to learn more about how individual demographic factors inform ESB activity, enabling future researchers to (1) develop more detailed studies with larger, more diverse populations, and (2) use growing knowledge of ESB adoption in individual households to inform educational programs,

financial incentives and policies intended to encourage the adoption of sustainable habits by individuals spanning the socioeconomic spectrum.

Background

Concerns over the consequences of global climate change are most prevalent in Canada, Europe, the United States, Japan and some South American countries (Leiserowitz, 2007). These and other countries have already taken action to address global climate change by passing legislation for limiting carbon dioxide and other greenhouse gas emissions as well as focusing on the development of renewable energy technologies and sustainable waste management (Chapin, Folke, Walker, Scheffer, & Rockstrom, 2010).

In 2008, the International Energy Agency (IEA) released a set of recommendations to help countries reduce their dependency on non-renewable fuel sources (fossil fuels, etc.) in order to encourage the adoption of a renewable, low-carbon energy system. Sweden in particular has become a leader in successful government-driven policy, adopting many of the recommendations, as well as ones set out by the European Union (IEA, 2013). The Swedish government adopted renewable energy protocols and technologies in an effort to protect their export-oriented manufacturing and engineering economy (IEA, 2013).

Since Sweden's adoption of the IEA recommendations and EU standards, renewable energy production has increased dramatically. In 2011, 35% of total energy produced in Sweden came from renewable resources (largely hydropower), up from 28% only 5 years previously (IEA, 2013). In addition to renewable energy use and

consumption, Sweden has passed long-term policies to ensure a fossil fuel-free vehicle fleet by 2030, and projections show they will meet or even exceed that target (IEA, 2013). This example conveys how energy policy at the government level can potentially be effective in combating global climate change and greenhouse gas emissions.

The issues of environmental conservation and global climate change became prevalent in the United States in the second half of the 20th century (Luterbacher & Sprinz, 2001). In 1987, the stratospheric ozone hole was discovered and theorized to be a direct result of human activity and the release of greenhouse gases into the atmosphere (Gardiner & Stern, 2004). As a result, a wave of climate change initiatives swept across the United States and the globe, culminating in many important pieces of legislation, perhaps the most famous of which is the Kyoto Protocol, enacted in 1997 (Rosenbaum, 2014). The Kyoto Protocol is an international agreement that commits participating countries to a binding set of emission reduction targets. As of 2011, 192 countries had signed and ratified the Kyoto Protocol, with only Afghanistan, Sudan and the United States abstaining (Hovi, Sprinz & Guri, 2012). Before the discovery of the ozone hole, global governments were not heavily involved in enacting legislation to directly combat environmental issues. After it was understood that the ozone hole was of anthropogenic origin, scientific policy in government became more of a norm and many nationally mandated laws and programs came into effect across the world (Rosenbaum, 2014).

Though it was the only developed country to forgo signing the Kyoto Protocol in the late 1990s, the United States had already passed legislation designed to help combat global climate change and protect the environment, including the Clean Air Act (1970), and Clean Water Act (1972). After rejecting Kyoto, the U.S. also passed the Energy

Policy Act (2005), Energy Independence and Security Act (2007) and others in support of renewable resources and energy security. More recently, the United States participated in the Paris Agreement, a deal reached by almost 200 countries pledging to fight global climate change and reduce carbon emissions. Although the incoming Trump Administration has made public statements suggesting it will work to disengage the United States from current Paris Agreement commitments (Chemnick, 2016), the success of this campaign remains uncertain, as there has also been strong support for the agreement by U.S. citizens and allies abroad (United Nations Department of Public Information, 2016). The Paris Agreement, Energy Policy Act and Security Act were pro-climate change as they changed U.S. energy policy by providing tax incentives and guaranteeing loans for a variety of energy production types, including wind, solar and geothermal. In addition to passage of these U.S. laws, all of which are mandated at the Federal level, individual states have also set their own standards regarding pollution emissions, fossil fuel extraction, efficient transportation and other factors with an environmental impact.

The unfortunate reality is that treating global climate change at the federal or even state level can be a slow and laborious process. Historically, environmental issues are not considered by governments to be as dire as other issues like national security and healthcare reform. In 2016, the United States had a budget of $597 billion dollars for national security (International Institute for Strategic Studies) and spent $592 billion dollars on Medicare alone (Congressional Budget Office, 2016). In contrast, the Department of Energy received only $24 billion and the Environmental Protection Agency only $7 billion in funding (Congressional Budget Office, 2016). This

discrepancy becomes alarming when the links between global climate change, national security and human health are understood. In May 2015, the White House released a report on "The National Security Implications of a Changing Climate", which outlined the potential devastating consequences of global climate change to national security and national health. The report outlined how climate change contributes to an increase in natural disasters, which influences refugee flows and conflicts over basic resources like access to clean water, food and shelter (White House National Security Strategy, 2015). Global climate change could also directly affect critical infrastructure across the United States, as temperature fluctuations can bring about severe heat waves which could disable transportation systems, damage roads and railways and strain power system (Department of Homeland Security, Climate Change Adaptation Roadmap, 2012). These strains on United States infrastructure would require the U.S. military to provide humanitarian assistance and provide civil authority in the fact of disaster relief, lessening their attention to overseas conflict weakening the U.S.'s overseas presence. With rising temperatures come the increased incidences of the spread of pandemic diseases. An example of this is rapidly expanding reach of the Zika virus, a mosquito borne illness that causes severe birth defects in children (Caminade et al., 2016). The rise of a warmer climate has allowed the mosquitos that carry this virus to not only expand their habitat range, but speed up their life cycle, enabling them to reproduce more and spread the virus faster and farther (Camindate et al., 2016). Zika is only one example of how warming temperatures can enhance the spread of infectious diseases.

National Security and Health are intrinsically intertwined with issues of global climate change. To address the latter is to address the former. Given that it takes the

United States government years to create and pass legislation mandating emission reduction and given the incoming Trump administration's lack of inclination to increase funding to global climate change combating programs, local initiatives present an alternative, more immediate solution (Dietz et al., 2009).

Sustainable Behaviors by Individuals

One alternative solution that has shown promise is encouraging individuals to adopt simple, sustainable habits and practices in the home (Dietz et al., 2009). For instance, reducing energy consumption will drastically reduce greenhouse gas emissions, which are largely produced as a byproduct of oil and fossil fuel used in energy generation (Gardner & Stern, 2009). Household activities in the United States, including individual nonbusiness travel, make up 38% of total energy consumption (Gardner & Stern, 2009). This percentage is greater than that of the industrial sector (32.5%), commercial/service (17.8%) and non-household transportation sector (11.7%) (Dietz et al., 2009). Adoption of pre-existing technologies by Americans in their homes does have a significant effect on reducing greenhouse gas emissions (Dietz et al., 2009). American households were able to significantly reduce their energy consumption and carbon emissions by participating in activities ranging from the costly (purchasing a fuel-efficient vehicle) to the inexpensive (changing the temperature setting on the washing machine) (Dietz et al., 2009).

The "behavioral wedge", a term coined by Dietz et al. (2009), makes four major points to illustrate the intersection of household behaviors and sustainability. Firstly, household behaviors can substantially reduce greenhouse gas emissions in the U.S.

household sector. Secondly, the majority of this change comes from the adoption of energy-efficient technologies. Thirdly, voluntary participation in sustainable habits is crucial, but not enough: local and national policies and programs are imperative to secure a permanent shift in current perceptions of sustainability and sustainable behaviors. Lastly, while these issues have been well studied, the problem of successfully implementing effective environmental policy remains.

Ultimately, programs that emphasize a specific element, such as financial incentive, vary in effectiveness depending on the degree of implementation (Dietz et al., 2009). In order to encourage people to make those changes, it is imperative to first see if we can better understand how and why people participate in ESBs through focused research. The expectation is that we will learn more about what motivates and inspires individuals to adopt ESBs, informing the design of more effective incentive and outreach programs that could increase ESB participation, should that be the goal of policy.

Theories of Sustainable Behavior

Different studies have already identified a myriad of motivators that inspire sustainable behaviors. Amel, Manning & Scott (2009) found that individuals with full awareness of the environmental repercussions of their actions were linked with incidences of (self-reported) sustainable behavior. The result reinforces the current paradigm wherein sustainable behavior depends strongly on focused attention and mindful behavior. That is, individuals have to specifically consider acting sustainably; it is not the societal default.

Kurz (2002) describes four psychological model approaches to environmental sustainable behavior including the rational-economic model, the social dilemma model, the attitude-behavior model, and the applied behavioral analysis model (Figure 2).

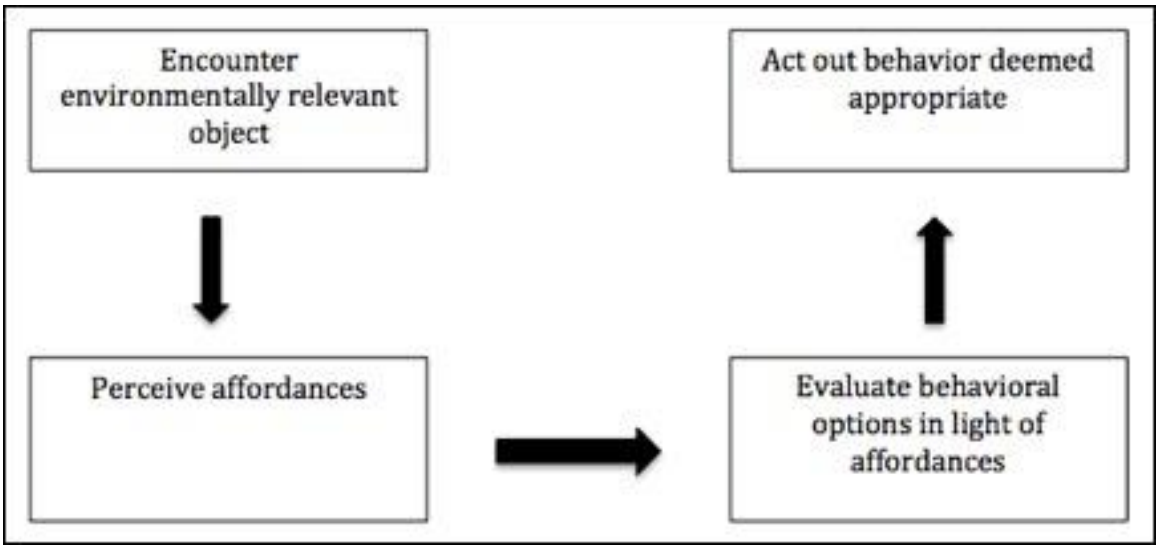

Figure 2. Attitude roles in the social-ecological framework of ESB (Kurz, 2002).

The rational-economic model of environmentally sustainable behavior will be used throughout this study. The underlying tenet of this theory is that an individual's motivation to engage in sustainable behavior is primarily determined by whether or not it is in his or her best financial interest to do so (Kurz, 2002). This model assumes that individuals will engage in some level of cost-benefit analysis when making decisions. If true, an obvious solution to change behavior would be to alter pricing structures of resources and technologies that would help sustainable behaviors to become more affordable. However, history has shown that these changes on their own are not likely to modify individual behaviors (Kurz, 2002). A good example of this is the failure of the Residential Conservation Service (RCA), a program in the United States wherein utility

companies provided free energy audits to their customers and offered low-interest loans to enable their clients to upgrade their existing energy systems (Kurz, 2002). The program was largely unsuccessful, even though it was predicted to help Americans lower their energy use and costs. The failure of the RCS to motivate any real change was attributed to the fact that most individuals require "persuasive communication" if they are to respond to a shift in economic guidelines (McKenzie-Mohr, 1999). Follow up studies into the failure of the RCS concluded that it is not enough to make conservation and sustainability economically viable and practical; it must be proven to individuals that these economic incentives not only exist but that they are worthy of behavioral change (McKenzie-Mohr, 2000).

