

# **Environmental beliefs, concerns, and behaviors of parents and children: The apple does not fall far from the tree**

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## **ABSTRACT**

Most parents and children spend significant amounts of time together, particularly during a child's K-12 years. Hence, the parent-child relationship may be instrumental in forming an individual's environmental attitudes and actions. This research examines the relationship between a parent and child's environmental beliefs, concerns, and behaviors in two ways. First, parents and their college-aged children responded to a set of questions about environmental sentiment that were derived from the Model of Responsible Environmental Behavior (Hines *et al.*, 1987) and the Value Belief Norm Model (Stern, *et al.*, 1999). Their responses were compared to a randomly generated population of unrelated parent/student pairs from the study population. Second, the degree of similarity of responses between related students and parents was determined. Results showed that related parent/student pairs evidenced greater similarity in environmental beliefs and behaviors than unrelated pairs, while the study population overall exhibited similar levels of environmental concern. These results suggest the existence of a relationship dynamic between parents and children that is influencing their beliefs and behaviors. Interestingly, parents engaged in a significantly greater frequency of environmentally responsible behaviors than their own children, on average. This relationship between environmental beliefs and behaviors of parents and children warrants further research to better understand the roots, dynamics and directionality of the influence. A deeper understanding of this relationship will help refine intergenerational environmental education programs that aim to transfer environmental knowledge between students and their parents.

**Keywords:** *intergenerational influence, intergenerational learning, children and parents, environmental beliefs, environmental concerns, environmentally responsible behaviors*

## **INTRODUCTION**

Deforestation, water pollution, and climate change are among many of the environmental problems facing our world today. Many scientists believe that the widespread adoption of more environmentally friendly lifestyles can potentially reverse much of the environmental damage already done. For example, the Union of Concerned Scientists claims that by 2050, the world must reduce global carbon emissions by 40 to 50 percent below the levels of 2000 in order to prevent our entire earth system from becoming irreversibly unbalanced (Luers, 2007).

Achieving these reductions in global carbon emissions will likely require individuals to regularly and repeatedly engage in a variety of Environmentally Responsible Behaviors (ERBs), such as home energy conservation, recycling, participating in environmental activism, and using mass transit.

This imperative begs the question: what causes people to engage in ERBs? Understanding why or why not individuals engage in ERBs is a valuable area of research and is essential for solving environmental issues. This research provides insight into factors that may contribute to ERBs, thus providing information that may prove valuable for creating effective policy and educational initiatives designed to promote ERBs.

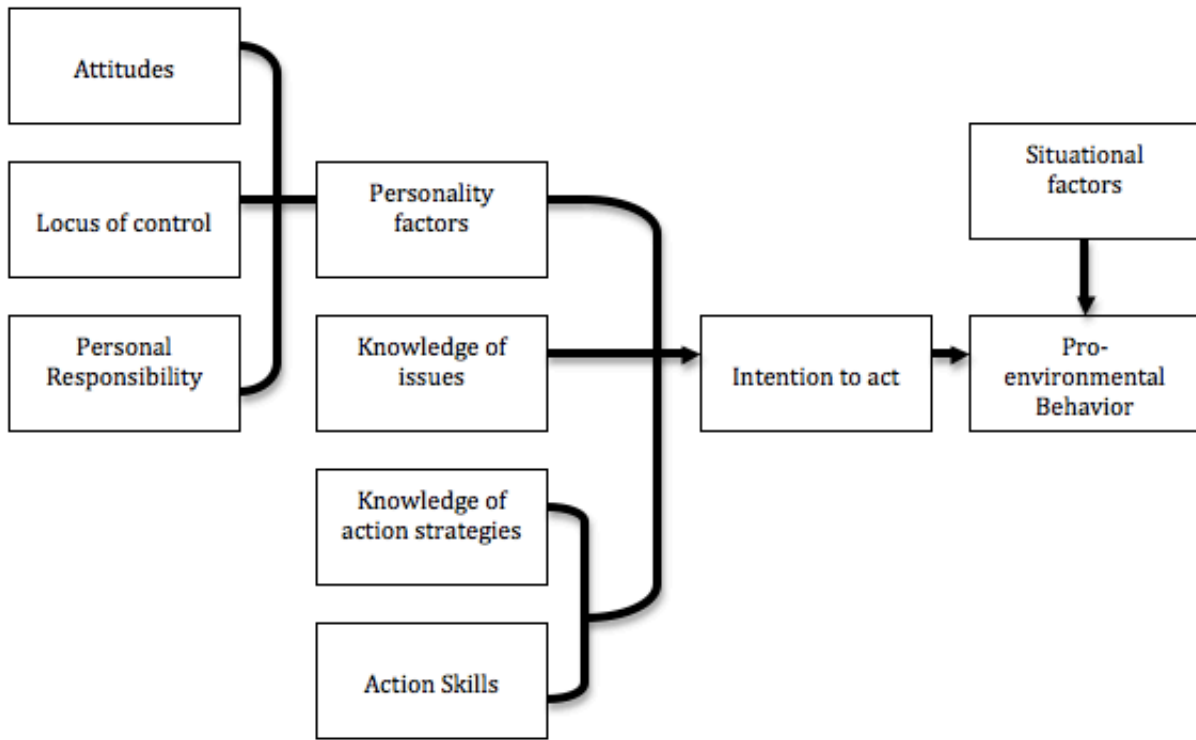
### **Environmentally Responsible Behavior Models**

Many researchers have studied ERBs and a variety of theoretical models exist to describe factors that promote or inhibit ERBs. Hines, Hungerford, and Tomera (1987) designed one such model called the Model of Responsible Environmental Behavior (Figure 1). The researchers performed a meta-analysis of 128 studies about ERBs and identified six variables associated with ERBs (Kollmuss & Agyeman, 2002):

- **Attitudes:** individuals with pro-environmental attitudes, including a general attitude towards the environment in addition to more specific attitudes such as those towards the energy crisis and taking environmental action, were more likely to engage in ERBs.
- **Locus of Control:** individuals with an internal locus of control were more likely to engage in ERBs. An internal locus of control means that an individual believes his or her own behavior is significant and can create change. In contrast, an external locus of control means that an individual believes his or her actions cannot create change.
- **Individual sense of responsibility:** individuals who felt a greater sense of personal responsibility to help the environment and engage in ERBs were more likely to perform ERBs.
- **Knowledge of issues:** individuals who were more informed about specific environmental problems and their causes were more likely to take action.
- **Knowledge of action strategies:** individuals that were aware of actions they could take in order to mitigate environmental problems were more likely to engage in said action.
- **Action skills:** individuals with greater action skills were more likely to participate in ERBs. Action skills represents the knowledge that an individual has, enabling him or her to actually complete an ERB.

Each of the mentioned variables contribute to one's *intention to act* which can be measured by one's verbal commitment to perform an ERB. Individuals who stated they would take action were more likely to engage in ERBs. However, another variable in the model,

“situational factors,” can interfere with one’s intention to act and influences actual completion of the ERB. Situational factors play a large role in actual ERBs and can include lack of economic resources and social pressures (Hines *et al.*, 1987).<sup>1</sup>

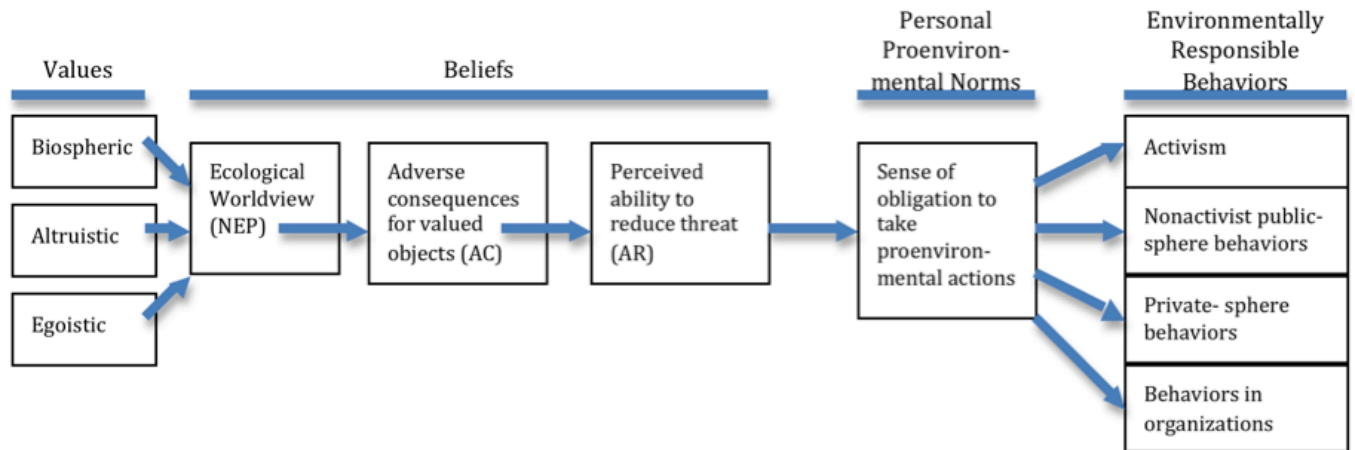


**FIGURE 1. The Model of Responsible Environmental Behavior (Hines *et al.*, 1987)**

Stern, Dietz, Abel, Guagnano, and Kalof (1999) developed another model explaining ERBs. This model, the Value Belief Norm Model of Environmentalism, includes variables about one’s values, beliefs, and pro-environmental personal norms. The version of the model, displayed in Figure 2 (Stern, 2000), proposes three value types related to environmental behavior: egoistic, altruistic, and biospheric. Egoistic values focus on an individual’s desire to protect him or herself, be it financially, physically, or mentally. Altruistic values are centered on an individual’s sense of moral obligation to others, such as his or her own children, future

<sup>1</sup> ERB is synonymous with the Pro-environmental Behavior variable used in the Hines *et al.* (1987) model.

generations, or all humanity. Biospheric values focus on an individual’s sense of responsibility for protecting and preserving the ecosystem and components of the ecosystem such as plants, marine life, and birds.



