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A Study of the Relationship between Proenvironmental Product Use and Environmnetal Concern

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A STUDY OF THE RELATIONSHIP BETWEEN PRO-ENVIRONMENTAL PRODUCT USE AND ENVIRONMENTAL CONCERN

THESIS

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Abstract

To be sustainable, an organization must be balanced in the three principles of economy, environment, and society. Advances in pro-environmental technology have overcome roadblocks limiting the economic and environmental principles. The remaining hurdle to becoming sustainable is having society's beliefs and behaviors align. Understanding the interaction between an individual's environmental belief and environmental behaviors is essential to bringing them into alignment. To explore this relationship, a model was developed that included the new ecological paradigm (NEP) scale and a generalized version of the theory of planned behavior (TPB). The attitudes, intentions, and use of six pro-environmental products were measured in an electronic survey. It was found that the model was adequate in measuring the general attitudes, intentions, and behaviors of individuals. In addition, environmental concern was shown to correlate with the attitudes of an individual. It was also found that the survey questionnaire should be modified to strengthen the relationships found.

Acknowledgments

I cannot begin to express all my love and appreciation to my wife for her support in this thesis endeavor. At the end of the day her loving support is what helped me through the toughest bouts of frustration and writers block. I would also like to express my thanks to my faculty advisor, Dr. Al Thal who, despite a multitude of commitments fighting for his time and attention, was able to find time to guide my efforts towards the correct path. I would also like to thank LtCol Alex Barelka for inspiring this thesis during a conversation that veered away from the original thesis idea.

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A STUDY OF THE RELATIONSHIP BETWEEN PRO-ENVIRONMENTAL PRODUCT USE AND ENVIRONMENTAL CONCERN

Chapter I. Introduction

Sustainability has been a buzzword passed around many industries despite having no clear definition and, unfortunately, the world cannot come to a consensus on just what that definition should be. Most recognize the evidence of not being sustainable, like pollution, rolling blackouts, the 2005-2008 fuel crisis, vacant strip malls, deforestation, and global climate change. Regardless of the true definition of sustainability, governments and organizations have decided that becoming sustainable is the correct path to take into the future. Their efforts to become sustainable often come in the form of company policy or laws and regulations that require a change in the way they do business. In response to these laws and regulations, individuals and organizations often search for technical solutions to solve the problem. Huge investments in infrastructure, building retrofits, manufacturing, energy recycling programs, and water and habitat conservation have been proposed and implemented. For these investments to be successful though, individuals and organizations need to accept the changes in behavior required of them. Therefore, understanding how environmental concern and behavior relate to each other is essential to know how to get individuals to accept sustainability solutions.

Background

In the past, the environment was considered external to humanity, to be used and exploited as desired, and a local problem (Hardin, 1968; Hopwood, Mellor, & O'Brien, 2005). The environment was considered a bottomless well or "commons" that everyone had the right to use and exploit to their hearts content (Hardin, 1968). This view has changed though, and humanity is now considered to depend on the environment, which is interconnected planet wide (Hopwood et al., 2005). It has changed so much that the Brundtland Commission was convened in 1983 to address issues dealing with environmental degradation and both the impact on and interaction with society and the economy (United Nations, 1987). That was followed by the 1992 Earth Summit in Rio de Janeiro (United Nations, 1992) which reaffirmed the commitment to environmental, social, and economic responsibilities.

Most of the world's communities are connected socially, economically, and environmentally (Curwell & Cooper, 1998; Hopwood et al., 2005). In unsustainable communities though, the connections between the three are none existent or broken. In unsustainable communities, the physical environment is degraded or polluted, the economy can no longer support the population's belief in "wealth creation" or "quality of life," and the social environment is dysfunctional, crime laden, alienating, and migratory (Curwell & Cooper, 1998). In order for communities to survive and be sustainable, they need to be built upon strong environmental, economic, and societal principles (Curwell & Cooper, 1998; Elkington, 1994; Hopwood et al., 2005). Elkington (1994) combined these principles and coined the phrase "triple bottom line" which is shown in Figure 1.

Any solution generated to move a community from being unsustainable to sustainable needs to address each of these principles.

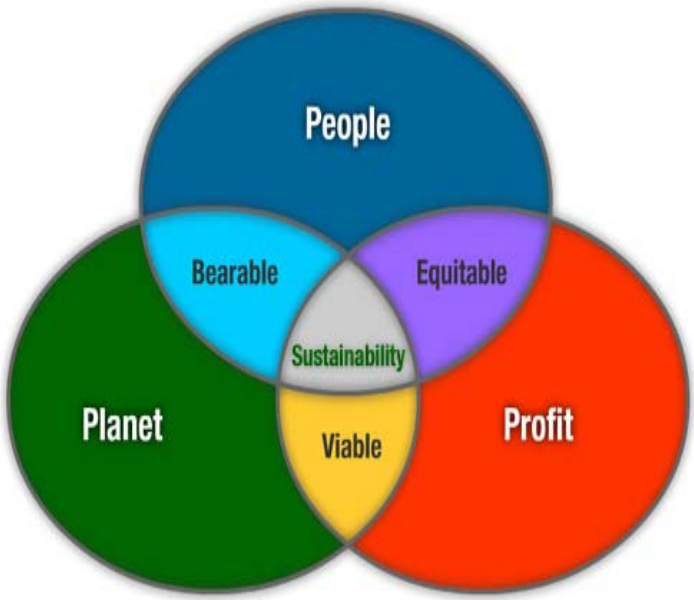


Figure 1. Triple Bottom Line (Elkington, 1994)

Attempts are being made to make this transition from unsustainable to sustainable, but often these efforts only address one or two of the principles of sustainability. For example, the energy market was considered to be sustainable until concerns for the environment came to the forefront in the 1950s. Becoming sustainable subsequently has produced many technical solutions, like efficient appliances, biofuels, clean coal, solar, wind, hydro, ocean, and nuclear power. While these solutions fulfill the environmental principle of sustainability, they have not become readily accepted because they do not fulfill one or both of the two principles of economy and society. In recent

years, the economic feasibility of implementing these technical solutions has become comparable to, if not better than, the current infrastructure, yet these solutions remain unimplemented.

The now economically feasible technical solutions in the energy market often remain unimplemented because the societal principle of sustainability has not been addressed. For sustainability to work, a shift in human values or ideas of morality needs to happen (Hardin, 1968). In the case of the energy market, the only feasible way for these technical solutions to work is in conjunction with a change in the values and ideas of society. So the question then arises, how can this change come about?

One way for achieving this change was described in the difference between a linear economy and a service economy (Curwell & Cooper, 1998). An unsustainable linear economy (shown in Figure 2) moves linearly through the resources, raw materials, manufacturing, utilization, and waste phases (Curwell & Cooper, 1998). A sustainable service economy (shown in Figure 3), on the other hand, introduces feedback loops to help reuse and repair, recycle, recondition, and upgrade goods and equipment (Curwell & Cooper, 1998). These goods and equipment might include buildings, construction materials, cars, or any number of goods that could still be utilized before being discarded and sent to the landfill.

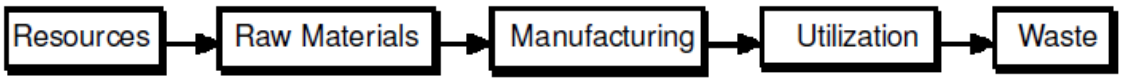
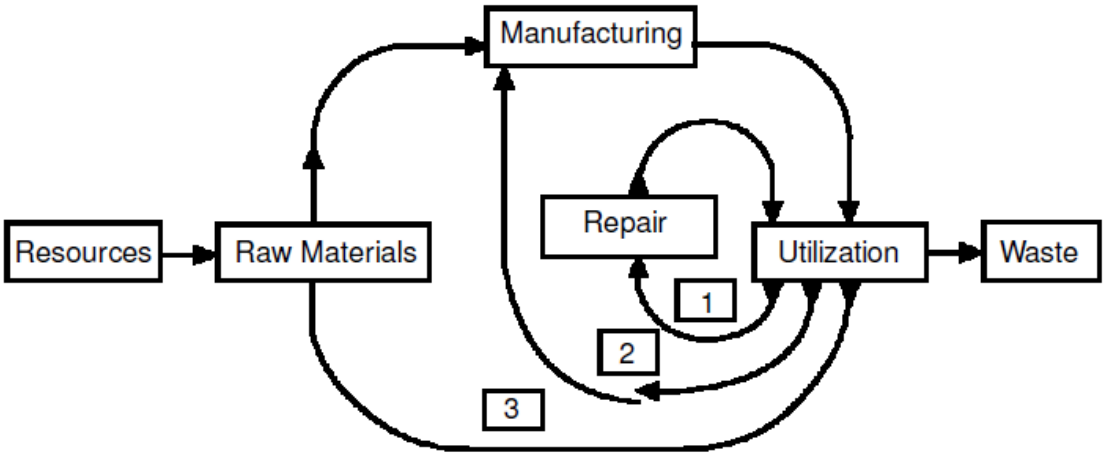


Figure 2. The Linear Economy (Curwell & Cooper, 1998)



Loop 1 Reuse and Repair Cycle.
Loop 2 Reconditioning, Technical and Fashion Upgrading Cycle.
Loop 3 Recycling of Materials.