Kurz also studied the social dilemma model of ESBs, which describes scenarios where the good of the individual goes against the good of the collective society. This dilemma becomes even more provocative when it involves the allocation of a scarce resource. This idea provided the basis of Garrett Hardin's influential work, "The Tragedy of the Commons", in which he suggests that social-dilemma models are represented by real world conservation issues, especially energy and water (Hardin, 1968). The social-dilemma approach involves two conflicting sets of rationalities that the individual making the decision must weigh when facing a social dilemma (Kurz, 2002). The prevailing theory discussed in Hardin's work suggests that most environmental sustainability issues arise from the fact that individuals are more likely to favor choices and behaviors that result in personal gain, at the expense of other users of a shared resource. Social dilemma research looks at how different defining characteristics of a group – including characteristics of the individual members, group communication methods, and group size

-- influence how individuals behave when facing a "commons dilemma" issue. The knowledge base that has been built as a result of social dilemma research shows great promise in prompting the adoption of environmentally sustainable behaviors across communities all over the world (Kurz, 2002).

One of the most common methods of studying ESB is through general attitude-behavior modeling. This type of modeling is conceptually similar to the social dilemma approach, as both consider the influence of the individual as well as the conditions under which the individual is operating. The attitude-behavior model takes into account how far environmental and sustainability attitudes influence behaviors, as well as the degree to which an individual's ESBs are influenced by their attitudes. The greatest difference between this model and the social-behavioral model is that the former considers characteristics of the individual, and what attitudes and environmental factors influence their behaviors and choices, while the latter looks at the dynamics of the group as a whole.

Finally, these models of environmental social behavior are based on behavioral analysis, which itself is based on the Skinnerian tradition of behavior modification (Wilson & Dowlatabadi, 2007). The focus of the Skinnerian model is on the antecedents and results of the behavior. This model is effective because it identifies several ways ESBs can be changed by presenting antecedents and then re-organizing the consequences. These four models of ESBs will be critical in differentiating sustainable behaviors that result directly from socioeconomic status from those driven by other factors.

Socioeconomic Status and ESB

The theory that socio-economic status and income are strong influencers of individual behavior is prevalent in the social sciences spectrum. However, in the context of environmental sustainability, the parameters of the subject are still being explored. A recent review has shown that various types of environmentally sustainable behavior are correlated to different motivational variables (Gatersleben, Vlek & Steg, 2002). Simple, repetitive and low-cost behaviors were most readily achieved by changing personal norms and attitudes, and that financial incentives and socioeconomic status were more effective at influencing long-term and high-cost behaviors such as car use and ownership (Gatersleben et al., 2002). Studies that have explored the psychology of sustainable behaviors have shown that ESBs are more strongly correlated to behaviors that have a low impact on an individual's personal life, or a low plasticity (Gatersleben et al., 2002). That is, it does not take much time, effort or money to undertake the behavior. Some examples of this type of low-impact behavior include political choices, food purchases and waste management (Gatersleben et al., 2002). Behaviors with a high psychological and financial impact, such as transportation choices and energy use, are less likely to be undertaken, even by those who identify as participating in ESBs, because they are time-consuming and costly (Gatersleben et al., 2002). The prevailing theory is that because these latter behaviors are time consuming and costly, they are the least likely to be carried out, even though they carry the greatest potential environmental impact.

While concern for the environment is prevalent across the socioeconomic spectrum, wealthier people are often more willing to invest to help protect it (Fairbrother, 2012). Individuals with higher income have a higher willingness to pay (WTP) for environmental protection and sustainable products than those who earn less (Fairbrother,

2012). However, WTP does not always translate into action. The likelihood that an individual actually participates in an ESB is motivated by a variety of previously discussed factors including personal beliefs, norms and preexisting habits. Nevertheless, studies by Fairbrother (2012), Gatersleben et al., (2002) and Kurz (2002) all indicate that economic variables may be one of the most important predictors of sustainable behavior.

Other Predictors of EBS

Education level also plays a role in whether or not an individual exhibits environmental awareness; environmental awareness was significantly correlated with education level in a Malaysian study (Aminrad, Zakariya, Hadi & Sakari, 2013) (Table 1). As students gained higher and more complex levels of education, their knowledge and environmental awareness increased.

Table 1. The relationship between awareness, knowledge, and attitude to education (Aminrad et al., 2013).

No	**Result Relationship**	**Correlation "r"**	***p*-value**	
1	Awareness and Knowledge	0.165	0.001	P > 0.05
2	Awareness and Attitude	0.990	0.000	P > 0.05
3	Knowledge and Attitude	0.174	0.000	P > 0.05

Religious ideology has also been shown to influence a person's environmental attitude and their likelihood of exhibiting ESBs (Morrison, Duncan, & Parton, 2015). A study in Australia surveyed members of four religious groups (Buddhists, Christians both

literalist and non-literalists and Secularists) regarding their climate change attitudes and behaviors. The results of this study concluded that groups differed in their belief of anthropogenic global climate change and the need for a policy-oriented response (Morrison et al., 2015). The study also discussed how religious orientations differ in the nature of the relationship between man and the natural world.

Table 2. Climate change attitudes of religious groups (Morrison et al. 2015).

	Atheist/ Agnostic/ No religion	Buddhist	Christian—Literal	Christian—non Literal	Overall sample	F-Statistic/ $\chi 2$
Certainty global warming is occurring[1]	7.02	7.63	5.79	6.3	6.54	24.357***
Believe that climate change is caused mostly by human activities	52.3%	77.1%	30.7%	41.8%	45.1%	52.525***
Believe that most scientists think global warming is happening	47.7%	51.1%	30.6%	34.0%	39.4%	38.457***
Perceived impact of own mitigation actions[2]	2.26	2.66	2.09	2.15	2.19	6.540***
Personal importance of issue[3]	3.11	3.37	2.77	2.87	2.96	10.659***
Desired Australian efforts to reduce warming given associated costs[4]	2.89	3.06	2.6	2.71	2.76	8.674***
Contingent international conditions for Australian mitigation action[5]	3.5	3.39	3.22	3.25	3.33	8.014***
Test result	3.97	4.06	3.58	3.41	3.72	10.117***

[1] Certainty global warming is occurring is measured on a nine-point scale;
[2] 1 = not at all, 4 = a lot;
[3] 1 = not at all important, 5 = extremely important;
[4] 1 = no effort, 4 = large-scale effort, even if it has economic consequences;
[5] 1-Australia should not reduce its emissions, 4-Regardless of what other countries do Australia should reduce its emissions.
***Significant at 1%

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Political affiliation is also likely to play a role in how environmentally aware an individual is; 71% of Democrats and Democrat-leaning independents believe that global climate change is real and of human origin, compared to 27% of Republicans (PEW, 2014). These differences held when other variables such as age and race were controlled for.

Dietz's behavioral wedge theory, Kurz's four models of environmental sustainable behavior and Fairbrother's willingness to pay study all highlight the need for more research in the field of sustainable decision making in the American household.

Research Questions, Hypothesis and Specific Aims

To explore the intersection of psychology, sociology, sustainability science and economics of ESBs, this study asks the following questions:

- Which factors have an influence on whether or not a person practices ESBs in their home environment?
- Could knowing demographic factors about a person predict their likelihood of participating in ESBs?

The hypothesis to be explored in the scope of this study is that household survey data will show conclusive evidence that household income is, or is not, the single greatest factor in predicting an individual's likelihood of participating in environmental sustainable behaviors.

To address these questions and test this hypothesis, I conducted the following steps:

- Distributed a randomized survey of residents of both Vermont and New Hampshire to collect demographic data and information regarding the basis of ESB adoption.
- Compared different demographic factors to look for a significant influence on ESBs
- Created a sustainability index to compare demographics
- Studied word use in the qualitative analysis to see if any inference can be drawn from that data

Chapter II

Methods

A survey was designed to compare behaviors and demographic factors as they relate to increased incidences of ESBs.

Survey Methods

After considering several available options, distributing the survey electronically was deemed to be the most efficient and practical for the time and resource constraints of this first study. The online survey platform, Qualtrics, was chosen for several reasons. First, using Qualtrics proved very time efficient, with the turn-around time from submission of the survey questions to the results being less than one week. Second, given that there was no interviewer present to deliver the questions, there was no likelihood of social bias or other bias. Finally, the Qualtrics contract guaranteed the exact number of respondents required and compensated them through a point system. The total cost was $1,400 for the 420 completed responses was covered by the author.

The online survey was designed to explore the idea that certain identifying demographic factors can be used as a strong predictor, whether independently or in conjunction with each other, of the likelihood of participating in ESBs (Appendix). The design of this survey was inspired by other surveys that explored similar subjects and was edited and refined under the guidance of Dr. Chase Harrison, Associate Director of

Survey Research at the Harvard Program in Survey Research. The population was defined as residents of New Hampshire and/or Vermont, ages 18 and older. This cohort was selected due to the wide socioeconomic diversity of individuals within both states. The survey was primarily comprised of continuous predictor variables.

Before the full survey was released, a pilot sample was sent out to 40 recipients ensure the survey design was sound. After the preliminary analysis, it was decided to add a section after each question where respondents could justify their answers. After this change was made, the entire survey was released on August 9th, 2016 and closed on August 12th, 2016 with 420 completed responses gathered. Of these, 71.9% were from New Hampshire and the remaining 28.1% listed themselves as being from Vermont. The locations of survey respondents is indicated in Figure 3.

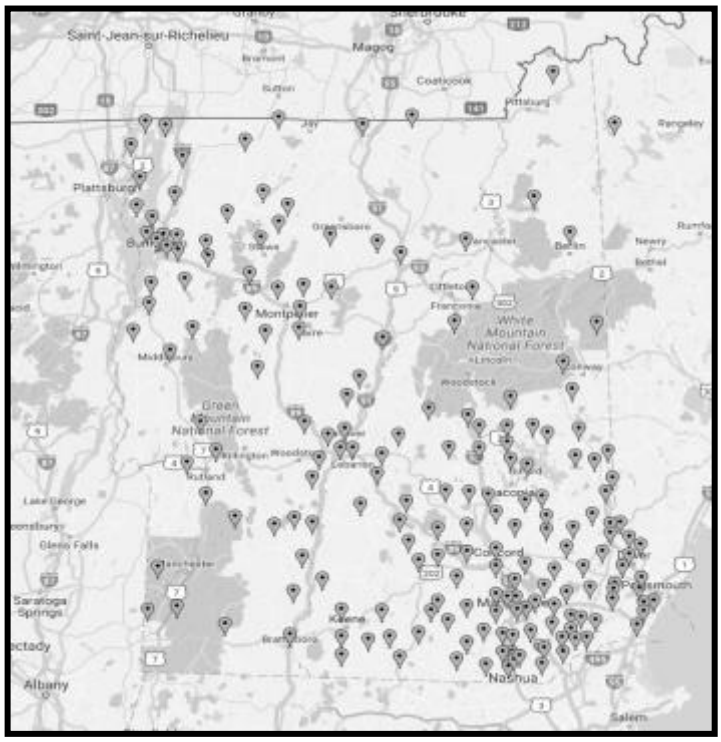

Figure 3. Distribution of survey respondents in VT and NH.