**FIGURE 2. Value Belief Norm Model (Stern, et al., 1999)**

One variable comprising the “beliefs” portion of the model is Ecological Worldview, which is measured by the New Ecological Paradigm (NEP). The NEP was first developed in 1978 by Dunlap and Van Liere. NEP focuses on an individual’s perception about his or her connectedness to nature and is derived from the egoistic, altruistic, and biospheric values of an individual (Stern, 2000). Dunlap and Van Liere believed that environmentalism was strongly related to humans’ views about their relationship with nature and developed an NEP scale to test this theory.

The NEP scale, which was revised in 2000 by Dunlap, Van Liere, Mertig, and Jones, contains fifteen Likert-scale items measuring beliefs about five different environmentally-related orientations: the reality of limits to growth, antianthropocentrism, the fragility of nature’s balance, rejection of exemptionalism, and the possibility of an ecocrisis (Table 1). *Limits to Growth* references the limits placed on society’s growth by the earth’s resources.

*Antianthropocentrism* focuses on beliefs regarding humanity's right to rule over nature.

*Fragility of Nature's Balance* references human ability to disrupt nature's balance. *Rejection of Exemptionalism* probes the belief that humans, unlike other animals and plants, are exempt from the forces of nature. *Possibility of an Ecocrisis* refers to the likelihood of an environmental catastrophe (Dunlap, et al., 2000). To determine the extent of an individual's ecological view, the NEP survey asks respondents to rate their agreement with the statements shown in Table 1 on a scale from 1 (strongly disagree) to 5 (strongly agree). A higher NEP score indicates a stronger pro-ecological view.<sup>2</sup>

In addition to NEP, adverse consequences (AC) for valued objects is the second component of the beliefs section of the Value Belief Norm Model. As the name implies, AC refers to whether or not an individual believes that the things he or she values will be threatened by environmental conditions. What an individual values is dependent upon his or her egoistic, altruistic, and biospheric values, which are taken into account in the first portion of the model. AC can be synonymous to environmental concern (Schultz, 2001). The final component of the beliefs section, perceived ability to reduce threat (AR), measures an individual's perception that his or her actions can avert environmental threats. AR is similar to the locus of control variable cited in the Hines *et al.* model (1987), in that they both measure an individual's perceived ability to create environmental change through his or her own actions.

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<sup>2</sup> Note that several of the items purposefully express anti-NEP views so as to prevent the tendency of respondents to answer all of the questions to the same degree, regardless of content. For example, respondents who felt they were pro-ecological could not receive the highest pro-ecological score by answering "Strongly Agree" for all questions. The anti-NEP questions have reversed scoring. Hence, in calculating NEP score, it is necessary to convert the anti-NEP responses so that they parallel those of pro-NEP ratings. For example, a rating of "2" for an anti-NEP question would receive a "4" when calculating the NEP score.

**TABLE 1**  
**The New Ecological Paradigm Scale, separated by factor**

<b>Factor</b>	<b>Statement</b>
<b>Antianthropocentrism</b>	<p>Humans have the right to modify the natural environment to suit their needs.</p> <p>Humans were meant to rule over nature.</p> <p>Plants and animals have as much right as humans to exist</p>
<b>Fragility of Nature’s Balance</b>	<p>The balance of nature is very delicate and easily upset.</p> <p>When humans interfere with nature, it often produces disastrous consequences.</p> <p>The balance of nature is strong enough to cope with the impacts of modern industrial nations.</p>
<b>Rejection of Exemptionalism</b>	<p>Human ingenuity will insure that we do NOT make the earth unlivable.</p> <p>Humans will eventually learn enough about how nature works to be able to control it.</p> <p>Despite our special abilities humans are still subject to the laws of nature.</p>
<b>Possibility of an Ecocrisis</b>	<p>Humans are severely abusing the environment.</p> <p>If things continue on their present course, we will soon experience a major ecological catastrophe.</p> <p>The so-called “ecological crisis” facing humankind has been greatly exaggerated.</p>
<b>Reality of Limits to Growth</b>	<p>We are approaching the limit of the number of people the earth can support.</p> <p>The earth has plenty of natural resources if we just learn how to develop them.</p> <p>The earth is like a spaceship with very limited room and resources.</p>

The final component that precedes environmental action in the Value Belief Norm Model is one’s personal pro-environmental norms. Norms are activated by the belief that an environmental condition threatens something of value to the individual (AC) and that the individual’s actions can reduce the harm (Stern, 2000). The norms contribute to whether or not an individual wants to engage in the ERB.

## **Current Research on the Parent-Child Relationship**

As illustrated by the two models, a variety of factors are believed to influence ERBs. Other models, not described here, include other factors such as incentives for pro-environmental behavior, like monetary savings and social desirability (Kollmuss & Agyeman, 2002). One factor, however, that has received little attention is the influence of family members on an individual's ERBs, more specifically influences from the parent-child relationship. American children spend a large portion of time with their parents, especially during their K-12 years. In 2001, Hoeffferth and Sandberg studied how American children spend their time by analyzing the time diaries of 2,818 children, ages 0-12. In the time diaries, subjects (or their parents) filled out how many hours each child spent on activities throughout the day. The results revealed that children engaged in 22 to 24 activities during the weekdays, on average, and interacted with many types of people, including peers, teachers, and family members. Some of the children's activities presented significant times for children and parents to interact, such as spending approximately 9 hours eating, 1.75 hours studying, 1 hour at church, 15 hours playing, 12 hours watching television, .75 hours in household conversation, and 1.5 hours reading per week.

Spending so much time together provides ample opportunity for the beliefs, concerns, and behaviors of a parent to have an impact on the beliefs, concerns, and behaviors of his or her child, or vice-versa. As stated by Glass, Bengston, and Dunham (1986), children learn their parents' beliefs, attitudes (concerns), and behaviors through direct interactions and indirect observations. Researchers have found that a child's values formed in the family context endure into adulthood (Glass, *et al.*, 1986). This leads one to believe that significant similarities may be found between the beliefs, concerns, and behaviors of parents and children. For example Green, Macintyre, West, and Ecob (1991) found that, in 1987, younger people who had parents that



smoked were significantly more likely to smoke than younger people whose parents did not smoke. Additionally, some research supports that the political party loyalties of twelfth-graders and their parent have a relatively high, positive correlation (Jennings & Niemi, 1968). These findings indicate that, for several variables, parents can influence the beliefs and behaviors of their children.

Further, research shows that children can influence the beliefs, attitudes, and behaviors of their parents. Children have been found to influence their parents' purchasing choices of breakfast cereals, toys, and clothes, in addition to vacation locations and restaurants (Berey & Pollay, 1968; Flurry & Burns, 2005; Roedder-John, 1999). Additionally, recent research has found that children can influence their parents' basic computer skills by instructing them in basic technology functions (Hampshire, 2000). With research showing that parents and children can influence each others' beliefs, attitudes, and behaviors in the variables mentioned, I became curious about how the parent-child relationship may shape environmental beliefs, attitudes, and behaviors.

### **Research about the Parent-Child Relationship's Influence on Environmental Variables**

The influence of the parent-child relationship on environmental attitudes and behaviors has been examined in environmental education programs through the mechanism of intergenerational learning. Intergenerational learning refers to individuals interacting with and learning from people of different ages. Specifically, several studies have examined the effects of intergenerational learning in K-12 environmental education (EE) programs. Intergenerational programs aim to influence students to share environmental knowledge with their parents as a means of promoting environmental stewardship in the older generation. Duvall and Zint (2007) reviewed seven studies about children in K-12 EE programs to gain more information about how

children may influence their parents' environmental attitudes and knowledge. The results indicated that K-12 EE programs only modestly impacted the environmental beliefs, attitudes, knowledge, and behaviors of parents. However, the authors note that the small number of studies and limitations on the EE programs may have contributed to these results.

Research on the parent-child relationship has also examined the influence that a parent can have on the environmental beliefs and behaviors of his or her child. Chawla (1998 and 1999) found that adult environmentalists consider their parents to have played a significant role in their career choices and attitudes towards the environment. Chawla reviewed multiple studies which used open-ended surveys and structured interviews to ask adult environmental educators and environmental professionals about the people and experiences that shaped their attitudes about the environment and their decision to become environmentalists. Chawla also conducted her own study which interviewed environmental professionals in the USA and Norway about their life experiences and the people who shaped their environmental career choice (Chawla, 1999).

Kollmuss and Agyeman (2002) summarized Chawla's research findings from both studies and found pro-environmental values held by one's family was one of the most frequently mentioned influences, with parents being the most influential family members (Chawla, 1999). Additionally, childhood experiences in nature, such as vacations and camps, were the most frequently cited influence. These childhood experiences may arise from parental decisions, such as deciding to go on a vacation to a national park. It is important to note that Chawla's studies focused on the influences that impacted the environmental attitudes and career choices of environmental professionals. Her subjects did not include a broader population of individuals that have little or no connection to the environment in their careers.

The research above suggests that the parent-child relationship can influence one's environmental attitudes and behaviors (Chawla, 1998; Chawla, 1999; Duvall & Zint, 2007). Based on these findings, it is reasonable to believe that the parent-child relationship intervenes in variables of the ERB models presented previously. In the Hines, *et al.* (1987) Model of Responsible Environmental Behavior, attitudes, locus of control, and personal responsibility are all personality factors that an individual learns or inherits which may be influenced by a parent or child (Figure 1). Additionally, a parent or child could provide the other with knowledge of issues and knowledge of action strategies. For example, a student may learn about a relevant environmental issue at school and inform his or her parent of the issue. Situational factors may also change due to the actions of a parent or child. For example, a parent may not pay for curbside recycling service, which prohibits the child from easy access to recycling.

The parent-child relationship also has the potential to impact variables in the Value Belief Norm Model (Figure 2). An individual's biospheric, altruistic, and egoistic values, which contribute to one's Ecological Worldview (NEP), may form as a product of one's living environment which can be shaped by parent-child interactions. Additionally, examining the ERBs that a parent or child performs may impact the decision of the other to engage in the ERB. For example, if a child (parent) observes his or her parent (child) using a reusable water bottle and sees how convenient the practice is, the child (parent) may be more obliged to similarly use a reusable water bottle.