Figure 3. The Service Economy (Curwell & Cooper, 1998)

In the service economy model shown in Figure 3, the key node that all the feedback loops flow through is utilization. Evolution from a linear economy to a service economy can only occur if the end-consumer understands and accepts their role in the overall system and redirects the goods along the three loops (Curwell & Cooper, 1998). The proper utilization and redirection of goods is vital to sustainability and can only be accomplished if societal principles, or the beliefs of the end-consumer, align with the economic and environmental principles.

Trying to get society to align its beliefs and behaviors with environmental and economic principles is not an easy task. Governments and organizations have tried to align societal beliefs in the work place with pro-environmental (Pro-E) behavior by creating policies and regulations that require the use of Pro-E technologies or practices.

For example, Executive Order 14323 requires that starting in 2008 all federal agencies must reduce energy intensity 3% annually until 2015 or have a combined 30% total reduction by the same date using 2003 as the baseline. Compliance with this order requires changes in operations as well as the beliefs of individuals using the facilities.

On federal installations, the burden to create these changes falls upon the energy manager. For many government installations, there is one energy manager for hundreds of buildings and facilities. Therefore, the energy manager often looks for an easy technical solution to help meet the regulations. However, the timetable to implement some of the solutions may be 5-10 years because of the required technology development, land acquisitions, construction, and installation. Compounding the decision making process is the fact that the payback period is tremendous and would not be accomplished for upwards of 15-20 years. Furthermore, most of the solutions available to the energy manager are not economically feasible and usually do not have the overall acceptance by the users of the facility. One solution is to get the users of the facilities to consume less or become more efficient consumers of energy. However, merely mandating a reduction in consumption to comply with policy will not guarantee that users will consume less.

While regulation, proper planning, and reforms are necessary to motivate some to action (Curwell & Cooper, 1998; Hardin, 1968; Hopwood et al., 2005), they usually do not shift the values and morals of the users. Therefore, the energy manager must find alternative means of compliance that users will accept and are economically feasible. To accomplish this, the beliefs of the individuals must align with the desired behaviors. The

use of inexpensive Pro-E products may be a way to facilitate this alignment. Before facilitation of this alignment, a full understanding of the relationship between Pro-E beliefs and behaviors must be conducted.

To understand Pro-E beliefs and behaviors of individuals, the proper instruments must be used. The New Ecological Paradigm (NEP) (Dunlap, Van Liere, Mertig, & Jones, 2000) is a well-recognized measure of the ecological beliefs or concerns of an individual. To measure environmental behavior, the Theory of Planned Behavior (TPB) (Ajzen, 1991) can be used. The TPB has been used mainly to understand specific environmental behaviors, but recently it has been shown to explain general environmental behaviors (Kaiser & Gutscher, 2003). This generalized use of TPB goes above and beyond the needs of an organization trying to understand how Pro-E products would influence their employee's behavior. Therefore, a slightly less generalized study of how Pro-E products relates to an employee's beliefs and behaviors is needed. Understanding the ecological concern and the Pro-E behaviors of employees will help an organization make decisions on how to influence its employees to become more sustainable.

Problem Statement

For organizations or communities to be sustainable, they need to maintain a complex balance of societal, environmental, and economic principles (Curwell & Cooper, 1998; Elkington, 1994; Hopwood et al., 2005). Recently, Pro-E technologies and products have begun to meet the economic and environmental requirements of sustainability; however, lack of societal acceptance is preventing organizations and communities from becoming truly sustainable. Governments and organizations have

attempted to overcome this by creating policies and laws requiring their employees and citizens to accept Pro-E practices. However, acceptance behavior of Pro-E practices is not governed by policies and rules. Pro-E behavior is predicted by positive behavioral intentions, which are influenced by attitudes toward the behavior, subjective norms, and perceived behavioral control. Current research on Pro-E behavior only addresses specific or very general behaviors. To understand Pro-E products which could be implemented by organizations or governments, a new study needs to be conducted.

Research Questions

Several questions arise while trying to understand how Pro-E product use behavior and Pro-E relate to each other. First, does an individual with high environmental concern have strong Pro-E attitudes toward the behavior? Second, does the use of Pro-E products increase someone's environmental concern? Third, can the use of a group of Pro-E products be generalized in the TPB?

Methodology

To answer the questions posed by this thesis, a survey was administered to graduate students at the Air Force Institute of Technology (AFIT). The survey instrument was developed from two published models to measure behaviors and environmental concern. Behaviors were measured using questions modeled after the four components of the TPB (Ajzen, 1991). The second set of questions was from the NEP scale (Dunlap et al., 2000) which measures ecological concerns. In addition, several questions regarding demographics were asked to enrich the understanding of the Pro-E

attitudes and behaviors of different ages, education levels, gender, and marital status. Participation was voluntary and the demographic data remained anonymous.

Following the administration of the survey, the collected data was statistically analyzed. First, a confirmatory factor analysis was performed on the NEP scale questions. Next, an exploratory factor analysis was done for the TPB questions in the survey. A bivariate correlation was then conducted for each component of the survey. After performing multiple regression analysis on the most influential component, a Sobel test was be conducted to test for indirect effects.

Assumptions/Limitations

In any research endeavor, there are assumptions and limitations that must be addressed. The biggest assumption made in this research was that the generalized TPB model posited by Kaiser (Kaiser, Wölfing, & Fuhrer, 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006) was applicable to the usage of six Pro-E products. In addition, it was assumed that the 15 questions from the NEP scale can be used as a single factor as Dunlap (2000) suggested. A final assumption was that responses from the students could be generalized to other organizations. One limitation was that no actual usage data was taken so intentions cannot be measured against actual behavior. A second limitation was that the data was limited to AFIT students and a more robust sample was not available.

Significance of Study

Results of this research should help organizations understand how an employee's environmental concern relates to their Pro-E product usage. With greater environmental

concern, employees may be self-motivated to find ways of being more efficient, conserve energy, and seek out and use Pro-E products. Ultimately, the hope is that introducing Pro-E products increases environmental concern, increases Pro-E behaviors, creates more efficient energy use, lowers the organization's ecological footprint, saves money on utility bills, and meets or surpasses the regulations placed upon the organization by the government.

Organization/Purpose of Remaining Chapters

The remaining chapters will explore the research behind ecological concern and ecological behavior. Chapter 2 will review the literature regarding environmental concern, behavior, and the mixture of the two paradigms. After reviewing the existing literature, Chapter 3 will discuss the methodology used to formulate the model and how the survey was administered. Upon collecting the data from the survey, a statistical analysis will be documented step-by-step and the results will be discussed in Chapter 4. Lastly, Chapter 5 will share the conclusions found from the results, along with the implications for organizations interested in understanding their employees' environmental concerns and Pro-E product use behaviors.

Chapter II. Literature Review

The focus of this chapter is to build a strong foundation of understanding by reviewing the existing literature regarding environmental concern and behavior, and how the two interact with each other. Environmental concern will first be discussed to establish the types of attitudes and beliefs that will be investigated in the research. Behavior will be the second topic of discussion, and it will explore the evolution of attitude/behavioral theories like the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB). The discussion will then focus on research which concentrates on the blending of environmental concern with behavior. Finally, an exploration will be conducted of pro-environmental (Pro-E) product interventions and how their use can facilitate Pro-E behavior and belief.

Environmental or Ecological Concern

Since the 1950s, concern for the environment has steadily increased as the consequences of years of negligence have become more apparent. Many argued that the environmental problems caused by this negligence were due to society's traditional values, attitudes, and beliefs at the time (Disch, 1970). These traditional values were comprised of what was known at the time as the "Dominant Social Paradigm" (DSP) or society's world view (Pirages & Ehrlich, 1974). This DSP consisted of a belief in abundance and progress, unbridled growth and prosperity, faith in science and technology, and a minor role of government planning in the economy (Dunlap & Van Liere, 2008). To avoid the environmental catastrophes that could result from maintaining

the existing DSP, it was argued that a new world view needed to emerge to replace it (Dunlap & Van Liere, 2008; Hardin, 1968).