Classification of Responses for Sustainability

At the time the survey was designed, it was understood that one measure to be studied would be the expense of the ESB surveyed. However, as the survey process progressed, it became apparent that the questions were not designed to provide an accurate measure of ESB costs and so that measure was abandoned. The results therefore had to be reweighted and combined to account for this discrepancy. The survey questionnaire is included as an Appendix.

The answers presented to the participants to the ESB questions were "always", "sometimes", "rarely" and "never". For the majority of the questions posed, "always" (option 1) and "sometimes" (option 2) represented the most sustainable answers, while "rarely" and "never" represented the least sustainable. However, for questions 4, 5, 9, 11, 13 and 15, the reverse is true, with "always" (option 1) and "sometimes" (option 2) being the least sustainable and "rarely" (option 3) and "never" (option 4) being the most sustainable. Before the survey was released, I changed the weight of questions 4, 5, 9, 11, 13 and 15 to reflect the reverse nature of the question. Once the survey answers were collected but before they were analyzed, I went manually through all the data and color coded each individual answer to be either red or green, with red being unsustainable and green being sustainable.

Demographic Variables

The survey examined how ESBs varied among seven demographic categories:

- Income: income was divided into eight categories; yearly salaries over $250,000, $250,000-$150,000, $105,000-$100,000, $100,000-$75,000, $75,000-$50,000,

$50,0000-$35,000, $35,000-$10,000 and $10,000-0. The 2017 average income in New Hampshire is $65,028 while the average for Vermont is $52,977 (U.S. Census Bureau, 2010). These categories were chosen to ensure there were a wide variety of options and to match similar studies.

- Political affiliation: political parties included in the survey were Democrat, Republican, Libertarian, Independent and none. These parties are the major parties recognized in both Vermont and New Hampshire.
- Religious ideology: religious variable options in this survey included Christian (including all sects and branches therein), Jewish, Muslim, Hindi, Agnostic, Atheist and other. These religions were selected because they represent a wide variety of dogmas and cultures associated with them.
- Education: participants of the survey recorded their highest education level achieved. Their options were high school degree, some college (not graduated), college graduate, master's degree or PhD.
- Age: age options on the survey were also similar to ones found on similar surveys. The age variable categories were 18-24, 25-35, 35-45, 45-55, 55-65 and 65+. These categories were chosen based off of criteria similar to reasons above. The survey was also only distributed to people 18 years of age and over, hence why the demographic data options started at 18.
- Gender: options were male, female and other. Of the 420 responses, only one checked themselves as falling into the "other" category, and so was dropped from the results.
- State of residence: Vermont or New Hampshire.

Statistical Tests

The survey data was analyzed in three ways. The first test focused on analyzing sustainable behaviors across individuals, the second on correlations among variables and the third looked at the qualitative responses by survey respondents.

Test 1: Sustainability Index

Once collected, the data were broken down into a 'sustainability index' based on the 15 questions asked. The number of questions, out of fifteen, that the individual answered within the parameters of a 'sustainable answer' (option 1 or 2 for questions 1,2,3,6,7,8,10,12 and 14 and options 3 and 4 for questions 4,5,6,11 and 13) were counted and divided by fifteen. Therefore, if, out of 15 questions, an individual answered six of them 'sustainably', her or she would have a sustainability index value of 0.40. The advantage of this system is in that it avoids a heavy bias in grouping due to individual questions. Another benefit of this system is that if each individual were given a numerical value based on the index, a single question that might be biased would only shift that individual's score by 0.067, which is an insignificant amount. Therefore, even if the person lives a very sustainable lifestyle but answers that question unsustainably, it would give a more accurate depiction of the individual, and not the wording of a single question. Therefore, this procedure treats each individual as an independent sample.

Once an index value was calculated for each answer, a non-parametric one-way ANOVA test was conducted on most of the demographic variables. Given that two demographics involved only two variables (gender and state), a simple t-test was done on these variables. This test was chosen because the goal was to compare the means of three

or more samples (the demographic data) against three or more independent variables (the answers to the survey questions). The ANOVA test is ideal for this purpose, given that the assumptions are met. Firstly, the response variable residuals are normally distributed (see appendix for full data breakdown and calculations). This was determined by calculating the mean and median across individuals and examining residuals. This non-parametric, one-way ANOVA test through PRISM was run on the political, education, income, age, and religion data, while a simple t-test was conducted on the gender and state data given there were only two different classes.

Test 2: Correlations among Variables

A second test using univariate statistics (mean, standard deviation and frequency) was carried out on the data in an effort to find patterns, relationships or correlations between the dependent and independent variables. The aggregate data were broken down into a sustainability index. The index was extrapolated by recording the number of answers to questions, out of the fifteen asked that were considered to be 'sustainable,' and dividing that number by 15 to get a percentage. Therefore, each individual who took the survey was assigned a sustainability index depending on his or her answers. The sustainability index for each individual within each demographic variable group was collected and averaged out across the sample size. It was therefore possible to extrapolate an average sustainability index across individuals from each demographic sample.

Qualitative Test

After each question, survey participants had the option of explaining their responses and reasons for their behaviors. In order to organize the resulting data, a word-count and frequency search was run through every response. The most frequently used words were tabulated to look for patterns and consistencies. This was done for each of the 15 questions, although not every respondent opted to explain their answers.

Chapter III

Results

The aim at the outset of this study was to determine conclusively whether or not income was the greatest factor in predicting an individual's likelihood of participating in environmentally sustainable behaviors. This hypothesis and other patterns in the survey data are examined here.

ANOVA Results

Of the seven demographic factors run through the statistical tests, only gender statistically predicted ESBs (Table 2). Of the 285 females surveyed, the average sustainability index among them was 0.72 while of the 134 men, it was only 0.69. While seemingly not a huge difference, it is large enough to be statistically significant (p-value less that 0.05).

Sustainability Index Results

The sustainability index for each segmented demographic factor was sorted from highest to lowest. Although index scores are not significantly different, the highest mean values within each variable were people who made between $50,000 and $75,000 (.721) (Figure 5), Democrats (.725) (Figure 6), Master's degree holders (.724) (Figure 8), aged 45-55, (.739) or 25-35 (7.22) (Figure 9). Together, these groups had an average sustainability index of .722. The bottom five sustainability indexes were those individuals

who made between $0-$10,000 per year (.644) or made of $250,000 per year (.666) (Figure 5), with a designated 'other' political affiliation (sustainability index of .629) (Figure 6), Atheists (.662) and individuals who hold a PhD degree (.666) (figure 8). The average sustainability index among these demographics was .648.

Table 3. ANOVA results for differences in ESB % among demographic factors.

Demographic	**P-Value**	**P < 0.05**
Income	0.203	No
Education	0.550	No
Religion	0.192	No
Political Affiliation	0.165	No
Age	0.155	No
State	0.519	No
Gender	0.006	Yes

Gender Results

Table 4. Gender breakdown by population and average sustainability index.

Gender	Male	Female
# respondents	134	285
Average Sust. Index	0.688	0.720

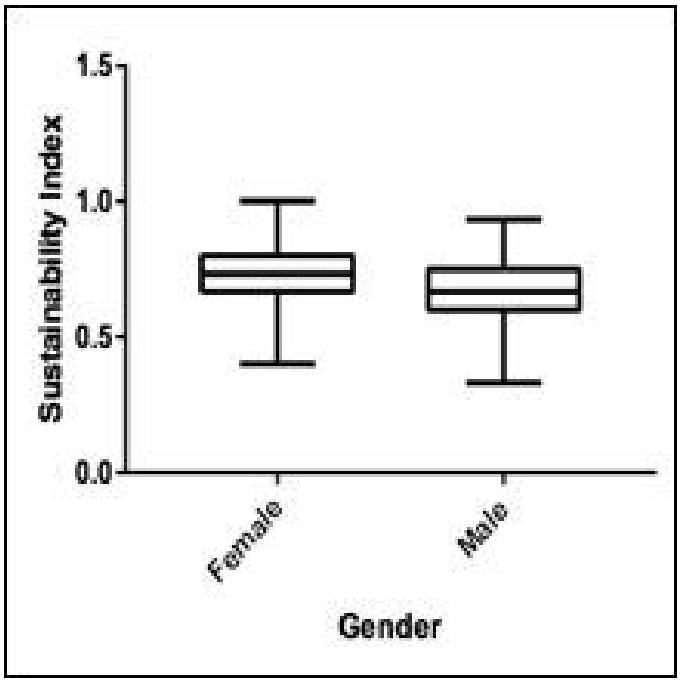

Figure 4. Jitter plot of difference between males and females in the sustainability index analysis (P =.006).

The results of the sustainability index analysis on gender (Table 4) show that women have a slightly higher sustainability index average than men (p = 0.006), indicating they were more likely to participate in ESBs than their male cohorts.

Income Results

At the outset of this study, it was hypothesized that the greatest motivator behind ESBs would be an individual's income. However, the ANOVA analysis results determined that income actually did not have a statistically significant impact. The 420 participants chose their income bracket, as shown in Table 5.

Table 5. Income breakdown by population and average sustainability index.

Income	$250k+	$150k-	$100k-	$75k-	$50k-	$30k-	$10k-	$0k-

		$250	$150k	$100k	$75k	$50k	$30k	$10k
# respondents	12	25	72	92	89	67	51	12
Average Sust. Index	0.666	0.714	0.72	0.715	0.721	0.695	0.707	0.644

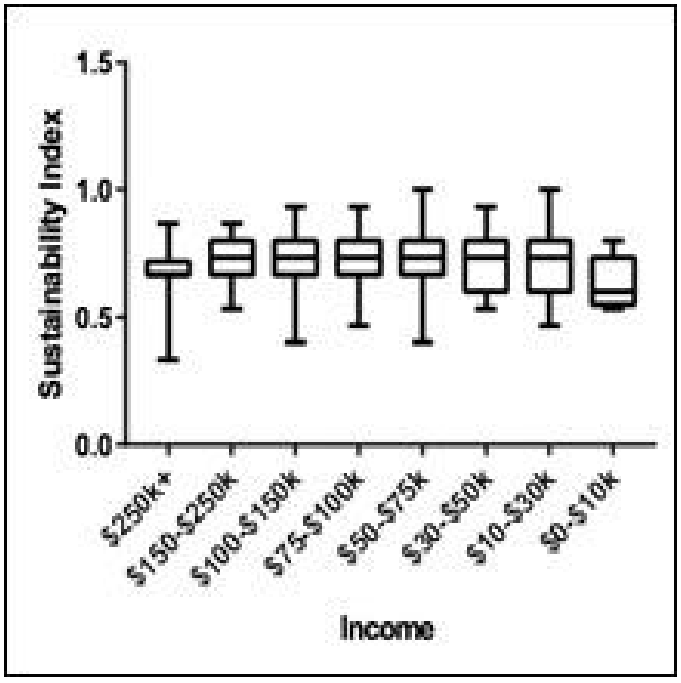

Figure 5. Jitter plot of variation in sensitivity index and income levels.

These data suggest that individuals who make between $75,000 and $50,000 per year practice the most ESBs and those making $0 - $10,000 practice the fewest. However, in the scope of this analysis, there is not enough statistical significance to do much more than speculate on the role of income in determining ESBs.

Education Results

In this study, participants were asked to list their education level. These data were then transformed into the sustainability index and averaged for a mean sustainability index across education levels.

Table 6. Education breakdown by population and average sustainability index.