Based on these models, it seems reasonable to suggest that the parent-child relationship could have a significant impact on variables that are believed to contribute to ERBs. Thus, studying the role of the parent-child relationship in shaping ERBs and the variables leading to ERBs will be a valuable topic for research. This study is designed to measure similarities

between a parent and child's ERBs, environmental concerns, and environmental beliefs. While measuring similarities does not necessarily measure how or how much an individual influences the other, it will still provide valuable insight into the existence of a parent-child dynamic that relates to ERBs. It is also important to note that measuring similarities does not indicate the *direction* of any influence (parent influencing child or child influencing parent).

This research first examines how similar a parent and child's environmental beliefs, concerns, and behaviors are in comparison to unrelated pairs in a population. That is, the research seeks to determine whether or not a parent and child's beliefs, concerns, and behaviors are more alike than a randomized pairing of children and adults in the research population. If they are more alike, this finding would suggest a generational relationship between the beliefs, concerns, and behaviors of a parent and child. However, the finding would not reveal the direction of influence, whether it was parent-to-child or child-to-parent.

Secondly, the research examines the degree of similarity between the parent and child's responses. While the first research question may indicate that parents and students on average were more alike to one another than unrelated pairs in a population, the scores themselves may still exhibit significant differences from one another.

Using the two research questions, four combinations of results can be derived from the data. First, if parents and students are more similar than a random population and not significantly different from one another, then this presents strong evidence for a parent-child relationship that may lead to the observed similarities in beliefs, concerns, or behaviors. Secondly, if the research reveals that parents and students are more similar than an unrelated population but are significantly different from one another, this could indicate generational influences but is weaker evidence of the influence since the student and parent scores are

significantly different. Thirdly, if parents and students are not more similar than a random population and are significantly different from one another, this provides the weakest evidence for generational influence. Finally, if parents and students are not more similar than a random population but are not significantly different from one another, this finding may indicate small variances between the majorities of subjects, regardless of relation, in the sample.

The results from this study can serve as a basis for further research into how a parent-child relationship may or may not shape environmental beliefs, concerns, and behaviors. If findings indicate that the parent-child relationship is an integral component of environmental attitudes and behaviors, this validates current research and warrants future research on intergenerational education programs as a means of promoting environmental stewardship. Additionally, future research to determine directionality of the relationship would provide added insight into the most effective ways to promote ERBs through education and policy.

## **METHODS**

### **Data Collection and Respondents**

As a college student, college peers are easily accessible research subjects. Therefore, this study examines the environmental beliefs, concerns, and behaviors of college students and their parents in the United States. A paper survey was utilized to gather data from subjects (see Appendices 1 and 2). To obtain the majority of the subjects, the surveys were distributed at the University of Michigan's Parents and Family Weekend 2011 Pre-Game Tailgate which took place in the Oosterbaan Field House on campus. This tailgate was held on September 24, 2011 before a University of Michigan home football game. Parents were able to purchase tickets to the tailgate for their family through the University's Office of New Student Programs. The

tailgate included a brunch, raffles, and performances by the Michigan Marching Band and various campus groups.

In between performances, students and their families sat and relaxed at tables in the field house. During this time, I approached students and asked if they and their parents would be willing to take a survey for my Senior Honors Thesis. If they said yes, I provided them with one student survey and one parent survey. If both parents wanted to take the survey, I provided an additional parent survey. All parent and student surveys in a familial unit were labeled at the top with the same number. This was a crucial component in the methodology to ensure that parent and student surveys could be paired together for the analysis.

Several additional parent-child subjects were similarly approached during the University of Michigan's Move-In Week in the Fall of 2011. Surveys were distributed to families in the Residence Halls and families walking around campus. In total, 74 pairs of student-parent surveys were collected and used for analysis.<sup>3</sup>

Parent respondents were 57.5% female and student respondents were 43.7% female. The parent-child pair gender distribution was relatively even, with mother-son pairs being the greatest (see Table 2). Each subject provided their year of birth. By subtracting the year from 2012, I was able to gain an approximate age of each respondent. The average parent age was 52.6 years of age and the average student age was 19.7 years. The average age difference between each parent and his or her student was 33.3 years.

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<sup>3</sup> Ten of the pairs initially had surveys from both parents; however, for the purpose of analysis, only one parent survey from each grouping was selected at random and used.

**TABLE 2**  
**Parent-child gender distribution of the subjects**

	Father	Mother
Son	24.3%	31.4%
Daughter	17.1%	27.1%

In the survey, students were asked about their declared majors in order to determine whether a large majority of students concentrating in topics related to the environment had been inadvertently surveyed. None of the students cited environmental studies, environmental science, or environmental engineering as their majors; however, four students were studying biology and two were studying microbiology. Additionally, other listed majors, like chemical engineering and political science, could have an environmental focus. Seventeen students stated that their majors were “undecided” meaning that they could eventually declare a major related to the environment. Many of the research subjects had “undecided” majors because the average student age was 19.7 years which is the approximate age of second-year students at the University. Freshmen and sophomores are less likely to have declared majors than juniors and seniors at the University.

Of the students that indicated their University attendance, 70 attended the University of Michigan and 1 attended Western Michigan University. While excluding the Western Michigan student from the data would have standardized the student population to only attend the University of Michigan, data from the Western Michigan student was included in the interest of having the largest data set possible.

## Measures

### *Environmental Beliefs*

To measure environmental beliefs, the New Ecological Paradigm Scale (NEP) was used, which is included in the Value Belief Norm Model (Figure 2). As described in the introduction, the NEP focuses on an individual's perception about his or her connectedness to nature. Since its creation in 1978, the NEP Scale has been used frequently to measure environmental attitudes, beliefs, and values. The scale is most commonly used for samplings of the general public but has also been used to study beliefs of farmers and members of interest groups (Dunlap, *et al.*, 2000). While the full NEP scale consists of fifteen statements, abbreviated versions of the scale are often used in surveys (Johnson, Bowker, & Cordell, 2004).

In order to keep the survey relatively short, the ten-item version of the NEP scale was used, instead of fifteen, which tested for all five factors comprising the scale (Johnson *et al.*, 2004). This scale included two items each for the factors *Antianthropocentrism*, *Balance of Nature*, and *Rejection of Human Exemptionalism*. Three items were included for *Possibility of an Ecocrisis* and one item asked about *Limits to Growth*. Table 3 displays the items used on the surveys, separated by factor.



**TABLE 3**  
**Items used from the New Ecological Paradigm Scale, separated by factor**

Factor	Statement
<b>Antianthropocentrism</b>	Humans have the right to modify the environment to suit their needs. Humans were meant to rule over nature.
<b>Fragility of Nature’s Balance</b>	The balance of nature is delicate and easily upset. When humans interfere with nature, it often produces disastrous consequences.
<b>Rejection of Exemptionalism</b>	Human skills and resources will ensure that we do not make the earth unlivable. Humans will eventually learn enough about how nature works to be able to control it.
<b>Possibility of an Ecocrisis</b>	Humans are severely abusing the environment. If things continue on their present course, we will soon experience an environmental catastrophe. The environmental crisis has been greatly exaggerated.
<b>Limits to Growth</b>	We are approaching the limits the earth can support.

The survey asked each subject to rank degree of agreement for each item using ordered response levels (strongly disagree to strongly agree). Figure 3 shows this portion of the survey. Agreement with Pro-NEP questions 2, 6, 7, 9, and 10 and disagreement with Anti-NEP questions 1, 3, 4, 5, and 8 indicated pro-ecological responses.<sup>4</sup> A higher score indicates stronger pro-ecological beliefs.

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<sup>4</sup> Reverse scoring was used for Anti-NEP questions (see footnote 2 on page 6).

<b>Section 1: Environmental Beliefs</b>					
Please indicate how much you agree with the following statements about the relationship between humans and the environment.					
	Strongly Disagree		Unsure	Strongly Agree	
	1	2	3	4	5
1. Human skills and resources will ensure that we do not make the earth unlivable.	1	2	3	4	5
2. Humans are severely abusing the environment.	1	2	3	4	5
3. Humans have the right to modify the environment to suit their needs.	1	2	3	4	5
4. Humans were meant to rule over nature.	1	2	3	4	5
5. Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5
6. If things continue on their present course, we will soon experience an environmental catastrophe.	1	2	3	4	5
7. The balance of nature is delicate and easily upset.	1	2	3	4	5
8. The environmental crisis has been greatly exaggerated.	1	2	3	4	5
9. We are approaching the limits the earth can support.	1	2	3	4	5
10. When humans interfere with nature, it often produces disastrous consequences.	1	2	3	4	5

**FIGURE 3. New Ecological Paradigm Scale used in the Environmental Beliefs section of survey**

NEP scores for each survey respondent were calculated in a number of ways. First, an overall mean NEP score was calculated for each subject. In other words, each respondent's average score for all ten items in the section was determined. Second, mean scores were recorded for each of the five factors of the NEP. For example, the average score for *Antianthropocentrism* was found by averaging a subject's response for "Humans have the right to modify the environment to suit their needs" and "Humans were meant to rule over nature." The intent was to analyze possible trends within certain factors of the scale. Items that subjects left blank were excluded from the data and did not contribute to the mean scores.

***Environmental Concern***

Several studies provide support for environmental concern falling into three distinct categories: concern for self, concern for other people, and concern for the biosphere (Schultz, 2001; Stern and Dietz, 1994). According to Stern and Dietz (1994), the categories of

environmental concern are related to the egoistic, altruistic, and biospheric value orientations of individuals described earlier. Environmental Concern, as measured in this study, is very similar to the variable adverse consequences (AC) for valued objects in the Value Belief Norm Model. AC claims that individuals will express concern if environmental conditions have adverse consequences for the things they value, which are determined by the three aforementioned value orientations. According to this theory, someone who has a high biospheric value orientation and believes that dumping trash into the ocean severely disrupts marine life will likely be very concerned about dumping and its impact on marine life. In contrast, someone who has a high biospheric value orientation but believes that dumping trash into the ocean does not inflict much harm on the marine life may not express great concern about dumping.

Comparing environmental concern in this study offers insight into the value orientations that parents and students may or may not share. Additionally, the Value Belief Norm Model holds that AC (environmental concern in this study) may predict one's motive to take environmental action. Thus, the differences in environmental concern between generations (parent and child) could have implications for future initiatives intended to encourage ERBs.