Working in the shadow of the existing DSP, many ideas merged to form a new world view to challenge the reigning world view. This shift away from the old DSP to a new world view resulted in the creation of the "New Environmental Paradigm" (NEP) in 1978 (Dunlap & Van Liere, 2008). The ideas incorporated in the NEP were limits to humanity's growth, the need for a "steady-state" or sustainable economy, trying to preserve the balance of nature, and changing the belief that all humanity has the right to rule over nature or anthropocentrism (Dunlap & Van Liere, 2008). To measure environmental concern, Dunlap and Van Liere (1978) developed a scale which incorporated the NEP ideas into three components: balance of nature, limits to growth, and anti-anthropocentrism.

When the NEP scale was first created, the components in the scale reflected the environmental issues of the times. Increased environmental awareness was in its infancy and many of the ideals and policies that were subsequently implemented were of a basic form that addressed obvious discrepancies like water pollution, air pollution, loss of aesthetic values, and resource conservation (Dunlap et al., 2000). During the time leading up to the creation of the NEP scale, many environmental policies were signed into law. These laws included the Water Pollution Control Act of 1952, Clean Air Act of 1963, National Environmental Policy Act of 1968, the Endangered Species Act of 1973, and Safe Drinking Water Act of 1974. These policies helped move society away from the anti-environmental DSP of the time towards a more environmentally conscious society with a new DSP or world view.

Since its development, the NEP scale has become a predominant model for understanding environmental concern (Dunlap et al., 2000; Dietz, 1998). This is demonstrated by a meta-analysis covering over 300 articles citing the NEP from 36 nations (Dunlap, 2008). As the NEP has become steadily accepted as a measure of environmental concern, actual environmental problems have become more complex than the original ideals upon which it was based (Dunlap et al., 2000). Global environmental problems like ozone depletion, deforestation, loss of biodiversity, and climate change have become the subjects of an increasing number of studies.

Even the use of the term "environmental" has slowly been replaced by the term "ecological," which is a more systematic way of examining environmental issues. While an individual with an environmental concern may focus on how dirty a lake or plot of land is and how to clean it up, an individual with an ecological concern would focus on the bigger system. Not only would they want to clean up the lake or land, but they would also want to prevent the lake or plot of land from becoming more polluted in the future. Their ecological concern would lead them to find out how to change the root causes of the pollution by understanding how the system works, where the inputs are, and who has control.

The changing ecological problems and ecological beliefs of society led Dunlap (2000) to analyze the original NEP scale to see if it was still relevant or needed to be updated. In his revisit, Dunlap found concerns about the basic nature of the NEP, which included an imbalance of pro- and anti-NEP statements in the scale, a narrowness of the original three factors, and some sexist terminology (e.g., "mankind")(Dunlap et al., 2000). An updated NEP was thus created and it was renamed the "New Ecological

Paradigm" to incorporate the broader understanding of ecological concern over the narrower environmental concern (Dunlap et al., 2000). In addition to the three original facets of balance of nature, limits to growth, and anti-anthropocentrism, the facets of human exemptionalism and ecocrisis were added to broaden the NEP scale (Dunlap et al., 2000).

The first of the two new facets of the NEP, human exemptionalism, is the belief that humans are exempt from the constraints of nature. The second of the new facets is the belief in potentially catastrophic environmental changes or "ecocrises" caused by mankind. This belief came about because of the increasingly argued hot topics of ozone depletion, climate change, and human-induced environmental change.

Behavior

Understanding human behavior is a complex endeavor for which multiple theories have been posited to help explain it. Behavior can be defined as all the activities of an individual which can be observed by another (Edwards, 1968). One of the most prominent ideals is that behaviors are a product of the attitudes of an individual. Attitudes can be defined as the level of positive or negative assessment of a particular behavior (Schepers & Wetzels, 2007). One of the most widely used theories in the study of this attitude-behavior relationship is the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1980).

In the TRA shown in Figure 4, the behaviors of an individual are the results of behavioral intentions to perform those behaviors (Ajzen & Fishbein, 1980; Ajzen, 1985; Ajzen, 1991). Antecedents to an individual's behavioral intentions are their attitudes

toward the behavior and the subjective norms they feel about the behavior (Ajzen & Fishbein, 1980; Ajzen, 1985; Ajzen, 1991). These two attitude components are products of behavioral beliefs and normative beliefs (Heath & Gifford, 2002). An individual's favorable or unfavorable evaluation of performing a certain behavior is their behavioral belief which governs the attitude toward the behavior component (Heath & Gifford, 2002). The normative belief of a person refers to that individual's perception of the positive or negative social pressures to perform the behavior which governs the subjective norm component (Heath & Gifford, 2002). These social pressures at times can be so strong that an individual will act in a way which goes against what they like or believe in and it is often described negatively as peer pressure.

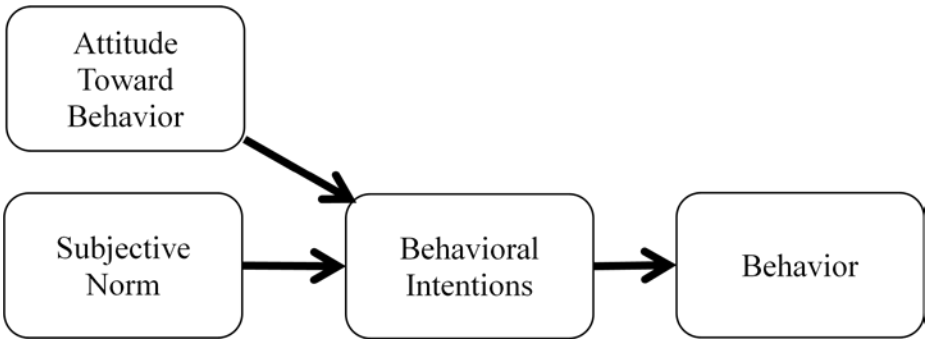


Figure 4. Theory of Reasoned Action (Ajzen and Fishbein, 1980)

Despite the success and acceptance of the TRA, there have been some criticisms. The major criticism is that the model is too general and limited when dealing with behavior in specific situations where other factors have a stronger influence (Ajzen, 1991). In the TRA, no matter how great the intentions of an individual, if he/she cannot

perform the behavior, it will not be executed. To account for this flaw in the model, Ajzen (1985) continued refining his model and eventually established a model that accounted for more variations in the behaviors being measured (Ajzen, 1985). This new behavioral model was entitled the Theory of Planned Behavior (TPB) (Ajzen, 1985). TPB is TRA with the addition of a third influence on behavioral intentions called perceived behavioral control (see Figure 5).

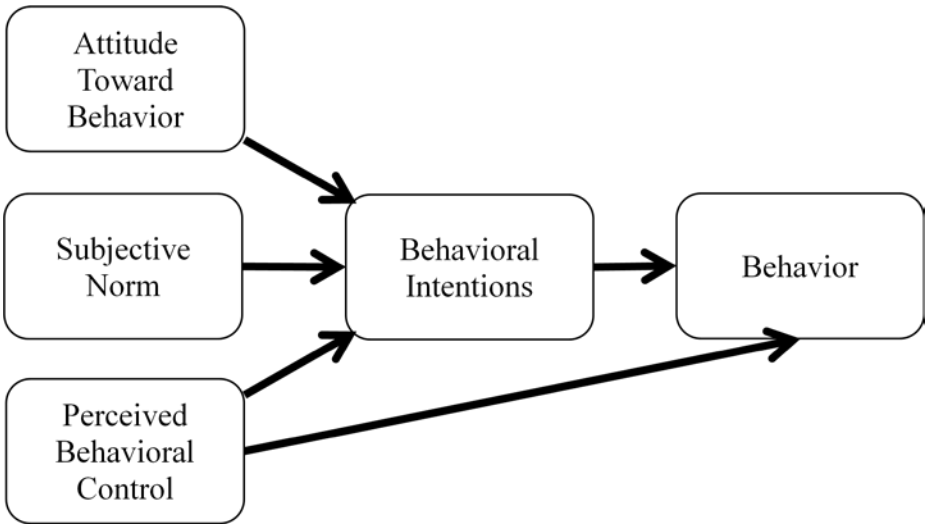


Figure 5. Theory of Planned Behavior (Ajzen, 1985)

In addition to the attitude toward the behavior and subjective norm, the behavioral intentions of an individual depend on their belief that they have power to perform the behavior in question. Furthermore, perceived behavioral control has also been shown to be a moderator for behavioral intentions (Heath & Gifford, 2002). When someone has actual control to perform a specific behavior, they can decide whether or not to perform

the behavior at anytime. Actual control can be a combination of many things like education, money, access to equipment, and training. As perceived behavioral control and/or actual control increases, the strength of the relationship between behavioral intentions and behavior increases (Heath & Gifford, 2002).