Education	College graduate	Masters	Some college	High School	PhD	Pro.	Other
# respondents	150	58	107	83	10	7	5
Average Sust. Index	0.715	0.724	0.697	0.713	0.666	.666	.706

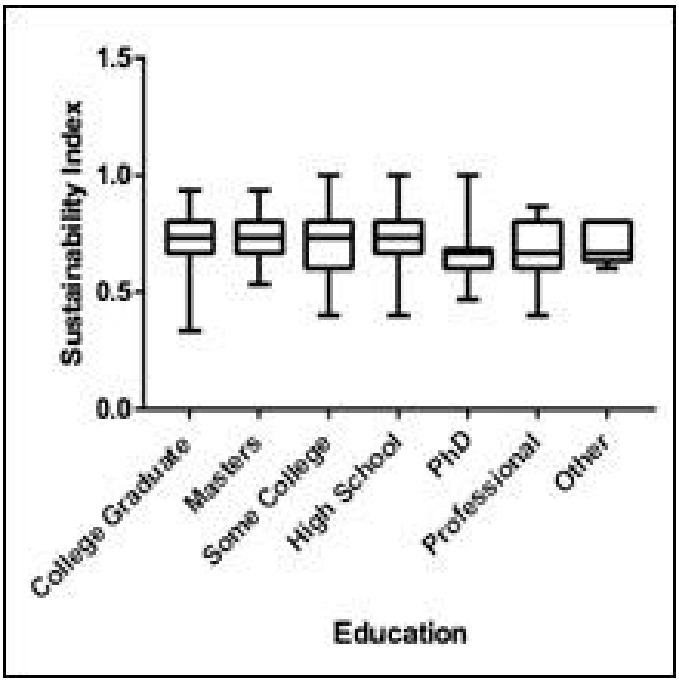

Figure 6. Jitter plot illustrating no significant difference between the different education levels.

From this analysis, it is shown that individuals holding a Master's degree record higher incidences of sustainable behavior than any other education level bracket, with an

average sustainability index of 0.72. The bracket with the lowest recorded sustainable behaviors was a PhD with 0.66.

Religion Results

There is great diversity in how different religions view the earth and man's place in it, and even more variation within each religion regarding which texts and ideologies worshippers value the most. Given this wide variety of beliefs, it was necessary in the course of this study to ascertain whether an individual's religious ideology was strong enough to dictate whether or not they behaved sustainably at home.

Table 7. Religion breakdown by population and average sustainability index.

Religion	Christian	Jewish	Hindu	Muslim	Agnostic	Atheist	Other
# respondents	240	10	2	3	54	34	77
Average Sust. Index	0.716	0.686	0.700	0.688	0.690	0.622	0.709

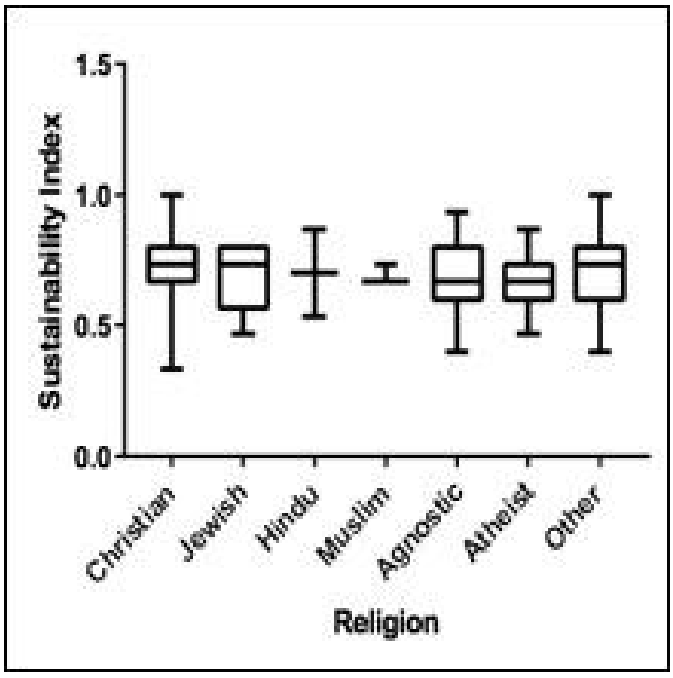

Figure 7. Jitter plot of relationship of the religious ideology and sustainability index.

From this analysis, it is indicated that the most environmentally responsible and aware religious group are Christians, with 71% responding that they regularly practice ESBs. For the sake of this study, "Christian" denotes all sects of Christianity, including Catholics, Episcopalians, Lutherans and others. At the other end of the spectrum are Atheists, with an average sustainability index of only 66%.

Political Results

An individual's political party is another possible indicator of their likelihood of participating in ESBs. The different political parties in the U.S. have strikingly different policies when it comes to how the environment should be treated, how energy should be sourced and how much role the government should have in environmental issues. The 420 survey respondents were asked to identify themselves as belonging to four recognized political parties or as belonging to "other" or "none". In the scope of this study, "other" refers to any major political party such as the Green or Constitution Party, and not a minor political party.

Table 8. Political breakdown by population and average sustainability index.

Political Affiliation	Democrat	Republican	Independent	Libertarian	Other	None
# respondents	111	75	178	9	9	38
Average Sust. Index	0.725	0.706	0.707	0.681	0.629	0.721

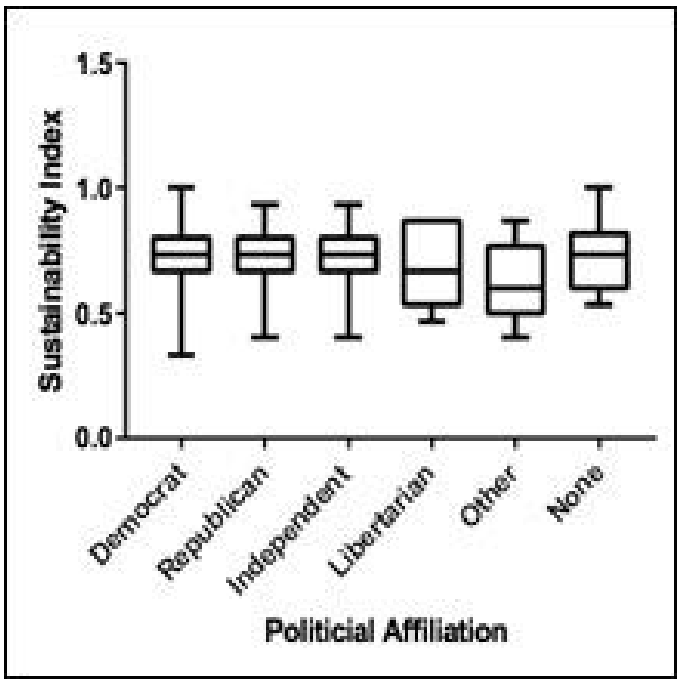

Figure 8. Jitter plot of relationship of political affiliation and sustainability index.

The results of this analysis show that Democrats are more likely to participate in sustainable behaviors, with an average sustainability index of 0.725. Across political parties, the least likely to be sustainable are those who listed themselves as "other", with an average sustainability index of only 0.629.

Age Results

An individual's personal agenda may vary widely depending on where in their life they are. Certain issues, which may be of high importance to the younger generation of Americans, may not hold much interest or importance to the older. With this thought in mind, the respondents' ages were assessed to see if there was a correlation between age

and average sustainability index. Ages were divided up into categories and each respondent selected their age cohort.

Table 9. Age by population breakdown and average sustainability index.

Age	18-24	25-35	35-45	45-55	55-65	65+
# respondents	35	89	71	93	73	59
Average Sust. Index	0.685	0.722	0.706	0.739	0.715	0.703

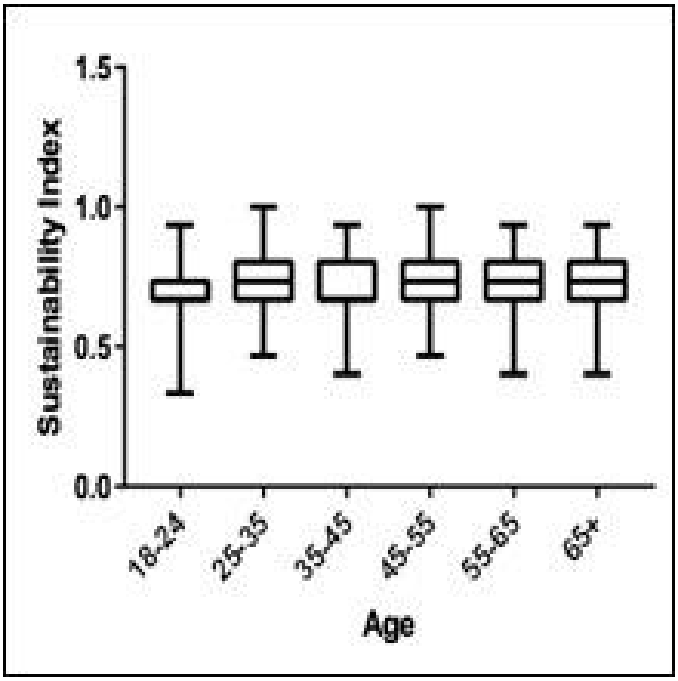

Figure 9. Jitter plot of age analysis, showing no difference between the different age cohorts.

This analysis shows that across age brackets, those with the highest sustainability index are individuals ages 45 - 55, with an average sustainability index of 0.739. The age

cohort exhibiting the lowest mean sustainability index is individuals aged 18 - 24, with an average index of 0.685.

State Results

The final analysis done was on each individual's state of residence. While New Hampshire and Vermont are geographically near to each other, they have dissimilar state ideologies. In the recent presidential election, Vermont was one of the first states called for Democratic candidate Hillary Clinton, while the New Hampshire vote was so close that it took a week for the results to be precisely tabulated. While in the end, New Hampshire and its four electoral votes went to Hillary Clinton, the fact that the race within the state was so tight further illustrates the difference between the two states. Given the seeming paradox between location and policy, an analysis was done to see how sustainability indexes differ across state lines.

Table 10. State breakdown by population and average sustainability index.

State	New Hampshire	Vermont
# respondents	302	118
Average Sust. Index	0.707	0.715

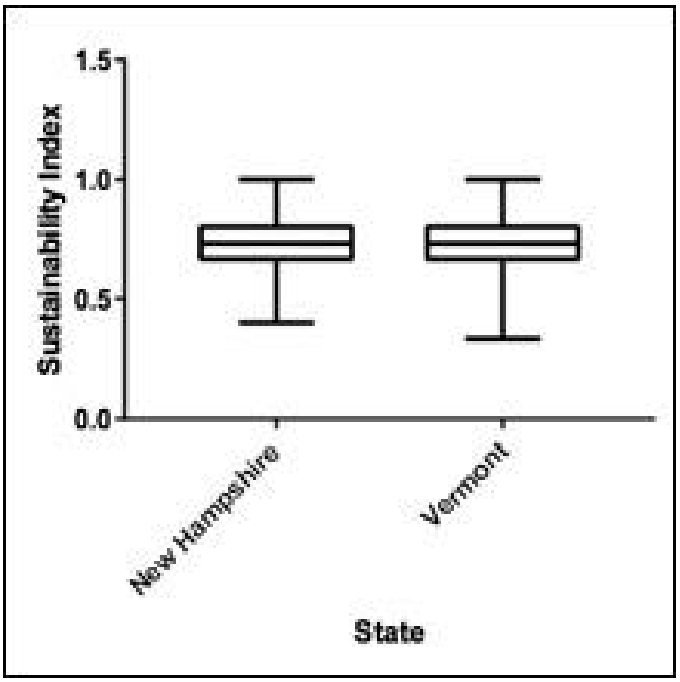

Figure 10. Jitter plot of state analysis and sustainability index showing no significant difference between Vermont and New Hampshire.