A survey constructed by Schultz (2001) was used, which aimed to analyze one's environmental concern and in turn, provide implications about an individual's value orientations. The survey asked participants to rank their concern for nine different items in response to the question, "I am concerned about environmental problems because of the consequences for \_\_\_\_\_" (see Figure 4). The nine different items were grounded in three clusters of valued objects falling under the categories egoistic, altruistic, and biospheric concerns. Egoistic concerns included *my lifestyle*, *my health*, and *my future*; altruistic concerns included *all people*,

children, and future generations; and biospheric concerns included *plants, marine life, and birds*.

The concern scale ranged from 1 (not concerned) to 5 (very concerned).

<b>Section 2: Environmental Concern</b>															
Please rate each of the following items in response to the following question:															
<b>"I am concerned about environmental problems because of the consequences for _____."</b>															
	Not Concerned	2	Moderately Concerned	3	Very Concerned	4	5		Not Concerned	2	Moderately Concerned	3	Very Concerned	4	5
Plants	1	2	3	4	5	My future	1	2	3	4	5				
Marine Life	1	2	3	4	5	All people	1	2	3	4	5				
Birds	1	2	3	4	5	Children	1	2	3	4	5				
My Lifestyle	1	2	3	4	5	Future generations	1	2	3	4	5				
My Health	1	2	3	4	5										

**FIGURE 4. Environmental Concern section of survey**

To analyze the data, a mean score for each of the egoistic, altruistic, and biospheric concern clusters was calculated. For example, the mean score of biospheric concerns was determined by finding the mean of the responses to *Plants, Marine Life, and Birds*. Also, an Overall Environmental Concern score was found by calculating the mean response from all nine items in this section of the survey.

### ***Environmentally Responsible Behaviors***

When selecting Environmentally Responsible Behaviors to assess in the survey, an effort was made to choose behaviors that are not highly dependent on situational factors, like income and place of residence. According to Hines *et al.* (1987), situational factors can interrupt or reinforce one's ability to act. For example, an individual may have a strong desire to use public transportation as a means of conserving fossil fuels, but the individual may not have access to public transportation. Thus, selecting behaviors that both college students and their parents can easily engage in was crucial. Additionally, situational factors change throughout one's lifetime, influencing ERBs. Thus, behaviors were selected that would be less dependent on changing

situational variables in order to minimize biases for ERBs that may be inherently easier or more difficult for certain groups to exhibit.

Based on these criteria, respondents were asked about the frequency with which they engage in five behaviors: using reusable grocery bags, purchasing environmentally friendly products, recycling at home, using a reusable water bottle, and turning off lights when exiting a room (see Figure 5). Subjects rated how often they perform each behavior on a five-item scale. The scale was coded into numerical values, with 1 being “Never” and 5 being “Almost Always.”

<b>Section 4: Environmental Behaviors</b>					
Please circle your responses to the following questions about your behaviors.					
<b>1. How often do you use reusable grocery bags?</b>					
Never	Rarely	Sometimes	Often	Almost Always	
<b>2. How often do you buy environmentally friendly products?</b>					
Never	Rarely	Sometimes	Often	Almost Always	
<b>3. How often do you recycle in your home?</b>					
Never	Rarely	Sometimes	Often	Almost Always	N/A
<b>4. How often do you use a reusable water bottle?</b>					
Never	Rarely	Sometimes	Often	Almost Always	
<b>5. How often do you turn off the lights when exiting a room?</b>					
Never	Rarely	Sometimes	Often	Almost Always	

**FIGURE 5. Environmentally Responsible Behaviors section of survey**

Of the five behaviors, using a reusable water bottle and turning off lights when exiting a room were believed to be most easily accessible to all subjects. Using reusable grocery bags is more pertinent to individuals who go grocery shopping regularly. Therefore, it may be more applicable to parents than students, since students may live in residence halls and have meals

provided. However, students who live in their own homes and live at home during the summer may have opportunities to use reusable grocery bags.

Purchasing environmentally friendly products is also more applicable to individuals who shop and have financial means to purchase environmentally friendly products. This may lead to parents engaging in the activity more; however, the term “environmentally friendly products” is very broad. Thus, students purchasing recycled paper or used clothes may consider their purchases “environmentally friendly.” By broadly defining the term, I hoped to gain an overall sense of how survey subjects think as consumers: do they make conscious efforts to promote environmental sustainability in purchasing decisions?

Finally, recycling is available to all students living in the residence halls and the majority of students living in off-campus housing in the City of Ann Arbor (*Recycling*, University of Michigan Housing; *Curbside recycling for single-family and duplex residence*, Recycle Ann Arbor). Therefore, accessibility to recycling programs should not pose a problem for students. However, because parents may not have access to recycling in their hometowns, a “not applicable” option was provided for this survey question.<sup>5</sup>

## **Data Analysis**

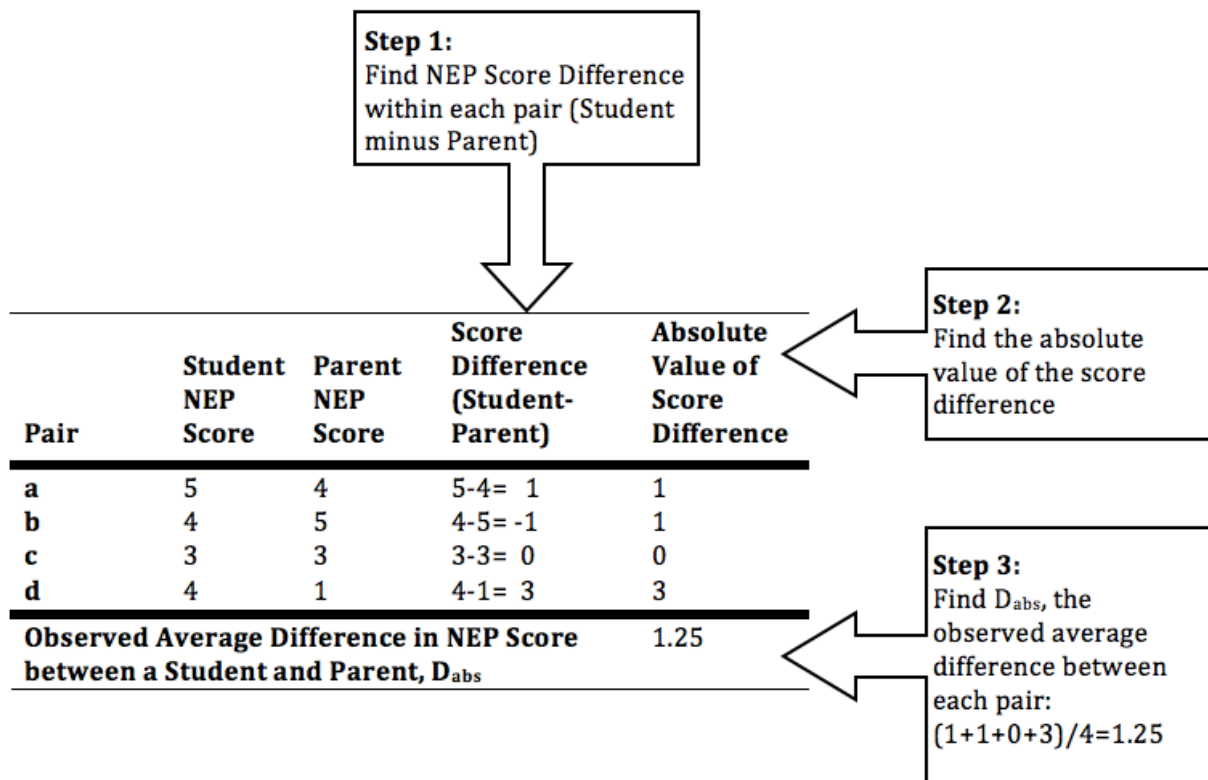
***Research Question 1:*** *Are the responses of a parent and his or her student more similar to one another than unrelated parent and student responses?*

The first research question asked whether the environmental beliefs, concerns, and behaviors of parents and their students were more similar to each other than those of unrelated

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<sup>5</sup> In addition to environmental beliefs, concerns, and behaviors, the survey included questions about the motivations behind using reusable water bottles and turning off the lights when exiting a room. Several of the motivations that participants could select were monetary benefits, increased resource conservation, and friend and family pressure. Due to time constraints, this data was not analyzed; however, the data could be used for future research.

student/parent pairs in a population. For each category of variables, the parent score was subtracted from his or her student's score (=student score *minus* parent score) to determine a score difference for each pair. In order to run the appropriate statistical test, this score difference was then converted to its absolute value. After finding the absolute value of the score difference between each pair (approximately 71 pairs)<sup>6</sup>, the mean difference between all of the pairs was calculated. This mean difference, called  $D_{abs}$ , was found by adding all 71 differences and dividing by 71. Figure 6 breaks down this calculation process into three steps using the Overall NEP Score variable as the example.



**FIGURE 6. How observed average difference ( $D_{abs}$ ) between parent and student responses was calculated**

<sup>6</sup> The number of pairs used in my analysis varied from 69 pairs to 73 pairs. This is because several respondents did not provide answers for questions in the survey; therefore, those subjects and their corresponding students/parents were omitted. Additionally, the statistics program, on occasion, would improperly analyze data when certain respondents were included in the data set; thus, those respondents/pairs were removed for analysis.

Since the first research question probes whether related student-parent pair responses are more similar than unrelated pairs, an unrelated, paired population needed to be created and analyzed. This process, called a permutation test, compared an observed value ( $D_{\text{abs}}$ ) to the distribution of repeated random pairs. In order to generate the repeated random pairs, the statistics application called *R* was programmed to randomly pair college students in the sample with an unrelated parent in the sample. This created approximately 71 different pairings<sup>1</sup> and one value  $D_{\text{random}}$ , which was calculated using the same method described in Figure 6. The program then repeated this 10,000 times which simulated a population of 710,000 pairs and 10,000  $D_{\text{random}}$  values. The program then compared the  $D_{\text{abs}}$  value found in my population of related students and parents to the 10,000  $D_{\text{random}}$  values derived from the unrelated pairs in the generated population. This comparison allowed me to observe whether the paired students and parents in the sample were significantly more similar than what would be found between unrelated pairs in a population. It is important to note that because the absolute value of the average difference between a parent and student score was used, the test does not indicate direction of the difference (i.e. whether a student has a higher score than the parent or vice versa).