Ajzen (1991) and numerous other studies (e.g., Armitage & Conner, 2001; Bamberg, 1996; Fielding, McDonald, & Louis, 2008; Heath & Gifford, 2002) demonstrated that TPB can be used to understand specific behaviors. In addition, TPB has been shown to describe specific ecologically responsible behaviors like recycling (Cheung, Chan, & Wong, 1999; Oskamp et al., 1991), public transportation use versus car use (Bamberg, 1996; Heath & Gifford, 2002), and energy use (Harland, Staats, & Wilke, 1999; Hondo & Baba, 2010). Additionally, research has found that the theory of planned behavior establishes a good framework for environmental attitude research (Heath & Gifford, 2002; Hondo & Baba, 2010; Kaiser et al., 1999). One of the reasons given for this conclusion is that the TPB includes a measure of constraints beyond one's control (Heath & Gifford, 2002). This helps explain why some individuals may have a positive attitude toward a certain behavior; however, if they cannot control the execution of the desired behavior, they will behave in accordance with their beliefs (Hondo & Baba, 2010).

While TPB works well for specific ecological behaviors, sometimes a broader understanding of general ecological behaviors is desired (Kaiser et al., 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006). An ecological behavior is defined by actions or activities performed to protect the environment or reduce the impact and deteriorating effects of those actions on the environment (Stern, 2000). Just as in

voting, a single vote may not make a whole lot of difference, so goes ecological behaviors where one specific behavior may not make a difference (Fielding et al., 2008). However, a myriad of behaviors will make a difference if an individual's overall general ecological behavior can be influenced towards being Pro-E (Fielding et al., 2008). Recently, research has applied TPB as a framework for general ecological behaviors (Kaiser et al., 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006).

Ecological Concern and Behavior

Thus far, ecological concern and behavior have been discussed individually. This section will discuss the relationships between the two that were found in the literature. Several researchers have speculated that a high NEP score or an individual with a Pro-E orientation is more likely to display Pro-E beliefs and attitudes (Fielding et al., 2008; Pierce, Dalton, & Zaitsev, 1999; Stern, Dietz, & Guagnano, 1995). This is not to say that individuals with a high NEP always act ecologically (Dunlap & Van Liere, 2008); it only states that individuals with a high NEP overall tend to lean toward Pro-E beliefs and attitudes. In many cases, the public may have Pro-E attitudes but their actions demonstrate conflicting ideals without realizing it (Dunlap & Van Liere, 2008). It has been shown that ecological concern measured with NEP was the most important variable to explain ecological behavior (Lopéz & Arango, 2008). This relationship led to the development of the first hypothesis.

> ***Hypothesis 1:*** A high ecological concern is a predictor of high ecological attitudes.

However, research has not always shown a connecting relationship between ecological concern and ecological behavior. Some ecological studies have found weak

links between ecological concern and behavior (Dunlap & Van Liere, 2008). There may be several reasons for this inconsistency. Some of the studies in the past tried to demonstrate direct effects of ecological concern on ecological behaviors (Stern, 2000). In addition, many of them never accounted for the difficulty in performing the desired Pro-E behavior (Heath & Gifford, 2002). Thus the framework for ecological behavioral research should include a measurement like perceived behavioral control that accounts for difficulties in performing ecological behavior (Kaiser et al., 1999; Heath & Gifford, 2002). Another explanation for the weak link between ecological concern and ecological behavior is that the relationship seems to be moderated by behavior-specific beliefs or attitudes toward the behavior (Bamberg, 1996; Bamberg & Möser, 2007; Steg, Dreijerink, & Abrahamse, 2005). This indirect effect of NEP on behavior led to the development of the second hypothesis.

> ***Hypothesis 2:*** Ecological attitudes are a mediator between ecological concern and ecological behavior.

Pro-Environmental Products

As global attitude and behavior have moved closer toward a more ecological world view, the products available have also become more ecological. Today environmental products range from hybrid electric vehicles to special laundry soaps for high-efficiency washers. The use of such products is voluntary and most individuals who use Pro-E products tend to demonstrate other Pro-E behaviors (Hondo & Baba, 2010). It has been shown that attitudes and beliefs about products can change because of use and exposure to the product (Bamberg, 1996; Heath & Gifford, 2002; Hondo & Baba, 2010; Reinecke, Schmidt, & Ajzen, 1996). Bamberg (1995) and Heath and Gifford (2002)

found that positive beliefs and attitudes toward public transportation increased after the implementation and use of a universal bus pass (U-pass) program. Another program was the installation and use of photo voltaic systems installed by the government in Iada City, Japan (Hondo & Baba, 2010). The photo voltaic systems prompted increased communication about environmental issues within the family and the community, which in turn promoted other ecological behaviors like energy conservation. In addition, increases in the target behavior were noted after implementation of the programs (Bamberg, 1996; Heath & Gifford, 2002; Hondo & Baba, 2010). If individuals are changing their behavior because of the use of products, can companies or organizations expect a belief, attitude, and behavioral change in employees who become exposed to Pro-E products? The findings above indicate that intervention programs can be used to change the beliefs, attitudes, and behavior of individuals. This relationship led to the development of the third hypothesis.

> ***Hypothesis 3:*** High use of the Pro-E products is a predictor of high ecological concern.

If a company were to introduce Pro-E products to employees, they could rightfully expect that the products will be used and the desired behavior will occur. This is because the subjective norm and perceived behavioral control components of the TPB have been strengthened since the barriers of the target behavior have been partially removed (Bamberg, 1996; Heath & Gifford, 2002; Van Vugt et al., 1996). With stronger subjective norm and perceived behavioral control, behavioral intentions are stronger and it is more likely that the desired behavior will result. With the introduction of the Pro-E product by the organization, the subjective norm of employees changes because the

importance of the desired behavior is demonstrated by the company. In addition, as employees engage in the desired behavior, others may adopt an "everyone is doing it" mentality and proceed to act accordingly (Heath & Gifford, 2002; McMakin, 2002). The Pro-E product introduction also helps overcome feelings of low behavioral control (Bamberg, 1996; Heath & Gifford, 2002; Van Vugt et al., 1996). In fact, interventions are usually ineffective until an important barrier to change is removed, thereby giving more perceived behavioral control to individuals (Stern, 2000). If the Pro-E product is provided to an individual, the chances that they will accomplish the desired behavior are greatly increased (Cheung et al., 1999; Oskamp et al., 1991). These TPB relationships led to the development of the final hypothesis.

> ***Hypothesis 4:*** A generalized use of TPB can be used to understand Pro-E product use attitudes and behavior.

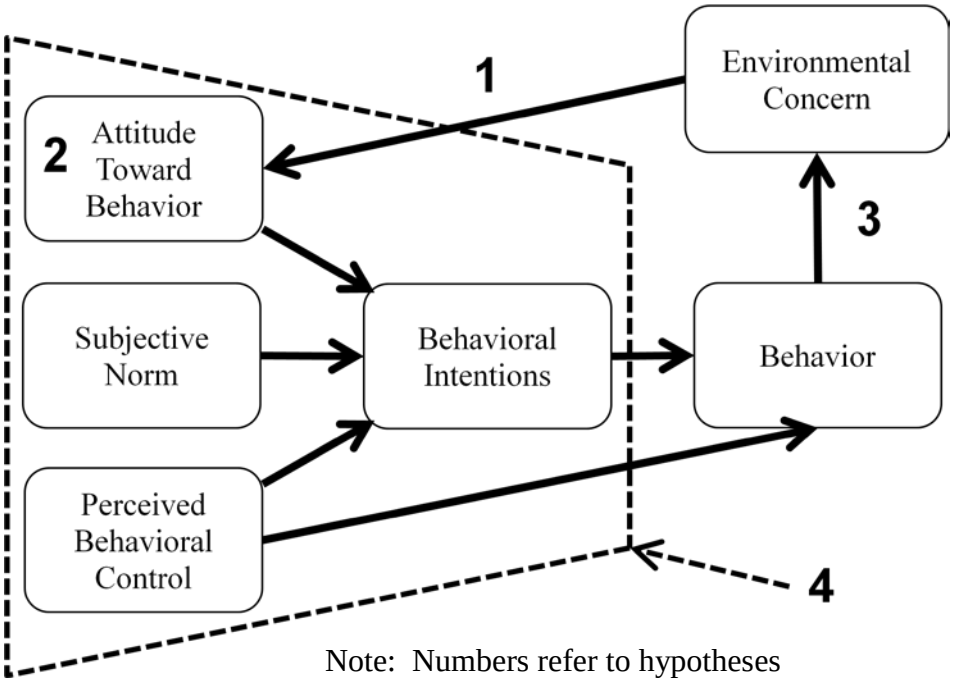
Not only does complying with an intervention program increase an individual's belief and attitude, but it also increases the behavior and compliance. There is a reciprocal nature between the behavior and the attitudes and beliefs. Complying with the target behavior through intervention increases attitude and belief, which then increases behavioral intentions, which ultimately increases behavioral compliance (Bamberg, 1996; Heath & Gifford, 2002). In the system dynamics discipline, this is considered a reinforcing loop.