Vermont residents as a whole had a slightly higher sustainability index (0.715) than New Hampshire residents (0.707) although not statistically significant.

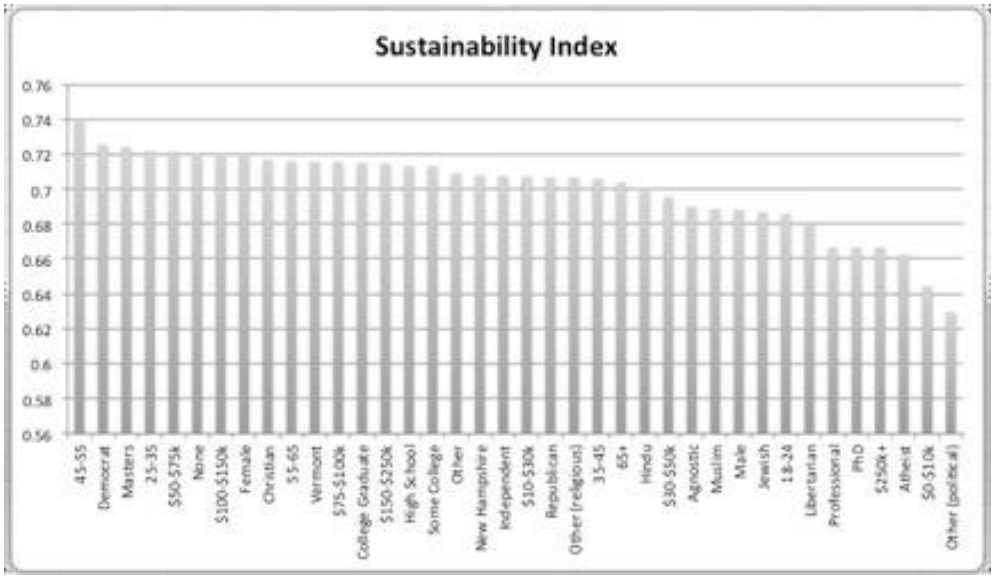

Figure 11. Complete sustainability index results breakdown.

Qualitative

After each question of the survey, there was a blank box where respondents could justify or explain their answer in a few words or sentences. While many chose to leave this place blank, others did enter answers.

Table 11. Qualitative analysis; most frequently used buzzwords.

Question	Top 5-10 most frequently used words
I shut down or put my computer in sleep mode when not using it.	Save, leave, laptop, energy, close
I unplug my portable electronic devices when not using them	Plugged, leave, phone, save, cell, electricity, hair
I use high-efficiency (LED/CFL) bulbs in my light fixtures	Energy, save(s), replaced/ing, house, burn
I turn my air conditioner (window unit, central air, etc) on when I feel hot.	Use, fan, heat, house, try, cool
I turn the heat on in my house/apartment when I feel cold	Put, use, winter, set, like, try, sweater, thermostat
I hang my laundry up to air dry after washing	Dryer/ing, use, items, like, line, dried, place, time, clothes
If I were to purchase a car, a hybrid/electric model would be my first choice	Like, gas, cost, afford, need, know, want, expensive
I winterize my house in some capacity in cold months	Windows, save/s, heat, live, energy, plastic, home, drafts, insulated, block, need
My showers take over ten minutes	Long, water, time, need, hair, like, save, waste, wash, quick
I use the cold-water cycle when using the washing machine	Hot, depends, warm, wash, always, saves, whites
I flush the toilet with every use	Gross, always, water, time, mellow, yellow, night, pee, sanitary, save
I wait until I have a full load of laundry to use the washing machine	Clothes, small, water, save, wait, need, time, loads, energy
I eat meat daily	Like, chicken, protein, fish, meal, love, need
I turn off the lights when leaving a room	Save, off, leave, energy, electricity, try
I leave the TV on even if no one is watching	Noise, background, leave, save, electricity, waste

Out of all of the answers to the explanations taken together, the top 10 most frequently used words were: off, noise, background, leave, watching, don't, turn, save/s, electricity, always, waste. These data are too vague to be able to do more than speculate, but it would suggest that for each issue, people have different concerns and reasons for their behavior. A prevalent issue across the questions was saving energy and money. Respondents also reported as "forgetting" or "being lazy" when it came to tasks such as unplugging small appliances, turning off lights, or hanging their laundry up to try instead of using a dryer. They also reported that comfort and personal choice was a defining reason why they chose to turn air conditioning or heat on, ate meat regularly and left the TV on even when unattended.

Chapter IV

Discussion

The outcome of this study, while not extensive or conclusive enough to prove anything with statistically-significant certainty, has delivered additional data that informs the complex and controversial issue of the motivators behind sustainable behaviors in the home environment. The original hypothesis, which stated that income would be the greatest determining factor as to whether or not an individual practices ESBs, could not be supported within the scope of the study. However, the survey data collected and subsequent analysis indicate that gender could potentially be a predictor of ESBs.

Gender as a predictor of ESBs

The ANOVA analysis of the survey results showed that women were significantly more likely than their male counterparts to behave sustainably. This result has been indicated in other surveys and similar research. A Pew Research Center survey of men and women classified as living together in a partnership showed that 43% of women made household-related decisions in more areas than men, who only made 26% of such decisions (Pew Research Center, 2008). Thirty-one percent of couples surveyed said they equally divide household decision making tasks. The kinds of decisions being made involved household finances, large and small purchases, social events and other activities

which were classified in the constrains of the study as 'domestic' (Pew Research Center 2008). A study conducted by Net Impact in 2012 showed that women are 10% more likely to enact environmental priorities both inside and outside the work environment (Net Impact, 2012). Of the women surveyed, 72% were confident that activities they participate in during and after work would have a positive impact, in contrast to only 56% of males. This trend, of women creating space and resources to act as change agents within and outside the work environment is prevalent across the domains of working life, domestic life, health and the environment. The Net Impact study also showed that women are more willing than men to accept a lower salary for a job in which they feel like they are in the position to make a positive environmental, social or political impact. This work strengthens the argument that women are not only motivated to be change agents, but also, 'put their money where their mouths are'. A 2009 EarthSense Poll showed that 80% of adult women believe that individuals can affect the environment, but that they personally are not doing enough to prevent environmental destruction. Given that women are increasingly seeking jobs where they can be an agent for positive change, it is therefore unsurprising that when a woman is responsible for the majority of household decisions, they tend to result in a net high sustainability index (Kabeer, 2012).

Many in the domains of public policy and consumer psychology are greatly interested in the impact of gender and sustainability on consumer behavior. Previous studies have shown that women, more so than men, are concerned about environmental issues (Koos 2011; Zelezny, Chua & Aldrich, 2000). Given that it has been shown that women are more likely to have a final say in what products and services are purchased within the home, it can be hypothesized that women are more likely than men to make

decisions and purchases with a sustainable outcome. However, why exactly women are more environmentally aware is less thoroughly understood. A study conducted by Paul Stern, currently of the National Research Center, categorized action in support of environmentally quality using three value orientations: egoistic, social-altruistic and biospheric. The study hypothesized that individual gender might explain the connection between these orientations and likelihood of participating in ESBs. A survey of 349 college students showed that women overall have a stronger belief about consequences for self, others, and the biosphere. That is, women are more likely to think about the repercussions of their actions, not only on themselves, but also on their cohorts, peers and the environment at large (Stern, 1993). Since the 1980s, sustainability and gender have been at the forefront of sustainable development agendas. A result of the WID (Women in Development) movement of the 1970s, theories surrounding women's innate connection to nature became a popular topic in environmental and developmental debates. In the 1980s, many scholars, including eco-feminists, argued that by virtue of their biological relationship to procreation, women are more closely linked to the natural world and given that, are more likely to be harmed by its destruction and thus more keenly aware of the need to protect and conserve it (Meinzen-Dick, Kovarik & Quisumbing, 2014). However, this theory was weakened by the fact it oversimplified the relationship between nature and women by viewing women as a homogenous group. This theory also did not take into account adequate analysis of the relationship of men to nature and sustainability. These theories and studies led to more, conclusive and inclusive studies over the past few decades which included men, the dynamics between men and women, and women across cultural, social and environmental contexts. A conclusive

literature review by Meinzen-Dick, Kovarik & Quisumbing (2014) showed evidence to support the theory that gender does indeed matter when it comes to sustainability. However, the research shows that neither gender is necessarily more resource-conserving. Instead, it indicates that it is important to consider the intangible and intrinsic motivations of both genders, and their physical conditions and means. The attitudes, desires and preferences of both men and women, with regard to sustainability and environmental conservation, need to be considered. It must also be understood that preferences for sustainability are flexible and highly influenced by material conditions and awareness campaigns aimed towards specific genders. Traditional gender roles and dependence on natural resources are indicative of how men and women build their knowledge of resources and desire for sustainability. However, in the end, it is not the motivation or decision-making power each gender has that will determine whether they behave sustainably or not, but the financial, labor, and knowledge resources available to them. Therefore, instead of focusing on why women or men are more likely to behave sustainably, it is worthier of time and effort to understand the specific constraints to ESB adoption across both genders.

Given that women are the primary decision makers in the home and given that it has been shown that women historically care more about sustainability issues than men, the results of this analysis are in alignment with the outcomes of previous studies (Brough, Wilkie, Ma, Isaac & Gal, 2016). This part of the study could have been more accurate had participants been asked about their marital status and whether they regard themselves as the primary decision maker in the home.

Income as a Predictor of ESBs

The ANOVA analysis run on the income data showed there was no statistically significant difference in ESB outcome between and among different income levels (P-value of .202). Therefore, we can only speculate about the role of income as a predictor of ESBs from the sustainability index results.

The sustainability index score was highest among people who made between $50,000-$75,000/year, while those who participated the least in ESBs made between $0-$10,000/year. While this number is not entirely surprising given the cost of maintaining an environmentally aware lifestyle, the surprising factor is that the cohort who ranked second to last in their ESBs were those in the highest income bracket, making over $250,000 a year.

Money is often a limiting factor when it comes to sustainable behavior, especially when it comes to sustainable behaviors in the home environment (Stern, 1999). Existing communities in Vermont and New Hampshire are often hundreds of years old and were not built with sustainability in mind. Therefore, the existing infrastructure is inefficient and outdated. Renovating these existing systems is expensive, time consuming and damages the historical integrity of the towns and cities involved (Yung & Chan, 2012). Existing homes and businesses in New England must deal with extreme cold temperatures in the winter and heat in the summer and are therefore quite energy intensive. In addition, people who rent homes or apartments are often not at liberty to renovate or modify the property to be more sustainable without the permission of the landlord. Given the high cost of buying a home in the current economic climate, it is often more of a priority to buy an affordable property instead of an energy efficient one.

Maintaining property to deal with both extremes is expensive and time consuming and other factors often take precedence for young or first time homeowners. While income may not directly influence decision-making and behaviors, income can and does influence behaviors that depend strongly on particular capabilities. A study done by Stern in 1999 showed that while socio-demographic variables had no correlation with consumer behavior or policy support when social-psychological variables were held constant, environmental citizenship was positively correlated with income and with the white race. The results of this study show that the effectiveness of environmental citizenship depends on an individual's social and economic resources. The study also showed that environmental activism was significantly (negatively) associated with age and income. Therefore, it can be theorized that while income does not have a direct correlation with the likelihood of participating in ESBs, income is correlated with other attitudinal, contextual and personal capabilities which taken together and separately can give a more coherent picture of predicting environmental sustainability.