***Research Question 2: How similar is a parent's response to his or her student's response on average?***

The second research question asked how similar the parent and student responses were to one another. While it may be possible that research question one shows that, for a particular variable, parent and student responses are more similar to one another than what would be seen between unrelated pairs, those related parent and student responses nonetheless could be significantly different from each other. The technique for solving this was very similar to the process used to answer the first research question (Figure 6); however, this time the real



difference value found between each pair was used, not the absolute value. Once the 71 difference values from each pair was obtained, an average difference called **D** was calculated.

A one-sample t-test was run on **D** to determine whether the score responses between students and parents, on average, were significantly different. Please note that I am *not* determining if the group of students or the group of parents had a significantly higher score: I am specifically examining whether or not, on average, a student had a significantly different NEP score than his or her own parent.

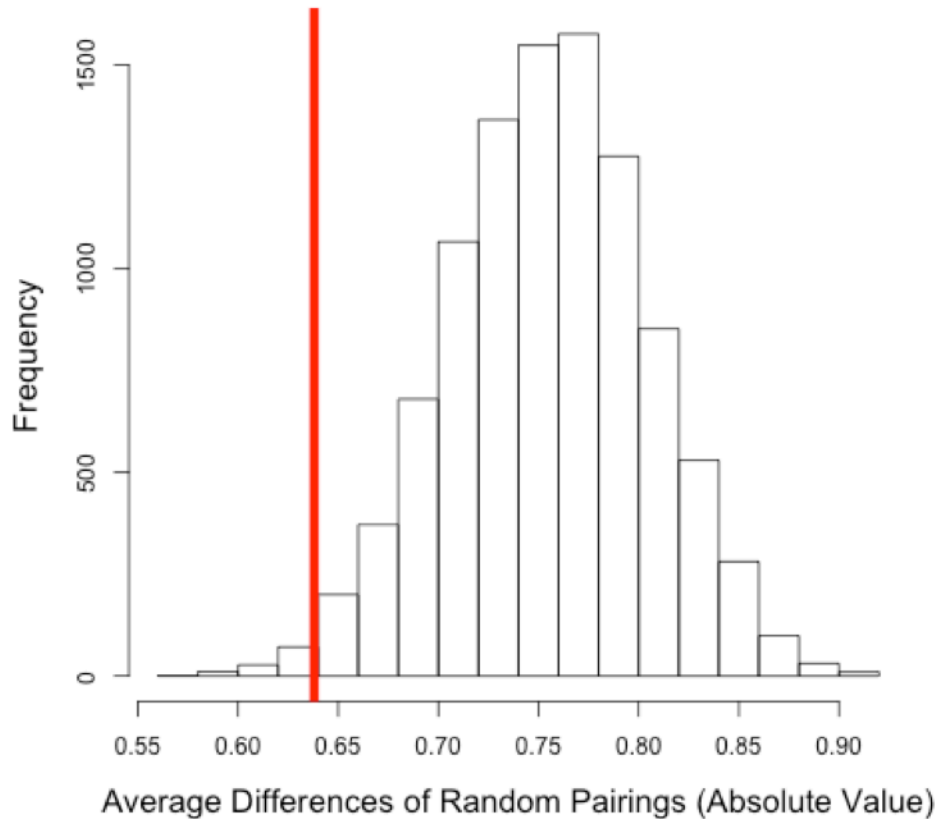
## **RESULTS**

### **Environmental Beliefs**

Results from the permutation test show that the Overall NEP scores of a parent and student are significantly more similar to each other than would be seen in the randomly generated, unrelated population ( $p \leq 0.05$ ). Figure 7 shows the distribution of the score differences found in the randomly paired, unrelated population. As seen, the distribution replicates a normal bell curve with the most frequently observed differences clustered in the middle. The mean difference for the entire distribution of unrelated pairs is 0.755 (see Table 4). This number falls roughly in the middle of the Figure 7 distribution. In marked contrast, the bold red line falls to the far left at a value of .638, indicating the observed average score difference ( $D_{abs}$ ) found in my sample between a student and his or her parent. This means that the average difference in NEP scores between a parent and his or her student is .638 (recall that this value was calculated using the absolute values of the differences). The red line falling to the far left of the randomly generated, unrelated population with a p-value of 0.01 indicates that the *Overall NEP Scores* between a related student and parent were significantly more similar than the scores

of a random student paired with a random parent. A value farther to the left on the x-axis indicates greater similarity between the parent and student score.

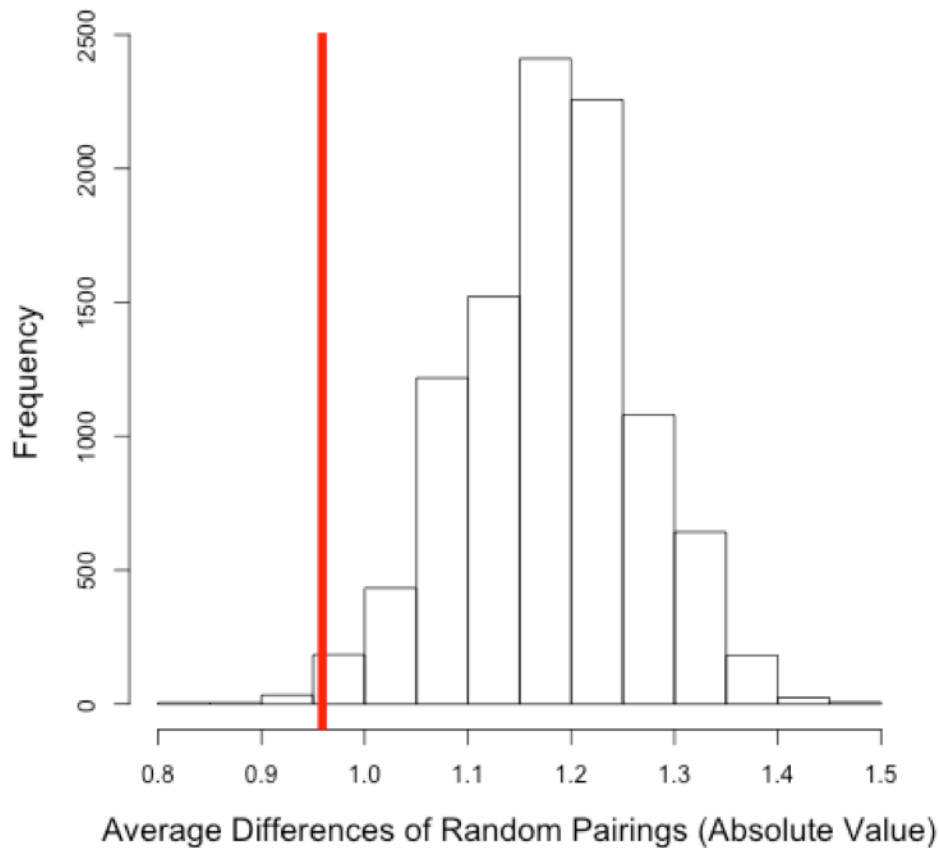
**FIGURE 7. Overall NEP Score**



**FIGURE 7.** Related parents and students had significantly more similar *Overall NEP Scores* than the population of randomly generated, unrelated pairs. The bold red line at 0.638 indicates the observed average difference ( $D_{abs}$ ) from my sample in comparison to the distribution of differences found between 710,000 randomly generated, unrelated pairs.

Additionally, the survey responses indicated that the *Antianthropocentrism* factor scores of a parent and student were significantly more similar to each other than would be seen in the repeated random pairs population, with a  $D_{abs}$  value of 0.959 and a p-value of 0.007. Figure 8 shows a permutation test: the distribution of the repeated random pairs population compared to the  $D_{abs}$  value found in the sample.

**FIGURE 8. Antianthropocentrism**



**FIGURE 8.** Related parents and students had significantly more similar responses in the Antianthropocentrism factor of the NEP Scale. The bold red line shows the observed average difference ( $D_{obs}$ ) found in my sample.

As described in Table 4 below, the responses from pairs of related parents and students for *Rejection of Exemptionalism*, *Possibility of an Ecocrisis*, *Fragility of Nature's Balance*, and *Limits to Growth* were not significantly more similar than the responses found in the randomly generated population, on average.

**TABLE 4**  
**Environmental Beliefs measured by the New Ecological Paradigm**  
*Average difference between related parents and students, compared to an unrelated, randomly generated population (absolute values used to determine differences)*

Variable	Observed Average Difference, $D_{abs}$	Unrelated Pairs Average Difference	p-value
Overall NEP Score*	0.638	0.755	0.01
Antianthropocentrism*	0.959	1.179	0.007
Fragility of Nature's Balance	0.877	0.978	0.078
Rejection of Exemptionalism	0.767	0.821	0.208
Possibility of an Ecocrisis	0.918	0.99	0.161
Limits to Growth	1.102	1.235	0.1

\*Significantly more similar than a population of random, unrelated pairs ( $p \leq 0.05$ )

A one-sample t-test was used to determine if, on average, a student had a significantly higher or lower response than his or her parent for the *Overall NEP Score* or the separate NEP factors. The only variable that demonstrated a significant difference in scores was *Limits to Growth*, which gives indication about how an individual perceives the earth's constraints on societal growth. On average, a student answered 0.377 points higher than his or her parent for the *Limits to Growth* category. Responses between a student and his or her parent were not significantly different for *Overall NEP Score*, *Antianthropocentrism*, *Fragility of Nature's Balance*, *Rejection of Exemptionalism*, or *Possibility of an Ecocrisis*. Among those five variables, the largest average difference between the responses of students and their parents was in the *Antianthropocentrism* factor and was only a difference of 0.0685. These results indicate that for five out of the six variables measured in the NEP, students and their parents did not have significantly different responses. Table 5 displays the average difference between a student and parent's response for each variable. A negative value indicates that the parent, on average, had a higher score than his or her student.