As an organization seeks a desired behavior from its employees, there needs to be a strong refusal to offer incentives. Incentives have proven to be ineffective in creating actual change in ecological interventions (De Young, 1986; McMakin, 2002; Widegren, 1998). These incentive or disincentive programs only reward the actual actions or

behaviors being committed. The attitudes toward the behavior do not change, but outside influences may change the subjective norm and perceived behavioral control. Peers may be getting an incentive and pressuring others to do likewise and this incentive or disincentive may be too great to resist. If the incentive or disincentive is strong enough, the influence of attitude on behavioral intentions is lessened.

Summary

Four hypotheses are submitted as possible outcomes from this research study regarding how NEP and TPB interact with the use of Pro-E products. Figure 6 shows how the four hypotheses fit into a proposed model that incorporates components from the NEP and TPB. Existing research focuses on either ecological concern or behavior and only a few studies discuss any relationship between the two (Fielding et al., 2008; Lopez, Torres, Boyd, Silvy, & Lopez, 2007; Pierce et al., 1999; Stern et al., 1995). Even when researchers discuss this relationship, it is mostly theoretical in nature. This research will attempt to bridge this gap in the literature and move the discussion away from the theoretical and into a solid understanding of how NEP beliefs interact with TPB.



Note: Numbers refer to hypotheses

Figure 6. Proposed relationships between the TPB and NEP

Chapter III. Methodology

This chapter explains the methodology used to explore the hypothesis postulated in the literature review. The first section describes the participants who took the survey. The second section details how the questionnaire was administered to the survey participants. The third section discusses how the survey was developed and the measures that were used. The final section describes the statistical analysis used to interpret the survey results that are presented in the next chapter.

Participants

The survey was administered to the Air Force Institute of Technology (AFIT) student body. The actual administration of the survey was accomplished using a hyperlink in an email sent to all AFIT students. On a strictly voluntary basis, the students followed the link to an intranet site that can only be accessed through the AFIT network. This was done to make sure the survey only went out to students affiliated with AFIT. The AFIT student body consists of Master's and Doctoral candidates in various engineering fields. This eliminated the need to ask about education level in the demographics section of the survey.

The survey was left open for 10 business days to allow sufficient time for individuals to set aside time to take the survey. Once the survey was closed, a statistical analysis was conducted to measure the relationships between each component of the survey. Confidentiality was maintained so participant did not feel that their opinions would jeopardize future employment in the Air Force. Of the 813 possible respondents,

172 students took the survey, resulting in a 21% response rate. All of the responses were deemed to be usable for the statistical analysis. Of the respondents, 157 were male and 15 were female. The number of married respondents was 120 or approximately 70%. There were 100 respondents who had children or approximately 58%. The ages of the respondents ranged from 22 to 44 with a median age of 30. The mean age of the respondents was 30.6.

Procedure

To study the relationship between ecological concern and ecological behaviors of individuals, data needs to be collected about those individuals. A 73-item questionnaire was developed to measure ecological concern and ecological behavior. A complete copy of the questionnaire is provided in Appendix A. From a review of the literature available on ecological concern and ecological behavior, two existing models were used to generate questions in the survey, the New Ecological Paradigm (NEP) scale and the Theory of Planned Behavior (TPB). Once the survey was created, it was transferred into an electronic format that could be accessed from a link sent to the students in an email. The email was sent to all students inviting them to voluntarily participate in the survey. After one week, a second email was sent to remind students that the survey would close in one week.

Measures

Environmental Concern. The first model was the NEP scale (Dunlap, 2000) which measures an individual's ecological concern by asking questions about the individual's beliefs regarding the balance of nature, limits to human growth, anti-

anthropocentrism, human exemptionalism, and potential ecocrisis. This section of the survey was preceded by the following instructions: "Listed below are statements about the relationship between humans and the environment. Using the scale below, please indicate the extent to which you agree with each statement by clicking on the appropriate response." The five available responses for the respondents to categorize their beliefs were: (1) Strongly Agree, (2) Mildly Agree, (3) Unsure, (4) Mildly Disagree, (5) Strongly Disagree.

In the NEP scale, there are three questions for each of the ecological beliefs for a total of 15 questions, which can be found in Table 1. Despite the separation of different types of questions, the NEP scale should be used as one factor for measuring environmental concern (Dunlap et al., 2000). In this research, the NEP was used as a single factor as Dunlap (2000) suggested.

Table 1. Ecological Belief Items in NEP Scale

Belief 1: Limits to human growth
- NEP 1 - We are approaching the limit of the number of people the earth can support.
- NEP 6 - The earth has plenty of natural resources if we just learn how to develop them.
- NEP 11 - The earth is like a spaceship with very limited room and resources.

Belief 2: Human's dominance over nature
- NEP 2 - Humans have the right to modify the natural environment to suit their needs.
- NEP 7 - Plants and animals have as much right as humans to exist.
- NEP 12 - Humans were meant to rule over the rest of nature.

Belief 3: Balance of Nature
- NEP 3 - When humans interfere with nature it often produces disastrous consequences.
- NEP 8 - The balance of nature is strong enough to cope with the impacts of modern industrial nations.
- NEP 13 - The balance of nature is very delicate and easily upset.

Belief 4: Human exemptionalism
- NEP 4 - Human ingenuity will insure that we do NOT make the earth unlivable.
- NEP 9 - Despite our special abilities humans are still subject to the laws of nature.
- NEP 14 - Humans will eventually learn enough about how nature works to be able to control it.

Belief 5: Ecocrisis
- NEP 5 - Humans are severely abusing the environment.
- NEP 10 - The so-called "ecological crisis" facing humankind has been greatly exaggerated.
- NEP 15 - If things continue on their present course, we will soon experience a major ecological catastrophe.

Ecological Behavior. The second measure used in the questionnaire was a generalized version of TPB (Ajzen, 1991). This generalized version was created by Kaiser (2002) because the original version of TPB was designed to measure specific ecological behaviors. In Kaiser's generalized TBP, he used six ecological behaviors to help generalize the individual's total ecological behavior. These six behaviors were pulled from the General Ecological Behavior scale (Kaiser, 1998; Kaiser & Gutscher, 2003).

Most of the behaviors that Kaiser (2002) used in his survey were not product based and therefore could not be used in this survey. The ecological behaviors in his study were, "I bring empty bottles to a recycling bin;" "I collect and recycle used paper;"

"I refrain from driving my car in or into the city;" "When I see someone behaving nonconservationally, I point it out to him or her;" "On freeways, I drive at speeds under 100 kph (62.5 mph);" and "I am a member of an environmental organization." Because most of these behaviors were not linked to specific products, it was necessary to develop a new list of behaviors.

The criteria used to select the pro-ecological (Pro-E) products used in this research were: (1) each product was readily available if someone wanted to use it, (2) to begin using the product would not be difficult, and (3) individuals had most likely already used or been exposed to the product. In summary, the products needed to be available, implementable, and familiar to be considered as ecological products in this study. Each product was rated on a scale from one to three, three being good and one being bad, on how well each criterion. Table 2 shows that 8 of the 13 Pro-E products initially considered had an aggregate score of six or greater. From these eight products, six were selected: compact fluorescents, energy efficient vehicles (greater than 33 mpg), AFIT hallway recycle bins, programmable thermostats, composters or composting, and energy efficient appliances (e.g., Energy Star). Compact fluorescent light bulbs were changed to energy efficient light bulbs to include LED light bulbs, which also scored high. Green electricity purchase was not included in the products because it is not an actual product but a behavior; additionally, a number of the students live on base and have no choice in the source of their electricity.

Table 2. Pro-Environmental Product Selection Matrix

Pro-E Product	Availability	Implementable	Familiarity	Sum
Hybrid Vehicles	2	3	1	6
AFIT Recycling Collectors	3	3	3	9
Compact Fluorescents	3	3	3	9
LED Light Bulbs	2	3	2	7
Solar Panels	1	1	1	3
Programmable Thermostats	3	3	3	9
Green Electricity Purchase	2	3	1	6
Waterless Urinals and Toilets	2	2	1	5
Geothermal Heat Pumps	1	1	1	3
Energy Star Appliances	3	3	3	9
Composting	3	2	2	7
Hydro Generators	1	1	1	3
Wind Generators	1	1	1	3

Each of the six ecological product use behaviors were inserted into statements similar to Kaiser's (2000) generalized TPB questionnaire. The new statements were, "I use energy efficient light bulbs," "I use the AFIT hallway recycle containers," "I use energy efficient appliances (e.g. Energy Star)," "I use a composter or compost pile," "I drive an energy efficient vehicle (greater than 33 mpg)," and "I use a programmable thermostat." Each of the behaviors was assessed using the two bipolar adjective scales Kaiser (2002) suggested for each of the four TPB components.