Education as a Predictor of ESBs

Similar to the income analysis, the ANOVA analysis run on the education data showed there was no statistically significant difference in ESB outcome between and among different income levels (P-value of .5498). The sustainability index analysis showed that individuals with a master's degree had a slightly higher mean sustainability index than other education levels (.724).

Environmental awareness and education has long been presumed to have a significant positive environmental awareness and impact. In the past few decades,

institutes of higher education have begun integrating sustainability issues and perspectives into higher education curricula (Lambrechts, Mula, Cuelemans, Molderez & Caermynck, 2013). However, separating discrete environmental education from pro-environmental behaviors and social influences is a daunting and complex undertaking. The interconnectedness of the range of aspects that influence behavior is extremely complex and hard to tease apart. A recent study done in Hungary compared environmental awareness between high school and college students. The results of this study showed that environmental awareness was significantly higher in the university students, and that they seemed, as a cohort, to be more aware of the interconnection between consumption and environmental issues (Zsóka, Szerenyi, Szechy & Kocsis, 2010). Given that college students are much more in control of what they study, the main result is that educators need to be aware of the level of commitment and interest among students towards issues of environmental sustainability and incorporate such tenets into course material whenever possible. Traditionally, environmental education is skewed towards those who already have an interest or have pre-existing environmental consciousness. This misses out on a wide cohort of students who either are less committed or simply lack the knowledge. In addition to widening the scope of environmental education outreach, the context of environmental education and the importance of sustainability need to be more focused on sustainable living strategies and appropriate, non-harmful consumer behavior. While awareness and education are an essential first step in cultivating positive attitudes towards becoming environmental change agents and participating in environmentally sustainable behavior, it is nothing without action. It must be recognized that the desire to be sustainable and having

knowledge of how important it is to have a lessened environmental impact is useless without action. Sustainability action is an even an even harder concept to quantify and is controlled by all factors enumerated in this study and more.

Religion as a Predictor of ESBs

Religious ideologies vary in their degree of anthropocentrism. Certain passages in some religious texts, particularly in Western religions and in Holy Books such as the New Testament, indicate that man should rule the earth and all that dwell upon it, as illustrated by Genesis 1:26; "Let them (man) have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth" (Genesis 1:26, King James Bible). However, other religious texts, often found in Eastern Religions, indicate that man should be more of a steward and shepherd of the earth, protecting and nurturing all inhabitants (Minton, Kahle, & Kim, 2015).

Sustainability will not be a motivating factor in home decision making without a core value system, which includes an appreciation for, and understanding the importance of environmental conservation. In many cases, a core value system is predicated upon a religious ideology. Various religious scriptures often reference sustainability and sustainability-related values, thereby suggesting that having a strong religious belief may influence consumer behavior as relates to sustainability (Minton et al, 2015). Religious views of the environment and sustainability may be divided into two broad categories; Western religions and Eastern religions. Western religions, including Christianity, Judaism, Islam, have holy texts that claim that God created nature, and therefore God and

humans hold a dominion over the environment and natural world. Conversely, Eastern religions, including Buddhism, Hinduism and Taoism, follow the idea that God is pantheistic, and that the universe and everything within it is a manifestation of God (Minton et al. 2015). According to tenets of Eastern religions, the natural world needs to be protected from destruction, for to harm the earth is to harm God. Before the environmental movements of the 1960s and 1970', this distinction between Eastern and Western religions was more pronounced. In his 1967 paper, "The Historical Roots of Our Ecological Crisis", Lynn White, Jr. expounded on how Western religions follow the idea that since God created nature and then gave control of nature to man, that humans who follow Western religion ideologies are less likely to be environmentally friendly and will be more willing to alter the environment to fit their needs and desires. This theory was strengthened by passages from the book of Genesis in the New Testament, which repeatedly describes man's dominion over nature (man names the animals, uses the land to plant crops, etc.). White theorized that given the teachings in the Bible and other holy books of Western religions, that those who practice Western religious ideologies are more likely to use environmental services without caution and risk depleting natural resources. A study in 1997 seemed to strengthen this theory, showing that Christians participated in fewer sustainable habits than people from other belief systems (Eckberg & Blocker, 1989; Wolkomir, Futreal, Woodrum & Hoban, 1997). However, more recent studies dispel this idea and show that participation in ESB depends less on cultural factors (often involving religion) and are more likely precipitated by personal ideologies, specifically altruism and helping others. Research on Eastern religions by Hunt and Penwell (2008) showed a much higher likelihood of participating in ESBs as most Some

of the most populist Eastern religions like Hinduism and Buddhism follow the idea that to destroy a part of nature is to destroy a part of God and therefore, people should protect, care for and exalt the earth. While religion is closely intertwined with altruism and supporting others, they are not the same construct, as a non-religious person can be altruistic and help others as well. Given the sustainability index constructed for purposes of the study showed no significant correlation between any of the studied religions and higher incidences of ESBs and the available literature, it cannot be said with any certainty that religion plays a major role in ESB behavior in Vermont and New Hampshire. However, understanding that to some, religion does relate to the environment and sustainability within the context of culture can be a very useful tool. Environmental researchers and change agents may benefit from understanding the religious values of consumers and may be able to shape their message depending on the religion of the target audience. Therefore, it can be concluded that while religion does not exclusively predict sustainable behaviors and attitudes, an understanding of different religions and the environmental implications of them can help provide insight into the mind and values of a sustainable consumer.

Politics as a Predictor of ESBs

Perhaps unsurprisingly, attitudes towards sustainability and environmental issues vary drastically between the two major American political parties. Fifty-eight percent of Democrats in a Pew Research Center survey said that environmental protection was their top priority, compared to just 27% of Republicans (Pew Research Center, 2012). The same survey showed that, of the 22 items asked, environmental protection was one of the

lowest priorities among Republicans, along with improving transportation infrastructure and campaign finance reform. While both Democrats and Republicans believe that the nation's energy crisis is an issue of high priority (55% top priority for Republicans, 57% for Democrats), the parties vary widely with the potential solutions.

The environmental movement of the 1960's was largely seen as a way to bring Americans together and helps restore the fractured country over a common goal after the Vietnam War. This movement was supported by many pieces of landmark legislation that passed during the Nixon and Ford administrations, with large bipartisan support. However, the conservative Reagan administration had strong anti-environment orientation and played a large role in halting all illusions of environmental policy being a non-partisan issue (Lash, Gillman & Sheridan, 1984). The environmental policies of George W. Bush strengthened this idea with his strong opposition of environmental protection. Over the past two decades, research has shown that Republicans have focused less on legislation considered pro-environmental than the majority of Democrats in legislative positions of power (Dunlap & McCright, 2011). This can be largely attributed to pre-existing ideologies aligned with each party. For example, Republicans have traditionally been very pro-business (and businesses and industries often oppose environmental policy due to the costs involved and restrictions put on land use and eminent domain), in favor of limiting government interference, and resistant to social change, all of which are elements of conservative ideologies and reduced pro-environmental behaviors. Democrats, on the other hand, are largely considered to be more liberal, more adjustable to social change, more trusting of big government and more willing to spend money on environmental issues (Dunlap e& McCright, 2011). This

divide indicates that Democrats more than Republicans are likely to participate in ESBs. While the ANOVA analysis did not show any statistically significant results to support this theory, the sustainability index did. The sustainability index showed a slight favoring of Democrats towards sustainable behaviors than Republicans, with the average Democrat having a sustainability index of .725 while Republicans only had .706. While a person's political affiliation is an unlikely indicator of their probability of participating in ESBs, knowing the different ideologies regarding the environment between the two major political parties in the United States and the values held by both can help future researchers to inform political processes intended to support environmentally sustainable activities and legislative policies.

Age as a Predictor of ESBs

Assumptions are often made that older generations tend to be more conservative and traditionalist when it comes to change, especially regarding the adoption of new, environmentally friendly policies (Fazio, Farm, Rodriguez & Molnar, 2006). However, the sustainability index with the highest mean found in this survey was attributed to individuals between ages of 45-55, one of the more mature generations in the study. In fact, the results of this study reiterated the idea that using age as a predictor of ESBs using the stereotypical behaviors ("traditional and status quo" older generations versus "innovative and early adopter" younger generations) is not necessarily helpful. For example, a study by Jean Twenge, E. Freeman and W.K. Campbell showed that while there is a surging interest in sustainability among millennials, they are also less likely than their Baby Boomer forefathers to cut electricity use or reduce heat usage during the

winter to save energy (Twenge, Freeman & Campbell, 2012). There are several theories for this apparent discrepancy. Firstly, traditionally, studies such as this one have been longitudinal in their reach and focus on the individual as the scale of moral analysis, or, the study focuses on the intent of the individual mindset. One of the defining characteristics of a millennial is their propensity to work and decision make in network groups (Bergman, Fearrington & Davenport, 2011). Therefore, in the scope of the younger generation, it is inaccurate to judge sustainability on an individual scale when the millennial mindset is more accurately a group one. Additionally, traditional studies looking at sustainability equate actions with belief, while people often fail to live up to their own moral ideals. Millennials, perhaps more than any other generation, are the "Me Generation", and thanks to the reach of social media channels, appearances have become more important than ever. It can therefore be speculated that while millennials are touted as being the Green Generation and have a wider understanding of sustainability and the repercussions of their impact on the environment, they are less likely to take action than their contemporary counterparts.

State as a Predictor of ESBs

Sustainability statistics among all 50 states in the US vary widely. These differences can be attributed to different climates, population variation, culture, demographics and other factors. Vermont and New Hampshire are two of the smallest states in the union, but they are both on the higher end of the sustainability spectrum than some of their western cousins (Kiernan, 2016). An analysis by WalletHub compared all 50 states across three dimensions: environmental quality, eco-friendly behaviors and

climate-change contributions. To compare the states, 17 metrics were compiled with corresponding weights and then each state score was calculated and ranked. Perhaps unsurprisingly, Vermont ranked first with a total score of 78.67, ranking second in environmental quality, second in eco-friendly behaviors and 10th in climate change contributions. New Hampshire came in at number 9, with a 30th rank in environmental quality, seventh in eco-friendly behaviors and third in climate change contributions (Kiernan, 2016). The sustainability index analysis carried out during this study showed a slight propensity for Vermonters over New Hampshire residents to behave sustainably, with a mean sustainability index of Vermonters of 71% and 70% for New Hampshire. While this difference is not large enough to say anything definitive about the differences between New Hampshire and Vermont, it is interesting to speculate on, given how close geographically the two states are and their similarity in climate, economic conditions and political ideologies.

This discrepancy can be partially explained by the fact that Vermont is a much more agricultural state than New Hampshire, whose main industries are technology and manufacturing (Mackie, 2017). It is important to agriculturalists to vote for politicians and support measures that protect the land from which their livelihood is derived and thus a higher percentage of people from Vermont are more likely to support sustainability agendas. New Hampshire's main export is industrial machinery, including computers, electrical equipment and medical/surgical instruments (Mackie, 2017). New Hampshire also does not have any personal state income tax, which has resulted in significantly higher property tax. This has resulted in many New Hampshire residents favoring politicians and measures that promise to keep taxes low, which is often a criterion for

conservative, Republican agendas (Smith, 2009). These agendas, as previously mentioned, are often not environmentally focused which could be why New Hampshire is ranked farther down on the sustainability index than Vermont.

Study Limitations

This study was complicated to design and conduct and proved an invaluable learning experience to the PI. After completion of the study, several points became apparent that could inform future survey work in order to ensure more clarity and statistical significance of results.