**TABLE 5**  
**Environmental Beliefs measured by the New Ecological Paradigm: One-Sample t-test**  
*Average difference between related student and parent response (student minus parent)*

Variable	Mean difference between student and parent response (student score minus parent score), D	p-value
Overall NEP Score	0.057	0.275
Antianthropocentrism	0.069	0.314
Fragility of Nature's Balance	0.055	0.335
Rejection of Exemptionalism	-0.055	0.675
Possibility of an Ecocrisis	0.032	0.407
Limits to Growth*	0.377	0.011

\*Significant difference between student and parent response ( $p \leq 0.05$ )

### Environmental Concern

Results show that, on average, none of the Environmental Concern responses of a student and his or her parent were significantly more similar to each other than would be seen in a random population (see Table 6). In other words, being related did not significantly influence a parent and student's score to be more similar from what would be seen in an unrelated population.

**TABLE 6**  
**Environmental Concern**  
*Average difference between related parents and students, compared to an unrelated, randomly generated population (absolute values used to determine differences)*

Variable	Observed Average Difference, $D_{abs}$	Unrelated Pairs Average Difference	p-value
Overall Environmental Concern	0.824	0.887	0.149
Egoistic Concern	0.954	1.039	0.131
Altruistic Concern	0.878	0.928	0.254
Biospheric Concern	0.982	1.096	0.075

Similar to Environmental Beliefs, the one-sample t-test revealed that, on average, there was no significant difference between a parent and student's response for any of the environmental concern variables (see Table 7). The greatest average difference between a parent and student's response was found in *Biospheric Concerns*, with a parent's score, on average, being only 0.26 points higher than his or her student, but this difference was not significant. None of the Environmental Concern variables were more similar for related pairs than unrelated, but none of the variables were significantly different between related parents and students. This indicates little variation in Environmental Concern between all of my subjects regardless of whether they were related or unrelated.

**TABLE 7**  
**Environmental Concern: One-Sample t-test**  
*Average difference between related student and parent response (student minus parent)*

<b>Variable</b>	<b>Mean difference between student and parent response (student score minus parent score), D</b>	<b>p-value</b>
Overall Environmental Concern	-0.051	0.646
Egoistic Concern	0.196	0.099
Altruistic Concern	-0.042	0.613
Biospheric Concern	-0.26	0.052

### **Environmentally Responsible Behaviors**

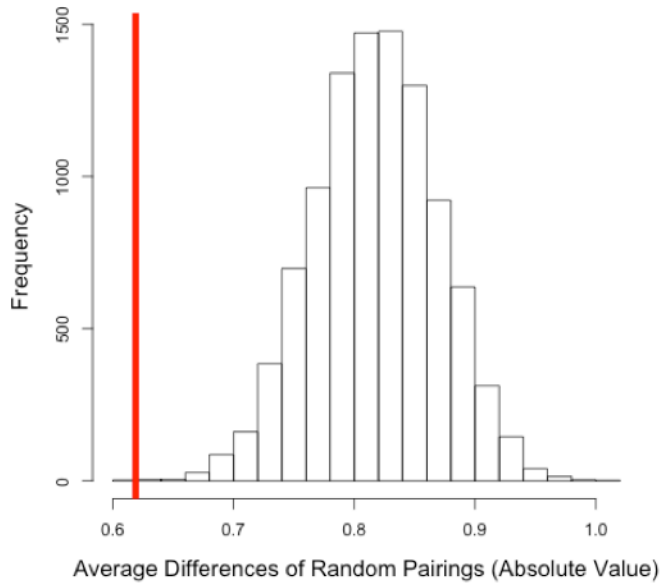
Results show that the *Overall ERB Score* of a parent and student were significantly more similar to each other than would be seen in the unrelated population ( $p \leq 0.05$ ). Additionally, the frequency of *using reusable grocery bags, recycling at home, and using a reusable water bottle* were significantly more similar between a parent and student when compared to an unrelated population (see Table 8 and Figures 9-12).

**TABLE 8**  
**Environmentally Responsible Behaviors**  
*Average difference between related parents and students compared to an unrelated, randomly generated population (absolute values used to determine differences)*

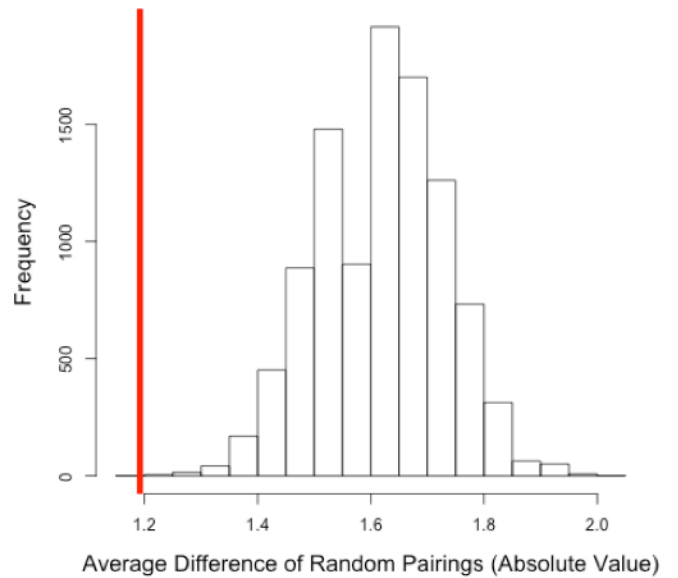
<b>Variable</b>	<b>Observed Average Difference, <math>D_{abs}</math></b>	<b>Unrelated Pairs Average Difference</b>	<b>p-value</b>
Overall ERB Score*	0.619	0.817	<0.001
How often do you use reusable grocery bags?*	1.192	1.619	<0.001
How often do you buy environmentally friendly products?	0.819	0.92	0.103
How often do you recycle in your home?*	0.843	1.037	0.0121
How often do you use a reusable water bottle?*	0.945	1.291	<0.001
How often do you turn off the lights when exiting a room?	0.55	0.56	0.526

\*Significantly more similar than a population of random, unrelated pairs ( $p \leq 0.05$ )

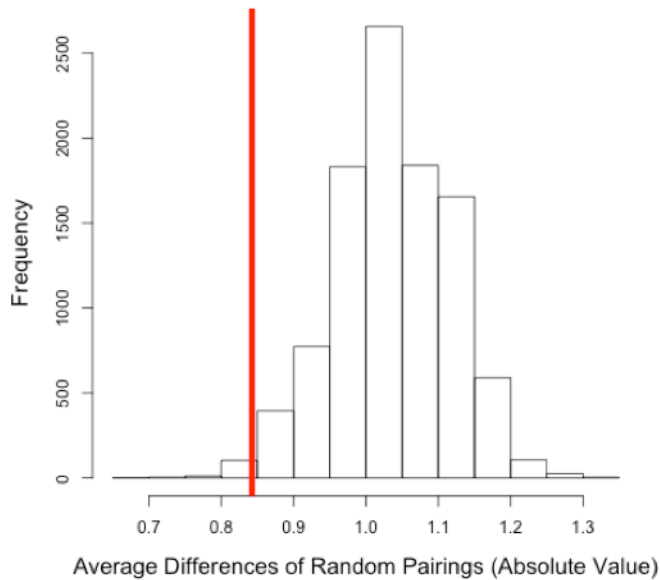
**FIGURE 9. Overall ERB Score**



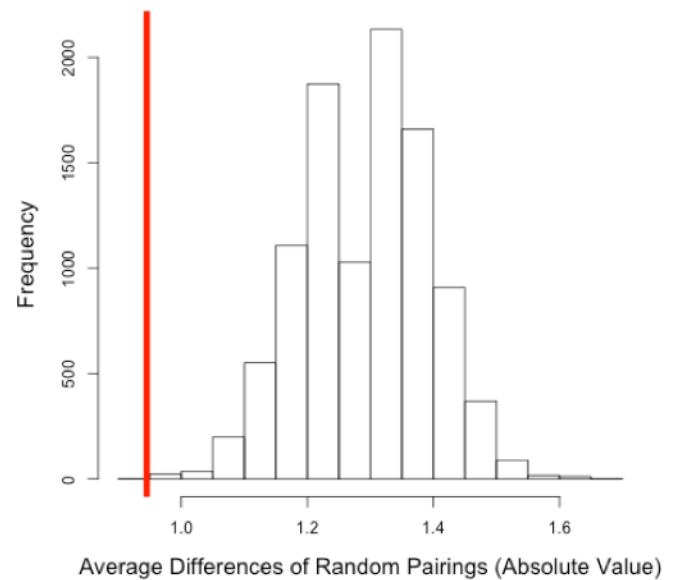
**FIGURE 10. Using Reusable Grocery Bags**



**FIGURE 11. Recycling at Home**



**FIGURE 12. Using a Reusable Water Bottle**



**FIGURES 9-12.** Parents and students were more similar than a population of unrelated pairs in the frequency of Overall ERB Score (Figure 9), Using Reusable Grocery Bags (Figure 10), Recycling at Home (Figure 11), and Using a Reusable Water Bottle (Figure 12). The bold red line indicates the observed average difference ( $D_{abs}$ ) from my sample for each variable in comparison to the distribution of differences found between 710,000 randomly generated, unrelated pairs.



Results from the one-sample t-test reveal that parents, on average, reported engaging in the following ERBs to a significantly greater frequency than did their students: *using reusable grocery bags, purchasing environmentally friendly products, and recycling at home.*

Additionally, when comparing the *Overall ERB Score*, a parent received a significantly higher score on average, suggesting that they more frequently engage in ERBs. The greatest average difference in scores between a student and parent was found in the reusable grocery bag question, with a parent answering 0.753 higher than his or her student on average (see Table 9). A negative value indicates that the parent reported a greater frequency than the student.