Using the six product use behaviors (compact fluorescents, energy efficient vehicle, AFIT recycle bins, composters, energy efficient appliances, and programmable thermostat), attitude was measured using the two 5-point bipolar adjective scales of good to bad and appropriate to inappropriate. Subjective norm was measured using the two 5-point bipolar adjective scales of likely to unlikely and agree to disagree. Perceived

behavioral control was measured using the two 5-point bipolar adjective scales of easy to difficult and simple to complicated. Behavioral intentions were measured using the two 5-point bipolar adjective scales of likely to unlikely and determined to undetermined.

Reverse coding was incorporated into several of the measures to help minimize common method bias. In the NEP scale, Dunlap (2000) designed the even numbered questions to be reverse coded so those results will need to be reversed. In the TPB measures, questions 28, 31, 33, 36, 37, 40, 41, 44, 45, 58, 59, 61, 66, 68, and 69 were reversed coded. This reverse coding was used to ensure that individuals were paying attention to the questions in the survey and not just choosing fives for every answer. In addition, reverse coding was incorporated in all the questions that deal with perceived behavioral control, questions 46 through 57, because it did not make sense to ask how complicated or difficult something was and have the survey taker score a 1 for most complicated or a 5 for most easy. Thus, the adjective pairs were ordered such that complexity and difficulty corresponded with high numbers. This adjective pair order made perceived behavioral control a low number; therefore, the questions were reversed so high perceived behavioral control was represented by a high number.

In addition to the four TPB components, behavior was measured using the 5-point Likert scale of frequency of use. The five alternatives were never, seldom, occasionally, often, and always. This was different from the generalized model of TPB developed by Kaiser (Kaiser et al., 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006). Kaiser used a 65-item General Ecological Behavior scale, which is where his six behaviors originated.

Statistical Analysis

The statistical analysis consisted of two parts. The first part consisted of both a factor analysis and a calculation of the Cronbach's alpha of each of the models. These were performed to gauge whether the questions in each component of the survey related to each other and if they had internal consistency. The factor analysis was first performed on the 15 question NEP scale; a Cronbach's alpha was also calculated to compare it to Dunlap (2000). For the TPB components, a factor analysis was performed on each component's two sets of questions and on a combination of the two. For example, the attitude toward the behavior component had a factor analysis on the first set of questions called "Att1," the second set "Att2," and the combined set "Att." A Cronbach's alpha was also calculated for each combined set and compared to Kaiser and Gutscher's (2003) results.

The second section of the analysis was conducted to address each of the four hypotheses. The statistical method for the first hypothesis, that NEP is a predictor of attitudes toward behavior, was simple linear regression. For the second hypothesis, which posits that the relationship between NEP and behavior is mediated by attitudes toward behavior, mediated regression using the Sobel test for indirect effects was used. The method used for the third hypothesis, that high Pro-E product use is a predictor of high NEP, consisted another linear regression. The final hypothesis, to find if Pro-E product use can be modeled by TPB, was a series of sub hypotheses. Multiple regression was conducted between the attitude toward the behavior, subjective norm, perceived behavioral control, and behavioral intention components. In addition, a linear regression was performed between perceived behavioral control and behavior. This was followed

by a second mediated regression between perceived behavioral control and behavior mediated by behavioral intentions. For the hypotheses, analysis was first accomplished using individual component variations before the generalized analysis was done.

Chapter IV. Analysis and Results

The purpose of this section is to present analysis and results from the online survey. The purpose of the survey was to measure Air Force Institute of Technology (AFIT) student's ecological concerns using the New Ecological Paradigm (NEP) scale and their pro-ecological (Pro-E) product use behavior, intentions, and attitudes using the Theory of Planned Behavior (TPB). The survey attempted to determine the extent to which NEP influences an individual's attitudes toward Pro-E product use, whether attitudes toward behavior mediates the relationship between ecological concern and ecological behavior, if high use of Pro-E products is a predictor of high NEP, and whether the TPB is a good model of Pro-E product use. Factor analysis was initially conducted to confirm that each set of questions loaded against separate factors. In addition, the Cronbach's alpha was found for each component to determine internal consistency. Next a statistical analysis to determine the strengths of the hypotheses, using a combination of bivariate correlations, regression analysis, multiple regression analysis, and mediated regression analysis, was conducted.

Factor Analysis and Cronbach's Alpha

A confirmatory factor analysis (see Appendix D) was conducted on the NEP scale and the results show that 31% of variance was accounted for by the first factor, matching the results found by Dunlap (2000). In addition, 10 of the 15 items loaded heavily on the first factor and one other had substantial cross-loadings with the first factor, whereas Dunlap (2000) found six and three, respectively. Additionally, the Cronbach's Alpha

(Appendix E) for the scale was 0.87, which was higher than the 0.82 that Dunlap (2000) found. Thus, the internal consistency was considered quite high.

Factor analysis and Cronbach's alpha calculations were also performed on each of the TPB components and the behavior component, first individually, then jointly. For the first set of attitude questions (Att1), one factor was found to account for 55% of the variance. The second set of attitudes (Att2) had one factor that accounted for 32% of variance and another that accounted for 24%. For the combined attitude (Att), three factors were found; one accounted for 29% of variance, the second accounted for 16%, and the third accounted for 12%. The first factor aligned with the single factor in Att1. The second and third factors aligned with the two factors in Att2. The Cronbach's alpha was an acceptable 0.63, which was lower than Kaiser's and Gutscher (2003) 0.79.

For the first set of subjective norm questions (Sub1) again only one factor was found, and it accounted for 54% of the variance. The second set of questions (Sub2) resulted in two factors, one with 29% of the variance and the other with 23%. The combined subjective norm questions (Sub) resulted in three factors; with each resulting in 28% of the variance, 17% of the variance, and 11% of the variance, respectively. The first factor aligned with the single factor in Sub1. The second and third factors aligned with the two factors in Sub2. The Cronbach's alpha was a weak 0.53, far below the 0.78 found by Kaiser & Gutsher (2003).

Questions from the first set of perceived behavioral control (Pbc1) had two factors accounting for 28% and 26% of the variance, respectively. Perceived behavioral control's second set of questions (Pbc2) had two factors as well, accounting for 31% and 26% of the variance, respectively. Combining the two resulted in five factors which

accounted for 22%, 14%, 14%, 14%, and 14% of the variance, respectively. The first factor from Pbc1 and the second factor from Pbc2, aligned well with the first factor in the combined Pbc. These factors accounted for the light bulb and recycle bin behaviors. The second factor from Pbc1 and the first factor from Pbc2 accounted for the other four behaviors; however, they didn't align with the combined factor. The four remaining combined factors were specific to each behavior individually. The Cronbach's alpha was an acceptable 0.75, which was slightly higher than Kaiser and Gutscher's (2003) 0.72.

The first set of intention questions (Int1) yielded two factors that accounted for 31% and 24% of the variance, respectively. The second set (Int2) also found two factors, which accounted for 31% and 26% of the variance, respectively. The combined set of questions resulted in four factors which accounted for 18%, 16%, 15%, and 13% of the variance, respectively. The first combined factor aligned well with the second factor from both Int1 and Int2. The second combined factor aligned with first factor in Int2. The third combined factor aligned with the first factor from Int1. The fourth combined factor didn't align with either individual component, but it did load heavily on the composting behavior for both. The Cronbach's alpha was again an acceptable 0.70 that was only slightly lower than the 0.74 value found by Kaiser and Gutscher (2003).

A factor analysis was also conducted on the behavior questions. Two factors were found that accounted for 25% and 21% of the variance, respectively. The Cronbach's alpha was a poor 0.45, which was significantly lower than the 0.81 value that Kaiser and Gutscher (2003) found using the General Ecological Behavior (GEB) scale.

Frequency Distributions

The frequency distributions for each component of the survey are found in Appendix D. The NEP distribution shows a tendency for the respondents to endorse Pro-E beliefs. Of the five separate components of the NEP, items for limits to growth, anti-anthropocentrism, and eco-crisis beliefs were shown to be Pro-E across the board, with mean values of 2.51, 2.75, and 2.68, respectively. Balance of nature questions had two questions that demonstrated Pro-E beliefs and one anti-ecological, but the mean value was high Pro-E (2.93) because the Pro-E questions were strong Pro-E. The human exemptionalism responses had two anti-ecological findings and one Pro-E finding, but the mean value was also high Pro-E (3.53) because the one Pro-E question was very strong Pro-E (mean = 4.48). Two of the NEP items had high "unsure" responses of over 20%.

The survey data showed that the first measure of attitudes, the respondents overall felt that using the six Pro-E products is considered good, with a mean value of 3.85. In four out of the six behaviors, more than 50% of the respondents choose the highest value of five. In the second attitude measure, most respondents thought of the behaviors as appropriate for themselves (mean = 3.41). However the overall composting behavior was deemed inappropriate and four of the six behaviors had more than 20% of the responses as a three (i.e. midway between appropriate and inappropriate). The first attitude measure also had the composting and driving an energy efficient vehicle assessed with over 20% of the participants responding with a three; however, the response on the good side of the scale (63.5%) was significantly higher than the bad side (7.35%) .