Survey design

The original survey design, developed as an initial pilot in New Hampshire and Vermont with little early information, was informed by Chase Harrison, Associate Director or the Program on Survey Research and Preceptor in Survey Methods at Harvard University. Given the short time for this particular study and the limitation of respondents, lessons learned for the design of a smaller survey included the fact that response requests could have been streamlined into "yes" or "no" answers (a binary system) and that all questions should have some weight, rather than be differentiated. In addition, all questions should have had the same weight throughout, instead of a few questions where the most sustainable and least sustainable answers were reversed in order. Thirdly, the demographic options should have been more thoroughly listed, especially with regard to the age category, where the options included an age bracket option of 25-35, 35-45, 45-55, and 55-65. This method could have led to confusion, given the repetition of some of the ages. It would have reduced confusion and increased

professionalism within the survey to have the age brackets omit overlap, e.g., 25-34, 35-44, 45-54, 55-64, 65+. For the qualitative section of the survey, instead of havingan open box for respondents to write in their own words, it would have been more efficient and effective to have a list of options for their choices, such as, “This saves money”, “This option is cheaper”, “I don’t care”, etc. With this method, it would have been feasible to extrapolate some potentially relevant data from the qualitative section, instead of just speculation. Finally, this study could have been more effective had it had a greater reach. Given the restricted nature of the funding, there were only a finite number of survey responses affordable and so the sample size is quite limited. Future studies of this topic need to be as far reaching and broad as possible to get many varied responses and a wide variety of opinions.

Regardless of the limitations, this work has been invaluable in several ways. It has taught the PI how to do research and educated her for a career in the social sciences and sustainability. It has shed a small ray of light on the increasingly complex issue of sustainability sociology and psychology and demonstrated the need for more, similar research to be done on the topic. It is my hope that this study and subsequent ones will help identify barriers to sustainable behaviors in and around New England and provide tools for bringing sustainability education and accessibility to those who have the ability to make a difference, one LED light bulb at a time.

Conclusion

Research in sustainable behavior and decision-making is complex. Not only are the parameters difficult to study, the nuances between sustainable values and actions are

also hard to quantify. This study did not find any statistically significant difference between how and why different demographics made sustainable decisions and – importantly – did not see the clear link to socioeconomic status and household income that was originally hypothesized to be key to household adoption of ESBs. While this study was unable to find any conclusively definitive reasons for sustainable decision-making among residents of New Hampshire and Vermont, it did shed some light on this issue. To begin with, results of the ANOVA analysis support the theory that women are more likely than their male counterparts to respond in their survey answers that they engage in ESBs in their household. This knowledge can help further studies explore more deeply into why women reported themselves as behaving more sustainably and what it is about female behaviors and attitudes towards sustainability that may cause them to act more sustainably than men. While the rest of the ANOVA results were not statistically significant, the sustainability index constructed from the data is also a useful tool for understanding sustainable behaviors in New England in that it confirms previously suggested theories. This topic is one which needs to be further explored to (1) better understand the demographic factors correlated to active adoption of environmentally sustainable behaviors in a statistically significant way, and (2) gather the evidence needed to inform policies at the local, state, and national level advancing sustainability at all levels through what have been found to be powerful and impactful "grassroots" activism. we are to have any hope of curtailing global climate change and saving the natural resources of this planet, to be used responsibly and sustainable for the generations to come.

Appendix

Survey Instruments

Survey materials

Domestic Sustainability Assessment

Introduction: This study is designed to collect information about how and why individuals participate in household behaviors with an environmental impact.

Procedures: You will be shown a series of questions regarding daily/weekly/monthly tasks done in the home. These questions will be in multiple choice format. The questionnaire consists of 15 questions and will take approximately 10-15 minutes to complete.

Risks/Discomforts: Risks are minimal for involvement in this study. All information is strictly confidential and once all data has been collected and analyzed, data sheets will be destroyed.

Benefits: There are no direct benefits for participants. However, it is hoped that through your participation, researchers will learn more about how sustainable decisions are made and enable the process to become more widely adopted and affordable.

Confidentiality: All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones). All questionnaires will be concealed, and no one other than then primary investigator and associated researchers listed below will have access to them. The data collected will be stored in the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the primary investigator.

Compensation: Participants are compensated through Qualtrics. When you received an invitation to complete this survey, you were offered some form of compensation. For example, you may have been offered online credit towards a gift card, or other types of e-commerce compensation, or cash incentives. When offered, this compensation it is typically delivered within 20 days after taking a survey, or once a person reaches a certain aggregate threshold accumulated from participation in multiple activities on a market research panel. After completing this survey, you will receive the appropriate compensation.

Participation: Participation in this research study is completely voluntary. You have the right to withdraw at anytime or refuse to participate entirely. If you desire to withdraw, please close your internet browser and notify the principal investigator at this email: mls379@cornell.edu.

Questions about the Research: If you have questions regarding this study, you may contact Molly Smith at 570-660-0859, mollysmith@fas.harvard.edu.

Questions about your Rights as Research Participants:

Please read both the Privacy and Security statements below and print them out for your records.

Privacy Statement http://www.qualtrics.com/privacy-statement/

Security Statement http://www.qualtrics.com/security-statement/

If you have questions you do not feel comfortable asking the researcher, you may contact Dr Mark Leighton, leighton@fas.harvard.edu or Dr. Melody Brown Burkins at melody.b.burkins@dartmouth.edu.

Q2 I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip To End of Survey

Please read each question carefully and select the best answer that most accurately reflects your habits in the home environment.

Q1 I shut down or put my computer in sleep mode when not using it

- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q2 I unplug my portable electronic devices (cell phone charger, hair dryer, electronic, coffee grinder, kettle, etc) when not using them

- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q3 I use high-efficiency (LED/CFL) bulbs in my light fixtures
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q4 I turn my air conditioner (window unit, central air, etc) on when I feel hot.
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q5 I turn the heat on in my house/apartment when I feel cold
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q6 I hang my laundry up to air dry after washing
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q7 If I were to purchase a car, a hybrid/electric model would be my first choice
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q8 I winterize my house in some capacity in cold months (e.g. insulate windows, block drafts, lay down carpets, etc)
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q9 My showers take over 10 minutes
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q10 I use the cold-water cycle when using a washing machine
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q11 I flush the toilet with every use
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q12 I wait until I have a full load of laundry to use a washing machine
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q13 I eat meat daily
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q14 I turn off the lights when leaving a room
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q15 I leave the TV on even if no one is watching
- ❍ Always
- ❍ Sometimes
- ❍ Rarely
- ❍ Never

Q16 Almost done! Now we have a few questions about you so that we can better understand your background.

Q17 Gender
- ❍ Female
- ❍ Male
- ❍ Other

Q18 Please enter your age
- ❍ 18-24
- ❍ 25-35
- ❍ 35-45
- ❍ 45-55
- ❍ 55-65
- ❍ 65+

Q19 Select the option closest to your yearly household income
- ❍ $250,000+
- ❍ $150,000-$250,000
- ❍ $100,000-$150,000
- ❍ $75,000-$100,000
- ❍ $50,000-$75,000
- ❍ $30,000-$50,000
- ❍ $10,000-$30,000
- ❍ $0-$10,000

Q20 Select your highest level of education
- ❍ High school
- ❍ Some college
- ❍ College graduate
- ❍ Masters degree
- ❍ PhD
- ❍ Professional degree
- ❍ Other _____

Q21 Please select your closest religious affiliation

- ❍ Christian
- ❍ Jewish
- ❍ Hindu
- ❍ Muslim
- ❍ Agnostic
- ❍ Atheist
- ❍ Other

Q22 Please select your political affiliation

- ❍ Democrat
- ❍ Republican
- ❍ Independent
- ❍ Libertarian
- ❍ Other
- ❍ None

Q23 How many people currently live in your household?

Q24 Please select the state in which you reside

- ❍ New Hampshire
- ❍ Vermont

Q25 Please enter your zip code

References

Allen, P., & Sachs, C. (1991). The social side of sustainability: Class, gender and race. *Science as Culture*. 2(4), 569-590.

Amel, E.L., Manning, C.M., Scott, B.A. (2009). Mindfulness and Sustainable Behavior: It's not effortless being green. *Ecopsychology* 1(1), 14-25

Aminrad, Z., Zakariya, S.Z.B.S., Hadi, A.S., Sakari, M. (2013). Relationship Between Awareness, Knowledge and Attitudes Towards Environmental Education Among Secondary School Students in Malaysia. *World Applied Sciences Journal,* 22(9), 1326-1333.

Bergman, S.M., M. Fearrington, S.Davenport, J. Bergman. (2011). Millennials, narcissism, and social networking: What narcissists do on social networking sites and why. *Personality and Individual Differences*, 50(5), 706-71.

Blocker, T., D., Eckberg (1989). Environmental issues as women's issues: General concerns and local hazards. *Social Science Quarterly*, Volume 70, 586-593.

Butler, C. D. (2002). Inequality and Sustainability. Doctoral thesis, Australian National University, Canberra. Retrieved from: https://digitalcollections.anu.edu.au/handle/1885/46233

Boykoff, M., J. Boykoff. (2003). Balance as bias: global warming and the US prestige press. *Global Environmental Change*, 14(2), 125-136.

Brough, A.R., J. Wilkie, J. Ma, M. Isaac, D. Gal., (2016). Is Eco-Friendly Unmanly? The Green-Feminine Stereotype and Its Effect on Sustainable Consumption. *Journal of Consumer Research*. 567-582. ucw044 DOI: 10.1093/jcr/ucw044

Caminade, C., J. Turner, S. Metelmann, J. Hesson, M. Blagrove, T. Solomon, A. Morse, M. Baylis. (2016). Global risk model for vector-borne transmission of Zika virus reveals the role of El Nino 2015. *Proceedings of the National Academy of Sciences of the United States of America*. Published ahead of print December 19, 2016. Doi: 10.1073/pnas.1614303114

Casillas, C., & Kammen, D. (2010). The energy-poverty-climate nexus. *Science*, Volume 330, 1181-1182.

Chapin, T., C. Folke, R. Stephen, B. Walker, M. Scheffer, J. Rockstrom. (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecology and Society*, 15(4), 20-20

Chemnick, J. (2016). Could Trump Simply Withdraw U.S. from Paris Climate Agreement? *Scientific American*, 315(5), 8-8

Corral Verdugo, V. (2011). The positive psychology of sustainability. *Environment, Development and Sustainability*, 14(5), 651-666.

Costanzo, M., Archer, D., Aronson, E., & Pettigrew, T. (1986). Energy conservation behavior: The difficult path from information to action. *American Psychologist*, 41(5), 521–528.

Dawson, L.M. (1995). Women and Men, Morality and Ethics. *Business Horizons*, 38(4), 61-68.

Dietz, T., G.T. Gardner, J. Gilligan, P.C. Stern, M. P. Vandenbergh. (2009). Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences of the United States of America*, 106, 18452–18456.

Dorling, D. (2010). Is more equal more green? London: University of Sheffield.

Dulal, H. B., Foa, R., & Knowles, S. (2011). Social Capital and Cross-Country Environmental Performance. *Journal of Environment & Development*, 20(2), 121–144.

Dunlap, R., McCright, A., (2011). The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010. *The Sociological Quarterly*, 52, 155-194.

Fairbrother, M. (2012). Rich People, Poor People, and Environmental Concern: Evidence across Nations and Time. *European Sociological Review*, 29(5), 910-922.

Fazio, R.A., S. Farm, J. M. Rodriguez Baide, J.J. Molnar. (2006). Barriers to the Adoption of Sustainable Agricultural Practices: Working Farmer and Change Agent Perspectives. *Renewable Agriculture and Food Systems*, 24(1), 60-71.