**TABLE 9**  
**Environmentally Responsible Behaviors: One-Sample t-test**  
*Average difference between related student and parent response (student minus parent)*

<b>Variable</b>	<b>Mean difference between student and parent response (student score minus parent score), D</b>	<b>p-value</b>
Overall ERB Score*	-0.276	< 0.001
How often do you use reusable grocery bags?*	-0.753	< 0.001
How often do you buy environmentally friendly products?*	-0.292	0.017
How often do you recycle in your home?*	-0.363	0.005
How often do you use a reusable water bottle?	0.151	0.15
How often do you turn off the lights when exiting a room?	-0.183	0.934

\*Significant difference between student and parent response ( $p \leq 0.05$ )

## **DISCUSSION**

Examining factors that contribute to Environmentally Responsible Behaviors (ERBs) is an area of research that is necessary for effectively promoting behaviors that lead to environmental sustainability. The majority of US children spend significant amounts of time with their parents (Hoeffferth and Sandberg, 2001), which may make the parent-child relationship a significant influence on one's ERB engagement, environmental beliefs, and environmental concerns. One way to examine the potential influences of the parent-child relationship is to first examine the similarities between the reported environmental beliefs, concerns, and behaviors of college students and their parents. This research suggests that, indeed, significant similarities and a relationship do exist, particularly in the environmental beliefs and ERBs of college students and those of their parents.

To support this conclusion, two questions were posed in this research. First, I was interested in learning whether or not college students and their own parents were more similar in their environmental beliefs, concerns, and behaviors, than unrelated college students and parents. The study's results reveal that related students and parents were more similar in their overall environmental beliefs system than unrelated pairs, as measured by the NEP. Further, related pairs were more similar than unrelated pairs in using reusable grocery bags, recycling at home, using a reusable water bottle, and the overall averaged ERB frequency. Table 10 summarizes the variables that were found to be more similar for related pairs than unrelated pairs. In contrast, results show that the environmental concern of related pairs is not more similar than would be seen between unrelated pairs. This finding was somewhat puzzling.

**TABLE 10**  
**Variables demonstrating greater similarity between related parent and student pairs than unrelated parents and student pairs, on average**

Variable
Overall NEP Score
Antianthropocentrism
Overall ERB Score
Using Reusable Grocery Bags
Recycling at Home
Using a Reusable Water Bottle

While results for the first question revealed that related student/parent pairs were more alike than unrelated pairs, these results did not reveal the degree of similarity between a student and his or her parent. Hence, the second research question examined the similarities between environmental beliefs, concerns, and behaviors of college students and their parents. The study's results demonstrated no significant difference in five out of the six environmental belief variables and all environmental concerns variables of related student/parent pairs. In contrast, results from the ERB section show that parents engaged in significantly more reusable grocery bag use, purchasing of environmentally friendly products, and in-home recycling, than their own children. Additionally, the combined average of all ERBs examined shows that parents engaged in ERBs more frequently than their students.

**TABLE 11**  
**Variables in which a parent had a significantly higher score than his or her own child, on average**

Variable
Overall ERB Score
Using Reusable Grocery Bags
Purchasing Environmentally Friendly Products
Recycling at Home

This study found that significant similarities exist between the environmental beliefs and behaviors of a parent and his or her college student, suggesting that further research into the parent-child relationship is warranted. Additionally, the findings validate further research into intergenerational environmental education programs as a means of promoting pro-environmental beliefs and behaviors between a student and parent.

### **Environmentally Responsible Behaviors**

As described previously, ERBs are crucial for environmental change. Thus, examining the nuances of the results pertaining to ERBs and providing possible explanations may be valuable. Related student/parent pairs demonstrated significantly more similarities in their frequency of home recycling, reusable grocery bag use, and reusable water bottle use, in comparison to unrelated pairs. One explanation for this finding may be the high degree of visibility for those behaviors. For example, when children go grocery shopping with parents or when parents bring groceries home from the store, the child can see the reusable grocery bags. When a child or parent recycles at home or uses a reusable water bottle at home, other family members can see. In contrast, purchasing environmentally friendly products, an ERB that was not more similar for related subjects, may occur when individuals are alone shopping and family members may pay less attention to what is purchased. Additionally, turning off lights is a highly common behavior that many subjects engaged in, making it very difficult for related subjects to demonstrate significant similarities in the behavior that would distinguish them from unrelated pairs. Overall, the degree of visibility for ERBs may make behaviors more transferrable between students and parents. Future research might test this hypothesis.

The results from the second research question indicated that parents reported significantly higher engagement than their own student in reusable grocery bag use, purchasing of

environmentally friendly products, and recycling at home. The dissimilarities between student and parent ERBs may be due to the nature of my survey that, as pointed out earlier in the research, includes behaviors favoring parent engagement. While I assumed that parents would engage more frequently in using reusable grocery bags and purchasing environmentally friendly products due to increased behavioral opportunity, the fact that parents engaged in more recycling at home was surprising. With such ample opportunity to recycle at the University of Michigan and growing up with such environmental hot-topics like climate change, I assumed that a student would engage in more recycling than his or her parent.

These results support recent findings by Twenge, Campbell, and Freeman (2012). The researchers performed a longitudinal study of high school seniors and college freshman over a span of 40 years and found a decline in taking personal action to help the environment for the younger generations. Several researchers responded to the study's findings and provided possible explanations for the decline (Irvine, 2012). Beth Christensen, head of the environmental studies department at Adelphi University in Long Island, claimed that many students now "have very little experience with the unpaved world" (Irvine, 2012). In contrast, she noted that her college peers in 1980 spent larger amounts of time hiking and in the woods. A disconnection with the natural world may provide an explanation for the decline in environmental action. Mark Potosnak, environmental science professor at DePaul University in Chicago, describes his students as "worn out" about the issue of climate change. He likens the situation to poverty in a foreign country: "You see the picture so many times, you become inured to it" (Irvine, 2012). These perspectives offer additional hypotheses for why students engaged in less recycling than their own parents that might be tested in future research.

Another possible explanation for this result may be that college students feel less connected to their own community, especially at the beginning of the school year when the surveys were distributed. Oskamp *et al.* (1991) found that individuals engaged in more curbside recycling when their friends and neighbors did so. Living in the residence halls or in off-campus housing during an undergraduate career provides less of an opportunity to become connected to neighbors, when compared to families who take permanent residence in a neighborhood for decades. This finding may offer another explanation as to why a parent recycled more than his or her student in this study, on average.

### **Environmental Concern vs. Beliefs and ERBs**

The variables *Overall NEP*, *Overall Environmental Concern*, and *Overall ERBs* were found by calculating the average of each section for every subject in the sample. While *Overall NEP* and *Overall ERBs* were found to be more similar within the related pairs than unrelated pairs, *Overall Environmental Concern* was not more similar for related individuals in the sample. These results are somewhat puzzling because the Value Belief Norm Model (Figure 2) contends that environmental beliefs (NEP) contribute to one's environmental concern which partially determines ERBs. Based on this model, one might assume that results found regarding the parent-child relationship in Environmental Beliefs and ERBs would mirror results about Environmental Concern. These surprising results may be a product of how one's environmental beliefs and concerns form and the ease with which they are influenced.

Several researchers believe that the NEP, measuring Environmental Beliefs in the survey, taps into an individual's "primitive beliefs" about the dynamic between the natural world and humanity (Dunlap, *et al.*, 2000). Rokeach (1968) claimed that primitive beliefs form one's core belief system and represent an individual's basic philosophies about physical and social reality

and the nature of self. Questions in the NEP address topics like humans having the right to modify the environment, humans controlling nature, and limits the earth can support. In contrast, Environmental Concern in my study simply asks what an individual is most concerned about harming as a result of environmental degradation (see Figure 4). For example, this portion of the survey asks about one's concern for plants, his or her health, and future generations.

It appears that the level of complexity differs between the two variables. While the NEP taps into one's core belief system, environmental concern is more issue-specific, focusing more on consequences for various groups of people, flora, and fauna. Due to the complex nature of NEP, it is reasonable to believe that one's core beliefs are harder to influence. NEP may form from deep, powerful influences that shape the primary beliefs of an individual, such as one's parents and/or children. For example, a simple advertisement about polar bears dying from climate change or a pamphlet about the necessity of recycling may be sufficient to elicit concern, but may not be enough to change one's core belief system and behavior. In contrast, environmental concern may be more easily influenced by a multitude of factors, one large factor being the media. The media often spotlights environmental consequences for plants, animals, marine life, and health but has been less likely to address more fundamental issues like human's right to control nature and limits the earth can support, which comprise NEP.

This critical distinction between the roots of beliefs versus concerns may explain why a stronger relationship was seen in the environmental beliefs and behaviors of related pairs than in the environmental concern of student/parent pairs. The distinction also might suggest that focusing primarily on environmental beliefs and behaviors in intergenerational environmental education programs would be beneficial because these variables express strong connections between parents and students.

## **Limitations and Future Research**

Several of this study's findings support Chawla's research (1998; 1999) which indicated that environmentalists found their parents to be a significant influence on their own environmental career paths and attitudes. Chawla's subject pool was limited to environmentalists; however, this study examined a population that was not strictly comprised of environmentalists. Thus, it would have been interesting to see if "environmentalist students," students who scored higher on the NEP (highly pro-ecological), had greater similarity to their parents than students who scored lower on the NEP. Dividing the subjects in this way would have allowed me to probe whether similarities between parents and students were greater in students with pro-ecological views or students with fewer pro-ecological views. While time constraints prevented this line of inquiry, this presents a question for further research because it could offer more information about people who are less pro-ecological. These people are the ones that should be targeted by environmental education and policy because they are presumably less likely to take environmental action than people who are highly pro-ecological.

Also, conducting similar studies but with a broader population will offer more information about the parent-child relationship in environmental beliefs, concerns, and behaviors. The sample in this study consisted mainly of university-enrolled, Caucasian students and their parents. Surveying a sample more representative of the United States population will provide further insight about the relationship.

Future research to determine the directionality of parent-child influence would be a valuable next step in exploring the parent-child relationship's influence on ERBs as well. If much of the influence on environmental beliefs and behaviors is passed from parent to child, this research indicates that pro-ecological beliefs and ERBs may be passed down family lineage and



become the environmental beliefs and behaviors of the following generation. Thus, strong efforts in policy and education to change environmental beliefs and behaviors of the present generation are an investment in the environmental beliefs and behaviors of future generations. This could provide excellent support for the importance of investing in environmental policy and education now.