Both of the subjective norm measures show large percentages of respondents as unsure. In the first subjective norm measure regarding the six Pro-E product use behaviors, four of the six behaviors indicated that respondents feel that others likely believe they should use the product. The responses to the other two Pro-E products, light bulbs and vehicles, indicated that others were slightly unlikely to believe that the respondents should use the products. The second subjective norm measure also had four product use behaviors that were positive and two that were negative. In particular, respondents strongly felt that people important to them did not use composters or compost piles. The belief that others important to the respondents use the AFIT hallway recycle containers was highly positive by approximately a three to one ratio.

As with the other TPB components, most of the students had a positive response regarding perceived behavioral control and the use of Pro-E products. There was low perceived behavioral control for driving energy efficient vehicles and using a composter or composting pile. In the first perceived behavioral control measure, over 20% for energy efficient appliances and energy efficient vehicles. For the second perceived behavioral control measure, over 20% also indicated a score of three for energy efficient appliances and composting. In both measures, energy efficient light bulbs and AFIT recycle containers were perceived as extremely controllable by the respondents with none feeling use was complicated and few feeling use was difficult.

Intention to use the products by the respondents was shown to be likely for four of the six behaviors for the first intentions component. Only the intentions for composting and driving an energy efficient vehicle were regarded as unlikely to be performed by respondents. The intention to drive an energy efficient vehicle was scored oppositely for

the second intention to use component. The second component had four of the six product use behaviors for which over 20% of the respondents responded with a score of three.

Finally, the behavior measure recorded a high number of "often" or "always" responses to the usage of light bulbs, AFIT recycle containers, energy efficient appliances, and programmable thermostats. Additionally, the programmable thermostats did not have many respondents answer seldom, occasionally, or often. Usage was either always or never, but not much in between. Finally, low use was recorded for the composter and energy efficient vehicles items.

Bivariate Correlations

In this section, the results of the bivariate correlation analysis are provided to help understand the relationships in hypotheses one, three, and four. First, hypothesis one postulated that NEP is a predictor of Attitude towards the behavior. In Table 3, the correlation between NEP and the two components of attitudes towards the behavior are shown. The relationship between NEP and Att1 has an r-value of 0.195 ($p<0.05$). The relationship between NEP and Att2 has an r-value of 0.208 ($p<0.01$). In hypothesis three, product use behavior was considered a predictor of NEP. The bivariate relationship between behavior and NEP has an r-value of 0.226 ($p<0.01$). In addition, the relationship between Int1 and NEP has an r-value of 0.205 ($p<0.01$), and the relationship between Int2 and NEP has an r-value of 0.168 ($p<0.05$). Therefore, hypothesis on and three were supported.

Table 3. Individual Component Correlations

				Correlations									
Subscale	*N*	*M*	*SD*	NEP	Att1	Att2	SN1	SN1	PBC1	PBC2	Int1	Int2	Beh
NEP	172	2.88	0.74	-------									
Att1	170	4.29	0.70	.195*	-------								
Att2	169	3.41	0.66	.208**	.112	-------							
SN1	170	3.28	0.67	.310**	.298**	.199**	-------						
SN2	169	3.03	0.56	.079	.080	.246**	.218**	-------					
PBC1	170	3.47	0.59	.250**	.179*	.242**	.119	.176*	-------				
PBC2	169	3.60	0.65	.155*	.134	.227**	.104	.208**	.637**	-------			
Int1	167	3.55	0.75	.205**	.429**	.151	.278**	.165*	.300**	.335**	-------		
Int2	168	3.46	0.66	.168*	.321**	.155*	.286**	.200**	.177*	.191*	.600**	-------	
Beh	172	3.13	0.63	.226**	.424**	.263**	.220**	.169*	.355**	.290**	.521**	.415**	-------

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

The relationships in hypothesis four are also shown in the Table 3 correlations. The relationship between attitude toward behavior and intentions was strong overall. The relationship between Att1 and Int1 had an r-value of 0.429 ($p<0.01$). The relationship between Att1 and Int2 had an r-value of 0.321 ($p<0.01$). The relationship between Att2 and Int1 was not significant with an r-value of 0.151. The relationship between Att2 and Int2 had an r-value of 0.155($p<0.05$).

Subjective Norm also showed a significant relationship to intentions overall. The relationship between SN1 and Int1 had an r-value of 0.278 ($p<0.01$). The relationship between SN1 and Int2 had an r-value of 0.286 ($p<0.01$). The relationship between SN2 and Int1 had an r-value of 0.165 ($p<0.05$). The relationship between SN2 and Int2 had an r-value of 0.200 ($p<0.01$).

The relationship between Perceived behavioral control and Intentions was also shown to be significant. The relationship between PBC1 and Int1 had an r-value of 0.300 ($p<0.01$). The relationship between PBC1 and Int2 had an r-value of 0.177 ($p<0.05$). The relationship between PBC2 and Int1 had an r-value of 0.335 ($p<0.01$). The relationship between PBC2 and Int2 had an r-value of 0.191 ($p<0.01$).

The final two bivariate relationships in the theory of planned behavior model are that behavior is predicted by intentions to perform the behavior and perceived behavioral control. The relationship between Int1 and Beh showed a medium correlation and had an r-value of 0.521 ($p<0.01$). The relationship between Int2 and Beh showed a small correlation and had an r-value of 0.415 ($p<0.01$). Perceived behavioral control also showed a small correlation with the six behaviors measured. The relationship between PBC1 and Beh had an r-value of 0.355 ($p<0.01$). The relationship between PBC2 and Beh had an r-value of 0.290 ($p<0.01$). Therefore, hypothesis four was supported.

Another correlation analysis was done to test the items in the survey in a more general sense. This was done by treating each of the attitude, subjective norm, perceived behavioral control, and intention measures as single factors rather than splitting each of them into two sub-factors. Table 4 shows the result of the bivariate correlation done between these aggregate factors, NEP, and behavior. All of the components showed at least a small correlation with each other. The intentions component and the behavior component had a medium correlation with an r-value of 0.530($p<0.01$).

Table 4. Combined Component Correlations

				Correlations					
Subscale	*N*	*M*	*SD*	NEP	Att	SN	PBC	Int	Beh
NEP	172	2.88	0.74	-------					
Att	171	3.85	0.51	.262**	-------				
SN	170	3.15	0.48	.262**	.347**	-------			
PBC	170	3.54	0.57	.215**	.283**	.207**	-------		
Int	168	3.50	0.63	.210**	.395**	.333**	.315**	-------	
Beh	172	3.13	0.63	.226**	.473**	.252**	.351**	.529**	-------

**. Correlation is significant at the 0.01 level (2-tailed).

Multiple Regressions

Multiple regressions were also performed to understand the influence that attitudes, subjective norms, and perceived behavioral control have on intentions to use the Pro-E products. Table 5 shows the results from individual component combinations and a generalized multiple regression. Att1 was found shown to always be significant when used, whereas Att2 was always found to be the opposite. SN1 was also found to be significant whenever used, and SN2 was shown to be insignificant for all combinations except when used with Int2. The perceived behavioral control components were always significant when used in conjunction with Int1, but were never significant when used with Int2. The generalized multiple regressions found all the components to be significant.

Table 5. Multiple Regression Comparison

	Int1		Int2	
Combinations	Sig	Not Sig	Sig	Not Sig
Att1, SN1, PBC1	.506**	Constant	.396**	PBC1
Att1, SN1, PBC2	.530**	Constant	.402**	PBC2
Att1, SN2, PBC1	.495**	SN2, Constant	.380**	PBC1
Att1, SN2, PBC2	.519**	SN2, Constant	.384**	PBC2
Att2, SN1, PBC1	.389**	Att2	.321**	Att2, PBC1
Att2, SN1, PBC2	.402**	Att2	.329**	Att2, PBC2
Att2, SN2, PBC1	.334**	Att2,SN2	.261**	Att2, SN2, PBC1
Att2, SN2, PBC2	.344**	Att2,SN2	.264**	Att2, SN2, PBC2
General Multiple Regression				
Att, SN, PBC, Int	.484**	Constant		

Mediated Regression

The last analysis was a mediated regression for indirect effects to test hypothesis two. This was accomplished using a Sobel test, which assumes a normal distribution and a large sample size, and a bootstrap test which does not assume either a normal distribution or a large sample size. Two relationships in the model were tested for indirect effects: the effect that NEP had on intentions mediated through attitudes and the effect that perceived behavioral control had on behavior mediated through intentions. Table 6 shows that the only relationship that had a significant affect using the Sobel test was NEP to Int2 as mediated by Att1. The bootstrap test showed that all of the combinations of individual components straddled zero. For the generalized relationship, NEP and intentions as mediated by attitudes was found to be significant ($p<0.005$) with the Sobel test and a confidence interval range greater than zero in the bootstrap.