Gardner, G.T., P.C. Stern. (2008). The Short List: The Most Effective Actions U.S. Households Can Take to Curb Climate Change. *Environment*, 50(5), 13-24.

Gatersleben, B. Steg L., Vlek C., (2002). Measurement and Determinants of Environmentally Significant Consumer Behavior. *Environment and Behavior*, 34(3), 335-362.

Goodland, Robert (1995). The Concept of Environmental Sustainability. *Annual Review of Ecological Systems*, 26(1), 1-24.

Hajer, M., Nilsson, M., Raworth, K., Bakker, P., Berkhout F., Boer Y., Rockstrom J., Ludwig, K., Kok M. (2015). Beyond Cockpit-ism: Four Insights to Enhance the Transformative Potential of Sustainable Development Goals. *Sustainability*, 7(2), 1651-1660.

Hansen, J., R. Ruedy, M. Sato, and K. Lo (2006). Global temperature change. *Proceedings of the National Academy of Sciences of the United States*, 103(39), 14288-14293.

Hardin, G. (1968). The tragedy of the commons. *Science*. 162(3859), 1243-1248.

Himmelweit, S., C.Santos, A. Sevilla, C. Sofer. (2013). Sharing of Resources Within the Family and the Economics of Household Decision Making. *Journal of Marriage and Family*, 75(3), 625-639.

Hirst, E. (1984). Household energy conservation: A review of the federal residential conservation service. *Public Administration Review*, 44(5), 421–430.

Hirst, E., Berry, L., & Soderstrom, J. (1981). Review of utility home energy audit programs. *Energy*, 6(7), 621–630.

Hobson, K. (2010). Competing Discourses of Sustainable Consumption: Does the 'Rationalization of Lifestyles' Make Sense? *Environmental Politics*, 11(2), 95-120. Print.

Holland, T. G., Peterson, G. D., & Gonzalez, A. (2009). A Cross-National Analysis of How Economic Inequality Predicts Biodiversity Loss. *Conservation Biology*, 23(5), 1304-13013.

Hovi J., D.F. Sprinz, B. Guri. (2012) Why the United States Did Not Become a Party to the Kyoto Protocol: German, Norwegian, and US Perspectives. *European Journal of International Relations,* 18(1), 129–150.

Hunter, L.M., A. Hatch, A. Johnson. (2004). Cross-National Gender Variation in Environmental Behaviors. *Social Science Quarterly*, 85(3), 677-694

IEA, comp. Energy Policies of IEA Countries Sweden 2013. *Paris: Organization for Economic Co-operation and Development*, 2013. Web: https://www.iea.org/publications/freepublications/publication/Sweden2013_free.pdf

IMF (International Monetary Fund) (2013). *World Economic Outlook Database*.

IPCC, 2014: Climate Change 2014: Synthesis Report. *Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151.

IRENA (International Renewable Energy Agency), (2014). The Socio-economic Benefits of Solar and Wind Energy http://www.irena.org/DocumentDownloads/Publications/Socioeconomic_benefits_solar_wind.pdf

Johnson, K.M., (2006). Demographic trends in rural and small town America. *The Carsey School of Public Policy at the Scholars' Repository.* Paper 5. http://scholars.unh.edu/carsey/5

Kahle, L.R., E. Minton, C. Kim. (2016). Religious Values as a Predictor of Sustainable Consumption Behaviors: A Cross-Cultural Comparison. *Developments in Marketing Science: Proceedings of the Academy of Marketing Science*. 273-278. http://dx.doi.org/10.1016/j.jbusres.2015.01.003

Kiernan, J.S. (2016) 2016 Greenest States Retrieved from: *Wallet Hub* https://wallethub.com/edu/greenest-states/11987/

Kollmuss, A., J. Agyeman. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.

Koos, S. (2011). Varieties of environmental labeling, market structures, and sustainable consumption across Europe: A comparative analysis of organizational and market supply determinants of environmental labeled goods. *Journal of Consumer Policy*, 34, 127– 151.

Kurz, Tim. (2002). The Psychology of Environmentally Sustainable Behavior: Fitting

Together Pieces of the Puzzle. *Analysis of Social Issues and Public Policy*, 2(1), 257-278.

KPMG International (2012). Taxes and Incentives for Renewable Energy. Retrieved online: www.kpmg.com/Global/en/

Lambrechts, W., I. Mula, K. Ceulemans, I. Molderez, V. Caeremynck. (2013). The integration of competence for sustainable development in higher education: an analysis of bachelor program in management. *Journal of Cleaner Production*, 48, 65-73.

Lash, J., Gillman, K., & Sheridan, D. (1984). *Season of spoils: the Reagan Administration's attack on the environment*. United States: Pantheon Books, New York, NY, USA.

Leiserowitz, A. (2007). American opinions on global warming. A Yale University / Gallup / ClearVision Institute Poll. New Haven, CT: Yale School of Forestry & Environmental Studies. http://environment.yale.edu/news/5305/american-opinions-on-global-warming/

Lindaman, K. (2002). Issue Evolution, Political Parties, and the Culture Wars. *Political Research Quarterly*, 55(1), 91-110.

Luterbacher, Urs, and Detlef F. Sprinz. (2001). *International Relations and Global Climate Change*. Cambridge, MA: MIT. Print.

Lutsey, N., D. Sperling. (2008). Greenhouse gas mitigation for the United States for transport versus other sectors. *Transport Research Part D*, 14, 222-229.

Mackie, J. (2015). Top Three Industries in New Hampshire. *NewsMax*. Retrieved from: http://www.newsmax.com/FastFeatures/industries-new-hampshire-economy/2015/04/15/id/638643/

McKenzie-Mohr, D., & Smith, W. (1999). *Fostering sustainable behavior: An introduction to community-based social marketing (2nd ed.).* Gabriola Island, British Columbia, Canada: New Society.

McKenzie-Mohr, D., (2000). New Ways to Promote Pro-environmental Behavior: Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing. *Journal of Social Issues*, 56(3), 543-554.

Meinzen-Dick, R., C. Kovarik, A. Quisumbing. (2014). Gender and Sustainability.

Annual Review of Environment and Resources, 39, 29-55.

Minton, E.A., L. Kahle, C.Kim. (2015). Religion and motives for sustainable behaviors: A cross-cultural comparison and contrast. *Journal of Business Research,* 68(9), 1937-1944.

Morrison M, Duncan R, Parton K (2015). Religion Does Matter for Climate Change Attitudes and Behavior. PLoS ONE 10(8): e0134868. https://doi.org/10.1371/journal.pone.0134868

Oreskes, N., (2004). The Scientific Consensus on Climate Change. *Science*, 306(5702), 1686.

Palmer, K., & Burtraw, D. (2005). Cost-effectiveness of renewable electricity policies. *Energy Economics*, 27(6), 873-894.

Pandit, R., & Laband, D. N. (2009). Economic well-being, the distribution of income and species imperilment. *Biodiversity and Conservation*, 18(12), 3219-3233.

Pew Research Center. (2015). The public's political views are strongly linked to attitudes on environmental issues: But political views are not a major factor on biomedical, food safety and space issues. *ScienceDaily.* ScienceDaily, 1 July 2015. <www.sciencedaily.com/releases/2015/07/150701114752.htm>.

Pew Research Center. (2008). Women Call the Shots at Home; Public Mixed on Gender Roles in Jobs. *Pew Social Trends.* Retrieved from http://www.pewsocialtrends.org/2008/09/25/women-call-the-shots-at-home-public-mixed-on-gender-roles-in-jobs/

Rosenbaum, Walter A. (2014). *Environmental Politics and Policy*. Washington, D.C.: CQ. Print.

Rosenzweig, C. W. Solecki, S. Hammer, S. Mehrotra. (2010). Cities lead the way inclimate-change action. *Nature*, 467. 909-911. doi:10.1038/467909a.

Scoones, I. (1998). Methods for Livelihoods Analysis. *Sustainable Livelihoods and Rural Development*, 98-108. doi:1858642248.

Shafik, N. (1994). Economic Development and Environmental Quality: An Econometric Analysis. *Oxford Economic Papers*, 46(1), 757-773.

Smith, A.E. (2009). Social Issues Divide NH. *The Granite State Poll by the University*

of New Hampshire Survey Center. Retrieved from: http://cola.unh.edu/sites/cola.unh.edu/files/research_publications/gsp2009_spring_socialiss42209.pdf

Spangenberg, Joachim H, and Sylvia Lorek. (2002). Environmentally Sustainable Household Consumption: From Aggregate Environmental Pressures to Priority Fields of Action. *Ecological Economics,* 43, 127-140. Print.

Steg, L., & Sievers, I. (2000). Cultural theory and individual perceptions of environmental risks. *Environment and Behaviour*, 32(2), 250-269.

Stern, P.C. (1993). Value Orientations, Gender, and Environmental Concern. *Environment & Behavior*, 25(3), 322-348.

Stern, P.C. (2000). Toward a Coherent Theory of Environmentally Significant. *Journal of Social Issues*, 56(3), 407-424.

Stern, P.C. (1999). Information, Incentives, and Pro-environmental Consumer Behavior. *Journal of Consumer Policy*, 22(4). 461-478.

Stevens, Candice. (2010). *Are Women the Key to Sustainable Development?* Sustainable Development Insights, Frederick S. Pardee Center for the Study of the Longer-Range Future, Boston University.

Sustainable Communities Skills and Learning for Place Making. 1st ed. Vol. 1. Hatfield, Hertfordshire: U of Hertfordshire, 2011. 224. Print.

Tapia-Fonllem, C., V. Corral-Verdugo, B. Fraijo-Sing, M. Fernanda Duron-Ramos. (2013). Assessing Sustainable Behavior and its Correlates: A Measure of Pro-Ecological, Frugal, Altruistic and Equitable Actions. *Sustainability*, 5. 711-723. doi:10.3390/su5020711

Tester, J. (2005*). Sustainable energy: Choosing among options*. Cambridge, Mass.: MIT Press.

Twenge, J.M., Freeman, E., Campbell, W.K. (2012). Generational Differences in Young Adults' Life Goals, Concern for Others, and Civic Orientation, 1966-2009. *Journal of Personality and Social Psychology*, 102(5), 1045-1062.

U.S. Census Bureau: State and County Quick-Facts. Data derived from Population

Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Non-employer Statistics, Economic Census, Survey of Business Owners, Building Permits Last Revised: Tuesday, 01-Dec-2015

United Nations, General Assembly, *Report of the Conference of the Parties on its seventeenth session*, Nov. 28- Dec 11 2011. (FCCC/CP/2011/9)

United Nations, Department of Public Information, *Paris Climate Agreement to enter info force on 4 November*. October 2016. http://www.un.org/sustainabledevelopment/blog/2016/10/paris-climate-agreement-to-enter-into-force-on-4-november/

van Trijp, H.C.M., *Encouraging Sustainable Behavior Psychology and the Environment*. New York: Psychology Press, 2014. Print.

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

Wolkomir, M., Futreal, M., Woodrum, E., Hoban, T., (1997). Substantive religious belief and environmentalism. *Social Science Quarterly*, 78, 96-108.

World Energy Outlook. *International Energy Agency*. Ed. Robert Priddle. OECD/IEA, 2008. Web. 09 Feb. 2016.

Yung, E.H.K., E.H.W. Chan. (2012). Implementing challenges to the adaptive reuse of heritage buildings: Towards the goal of sustainable, low carbon cities. *Habitat International*, 36(3), 352-361.

Zelezny, L. C., Chua, P.-P., & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56, 443–457.

Zsóka, A., Z. Szerényi, A. Széchy, T. Kocsis. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. *Journal of Cleaner Production*, 48, 126-138.