Influence on environmental beliefs and behaviors may also flow from child to parent. The current research on intergenerational environmental education programs seeks to explore the capacity of students to influence the environmental beliefs and behaviors of their parents. Ballantyne, Connell, & Fein (1998) point out that adults have small amounts of free time, and funding to develop adult environmental education programs is limited. Thus, intergenerational education programs in K-12 education seem to be a feasible solution for educating adults about the environment. Had the current study found no relationship between the environmental beliefs and behaviors of a parent and child, the potential effectiveness of intergenerational environment education programs would warrant reconsideration. However, the fact that a relationship was found, suggests that these types of programs could be used to capitalize on the existing parent-child relationship as a means of promoting environmental stewardship.

Determining directionality in future research may also reveal that directionality changes throughout the lifetimes of parents and their children. At a very young age, it seems reasonable that the parent may have a strong impact on the child's environmental beliefs and behaviors. However, as a child grows and progresses in his or her education, the child may become a stronger influence on the parent's environmental beliefs and behaviors. Defining the time periods of directionality may aid educators in creating the most effective intergenerational programs.

## **CONCLUSION**

Children and parents spend significant amounts of time together, providing an opportunity for the sharing of environmental beliefs, concerns, and behaviors. Using survey data from college students and their parents, this study finds significant similarities in the environmental beliefs and Environmentally Responsible Behaviors of related pairs of parents and college students when compared to unrelated parent/student pairs. These results suggest that the parent-child relationship has some influence on one's environmental beliefs and behaviors. Understanding the roots and dynamics of this relationship could provide insight into more effective intergenerational environmental education programs. While the research demonstrates the significance of the relationship, it does not determine the directionality of the relationship. Determining the directionality (whether parents are influencing children or vice versa) will be a crucial next step for creating effective policy and education programs that aim to promote positive changes in environmental beliefs, concerns, and behaviors. With environmental degradation on the rise, understanding successful pathways for promoting ERBs will be essential for instituting environmental change. Based on this research, utilizing the parent-child relationship may be an effective means of encouraging ERBs.

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## APPENDICES

### Appendix 1: Student Survey

Note: Survey fit on two pages for distribution.

#### Section 1: Environmental Beliefs

Please indicate how much you agree with the following statements about the relationship between humans and the environment.

	Strongly Disagree		Unsure		Strongly Agree
1. Human skills and resources will ensure that we do not make the earth unlivable.	1	2	3	4	5
2. Humans are severely abusing the environment.	1	2	3	4	5
3. Humans have the right to modify the environment to suit their needs.	1	2	3	4	5
4. Humans were meant to rule over nature.	1	2	3	4	5
5. Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5
6. If things continue on their present course, we will soon experience an environmental catastrophe.	1	2	3	4	5
7. The balance of nature is delicate and easily upset.	1	2	3	4	5
8. The environmental crisis has been greatly exaggerated.	1	2	3	4	5
9. We are approaching the limits the earth can support.	1	2	3	4	5
10. When humans interfere with nature, it often produces disastrous consequences.	1	2	3	4	5

#### Section 2: Environmental Concern

Please rate each of the following items in response to the following question:

**“I am concerned about environmental problems because of the consequences for \_\_\_\_\_.”**

	Not Concerned		Moderately Concerned		Very Concerned		Not Concerned		Moderately Concerned		Very Concerned
Plants	1	2	3	4	5	My future	1	2	3	4	5
Marine Life	1	2	3	4	5	All people	1	2	3	4	5
Birds	1	2	3	4	5	Children	1	2	3	4	5
My Lifestyle	1	2	3	4	5	Future Generations	1	2	3	4	5
My Health	1	2	3	4	5						

**Section 3: Environmental Concern Comparisons**

Please indicate how much you agree with the following statements about environmental concern.

	Strongly Disagree		Unsure		Strongly Agree
	1	2	3	4	5 N/A
1. I care about the environment MORE than one or both of my parents do/did.					
2. I care about the environment MORE than my peers do.	1	2	3	4	5

**Section 4: Environmental Behaviors**

Please circle your responses to the following questions about your behaviors.

**1. How often do you use reusable grocery bags?**

Never          Rarely          Sometimes    Often          Almost Always

**2. How often do you buy environmentally friendly products?**

Never          Rarely          Sometimes    Often          Almost Always

**3. How often do you recycle in your home?**

Never          Rarely          Sometimes    Often          Almost Always N/A

**4. How often do you use a reusable water bottle?**

Never          Rarely          Sometimes    Often          Almost Always

**In response to the question directly above (Question #4), please rate the importance of each of the following reasons behind why you have used a reusable bottle.**

	Not Important		Moderately Important		Very Important
	1	2	3	4	5
To save money					
Convenience					
To do the right thing					
Friends/ family members want me to					
To help stop climate change					
To conserve resources					

**5. How often do you turn off the lights when exiting a room?**

Never          Rarely          Sometimes    Often          Almost Always

**In response to the question directly above (Question #5), please rate the importance of each of the following reasons behind why you have turned off the lights.**

	Not Important		Moderately Important		Very Important
	1	2	3	4	5
To save money on energy bill					
To do the right thing					



Friends/ family members want me to	1	2	3	4	5
To help stop climate change	1	2	3	4	5
To conserve resources	1	2	3	4	5

**Section 5: Demographics**

1. **Birth date (Month/Day/Year):** \_\_\_\_/\_\_\_\_/\_\_\_\_ (\*This question is extremely crucial to the study)

2. **Please circle your gender:**            Male            Female

3. **If currently in college, what is the name of your school?** \_\_\_\_\_

**What is your major?** \_\_\_\_\_

4. **Please circle your ethnicity:**            Hispanic or Latino            Not Hispanic or Latino

5. **Please circle your race:**    American Indian or Alaska Native            Asian            White  
 Black or African American    Native Hawaiian or Other Pacific Islander    Other \_\_\_\_\_

6. **Please classify your place of current residence:**    Urban            Suburban            Rural

7. **Please classify your place of past residence (where you spent the majority of your childhood):**            Urban            Suburban            Rural

## Appendix 2: Parent Survey

Note: Survey fit on two pages for distribution.

### Section 1: Environmental Beliefs

Please indicate how much you agree with the following statements about the relationship between humans and the environment.

	Strongly Disagree		Unsure		Strongly Agree
1. Human skills and resources will ensure that we do not make the earth unlivable.	1	2	3	4	5
2. Humans are severely abusing the environment.	1	2	3	4	5
3. Humans have the right to modify the environment to suit their needs.	1	2	3	4	5
4. Humans were meant to rule over nature.	1	2	3	4	5
5. Humans will eventually learn enough about how nature works to be able to control it.	1	2	3	4	5
6. If things continue on their present course, we will soon experience an environmental catastrophe.	1	2	3	4	5
7. The balance of nature is delicate and easily upset.	1	2	3	4	5
8. The environmental crisis has been greatly exaggerated.	1	2	3	4	5
9. We are approaching the limits the earth can support.	1	2	3	4	5
10. When humans interfere with nature, it often produces disastrous consequences.	1	2	3	4	5

### Section 2: Environmental Concern

Please rate each of the following items in response to the following question:

**“I am concerned about environmental problems because of the consequences for \_\_\_\_\_.”**

	Not Concerned	Moderately Concerned	Very Concerned		Not Concerned	Moderately Concerned	Very Concerned				
Plants	1	2	3	4	5	My future	1	2	3	4	5
Marine Life	1	2	3	4	5	All people	1	2	3	4	5
Birds	1	2	3	4	5	Children	1	2	3	4	5
My Lifestyle	1	2	3	4	5	Future Generations	1	2	3	4	5
My Health	1	2	3	4	5						

**Section 3: Environmental Concern Comparisons**

Please indicate how much you agree with the following statements about environmental concern.

	Strongly Disagree		Unsure		Strongly Agree	
	1	2	3	4	5	N/A
1. I care about the environment MORE than one or both of my parents do/did.	1	2	3	4	5	N/A
2. I care about the environment MORE than my child does.	1	2	3	4	5	N/A
3. I care about the environment MORE than my peers do.	1	2	3	4	5	

**Section 4: Environmental Behaviors**

Please circle your responses to the following questions about your behaviors.

**1. How often do you use reusable grocery bags?**

Never      Rarely      Sometimes      Often      Almost Always

**2. How often do you buy environmentally friendly products?**

Never      Rarely      Sometimes      Often      Almost Always

**3. How often do you recycle in your home?**

Never      Rarely      Sometimes      Often      Almost Always N/A

**4. How often do you use a reusable water bottle?**

Never      Rarely      Sometimes      Often      Almost Always

**In response to the question directly above (Question #4), please rate the importance of each of the following reasons behind why you have used a reusable bottle.**

	Not Important		Moderately Important		Very Important
	1	2	3	4	5
To save money	1	2	3	4	5
Convenience	1	2	3	4	5
To do the right thing	1	2	3	4	5
Friends/ family members want me to	1	2	3	4	5
To help stop climate change	1	2	3	4	5
To conserve resources	1	2	3	4	5

**5. How often do you turn off the lights when exiting a room?**

Never      Rarely      Sometimes      Often      Almost Always

**In response to the question directly above (Question #5), please rate the importance of each of the following reasons behind why you have turned off the lights.**

	Not Important		Moderately Important		Very Important
To save money on energy bill	1	2	3	4	5
To do the right thing	1	2	3	4	5
Friends/ family members want me to	1	2	3	4	5
To help stop climate change	1	2	3	4	5
To conserve resources	1	2	3	4	5

**Section 5: Demographics**

1. **Birth date (Month/Day/Year):** \_\_\_\_/\_\_\_\_/\_\_\_\_ (\*This question is extremely crucial to the study)

2. **Please circle your gender:**            Male            Female

3. **If currently in college, what is the name of your school?** \_\_\_\_\_

**What is your major?** \_\_\_\_\_

4. **Please circle your ethnicity:**            Hispanic or Latino            Not Hispanic or Latino

5. **Please circle your race:**    American Indian or Alaska Native            Asian            White  
 Black or African American    Native Hawaiian or Other Pacific Islander    Other \_\_\_\_\_

6. **Please classify your place of current residence:**    Urban            Suburban            Rural

7. **Please classify your place of past residence (where you spent the majority of your childhood):**            Urban            Suburban            Rural