Table 6. Attitude Mediation Between NEP and Behavior Intentions

	Att1				
	Sobel			Bootstrap	
	Sig	LL 95 CI	UL 95 CI	LL 95 CI	UL 95 CI
Int1	0.2069	0.0088	0.1448	-0.0224	0.1513
Int2	0.0415	0.0019	0.0986	-0.0167	0.1047
	Att2				
Int1	0.2224	-0.0150	0.0643	-0.0167	0.0716
Int2	0.1802	-0.0115	0.0610	-0.0115	0.0662
	Att				
Int	0.0047	0.0253	0.1394	0.0336	0.1380

In Table 7, the relationship between perceived behavioral control and behavior as mediated by intentions was shown to be a strong mediated relationship. All the combinations of individual components were significant and had a confidence interval above zero using the Sobel test. The bootstrap also showed that all the confidence intervals were above zero.

Table 7. Intention Mediating Between Perceived Behavioral Control and Behavior

	Int1				
	Sobel			Bootstrap	
	Sig	LL 95 CI	UL 95 CI	LL 95 CI	UL 95 CI
Pbc1	0.0006	0.0618	0.2264	0.0593	0.2504
Pbc2	0.036	0.0044	0.1317	0.0047	0.1393
	Int2				
Pbc1	0.0002	0.0743	0.2355	0.0472	0.0707
Pbc2	0.0256	0.0083	0.1285	0.0128	0.1353
	Int				
Int	0.0003	0.0738	0.2506	0.0706	0.2684

Chapter V. Discussions and Conclusions

The purpose of this research was to see whether New Ecological Paradigm (NEP) could be incorporated into the Theory of Planned Behavior (TPB) to understand the beliefs, attitudes, and behaviors associated with pro-ecological (Pro-E) products. Data collected through an online survey were used to determine the correlations between the NEP and TPB. This final section will discuss the results found from the data analysis, discuss limitations to the research, and propose areas for follow-on.

Ecological Concern

Use of the NEP scale to measure the ecological concern of the respondents was shown to be appropriate. However, one of the components of the scale, human exemptionalism, showed some inconsistency in the responses. Two of the three questions demonstrated a low NEP but the third question was extremely high for NEP. It is possible that this discrepancy is due to the fact that respondents are primarily scientist or engineers who are highly educated. The two questions that demonstrated low NEP were, “Human ingenuity will insure that we do NOT make the earth unlivable” and “Humans will eventually learn enough about how nature works to be able to control it.” Both of the questions deal with using ingenuity and learning to solve the problems that might bring harm to the earth, since those who would be doing so are engineers and scientists, the respondents may naturally have faith in their abilities to accomplish the task. The human exemptionalism question, that scored extremely high NEP, was “Despite our special abilities humans are still subject to the laws of nature.” This also

falls in line with the beliefs of scientists and engineers because these individuals tend to follow laws and principles of science as part of their disciplines.

In addition to demonstrating support as a measure of ecological concern, the NEP was found to fit well in the proposed model. First, it was found to have a significant correlation with attitudes towards using Pro-E products. This confirms the first hypothesis that an individual's ecological beliefs or concerns will govern or influence that individual's attitudes towards using Pro-E products. The second hypothesis that an individual's high Pro-E product use will predict a high NEP score was also confirmed. This correlation closes the reinforcing loop that was suggested earlier. In other words, as an individual uses Pro-E products, their ecological concern increases; this in turn influences their attitude toward using other Pro-E products and subsequently their intentions. The third hypothesis that attitudes mediates the relationship between NEP and behavior was also confirmed; it was found that the relationship between NEP and Int2 was mediated by both Att1 sub-factor and the generalized version.

Ecological Behavior

The use of the TPB to understand Pro-E product use behavior was found to be appropriate, thus confirming the fourth hypothesis. All of the components of TPB showed significant bivariate correlations at $p<0.05$, with most having a significance of $p<0.01$. When each component was generalized, all the correlations were significant at the $p<0.01$ level. The multiple regressions between intentions and attitude toward Pro-E product use, subjective norm, and perceived behavioral control, showed that only the Att1, SN1, PBC1, and Int1 components were significant. The generalized components

were also shown to be significant using the multiple regressions. Finally, the mediated regression showed that perceived behavioral control indirectly affects behavior through intentions both specifically and generally. The best combination of components of the survey for TPB is either the Att1, SN1, PBC1, and Int1 components or the general use of all 12 questions from each component.

The strength of the TPB measures was not as strong as those used in previous studies of ecological behavior (Kaiser & Scheuthle, 2003; Kaiser, 2006). This difference may be due to the use of different ecological behaviors between the two questionnaires and the emphasis put on Pro-E products in this study. In this study, there was also a high number of middle-of-the-road responses that bring into question the strength of the questions used in the survey.

In fact, several responses were received via email confirming that the questions in the survey need to be modified to be less confusing. These confirmatory statements included, “did get a little confusing,” “it was very difficult to deal with positive, negative, and double negative statements and answers all mixed up together,” and “questions got confusing.” There may be several changes that can be made to improve the survey. These include rewording the questions to avoid confusing statements and providing more response options by using a seven-point Likert scale instead of the five-point Likert scale used by Kaiser(2002).

In addition, the responses showed that the six Pro-E behaviors used to generalize the four components of the TPB may be weak. The responses for the composting and the driving energy efficient vehicle behaviors had opposite answers from the other four behaviors approximately 75% and 63% of the time, respectively. This suggests that these

two behaviors should be removed from surveys using generalized components of Pro-E products. Perhaps there is a strong negative affinity towards using a composting pile or composter. On the other hand, the students at AFIT are transient military personnel and perhaps many of them rent their homes or apartments and composting is not a viable option for them. There seems to be some support for this in the data because the perceived behavioral control was also scored as difficult or complicated. The behavior of driving an energy efficient vehicle showed the same patterns of low intentions and low perceived behavioral control. The greatest roadblock for this behavior would definitely be price. Any vehicle is a high-priced item and purchasing one is not a small decision. In addition, energy efficient vehicles are currently higher priced than similar normal models. So justification to take this item off of a generalized group of ecological behaviors seems warranted.

Two of the specific behaviors showed strong support for intervention programs. Using both energy efficient light bulbs and the AFIT hallway recycle containers demonstrated high product use. In addition, the components of TPB were also found to highly support the use of Pro-E products and subsequently predict the behavior. In both cases, intervention programs were put into place by organizations to increase the use of the products and subsequently ecological behavior. For the recycle containers, the organization and intervention program is fairly obvious, but for the light bulbs the organization is a little vaguer. The organization, Dayton Power and Light, has subsidized the price of compact fluorescent light bulbs in the Dayton area. These intervention programs most likely contribute to the high subjective norm and perceived behavioral

control responses in the survey, and therefore responsible for the high intentions to use and actual use of the Pro-E products.

Limitations of the Study

This research effort did have its limitations which can be expected with any study. The foremost limitation was the fact that the survey participants were limited to AFIT students, thus making the results ungeneralizable to the general public. Generalizations may be made for those with higher education or for Air Force personnel. A more diverse group of survey participants would help develop a better in understanding of the relationship that the use of Pro-E products have on behavior and ecological concern.

A second limitation was that the selection of the Pro-E products may not have had a wide enough range to support a general use of TPB. The fact that two of the products did not seem to fit well with the others suggests that additional products may need to be included. Including such products as solar panels or windmills would have helped shed more light on the contrast between providing products or not providing them. In addition, in previous studies the general ecological behavior questionnaire (GEB) was used to generalize ecological behavior (Kaiser et al., 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006). This study only focused on the self reports of the six Pro-E product use behaviors.

A final limitation was the inability to measure the actual behavior other than by using a self-report. Self-reports are known to not be as accurate as observing actual behavior. However, TPB has been shown to account for 11% more variance than observed data (Armitage & Conner, 2001).

Recommendations for Future Research

Further research needs to be conducted to close the loop and see whether intervention programs increase subjective norm, perceived behavioral control, NEP, and behavior. Perhaps a phased survey where an actual intervention is implemented and the NEP and TBP were measured before and after administration of the intervention. A phased survey would also help avoid common method bias. The independent variable component questions could be asked in the first survey, with the dependent variable component questions being asked in the second survey. That way, individuals do not try and match responses between like questions.

Future research may also want to analyze the six Pro-E product use behaviors individually, especially if an interested organization were looking to purchase a specific product for employee use. However, if an organization was more interested in the general aspect of this study, they might include the GEB measure (Kaiser et al., 1999; Kaiser & Gutscher, 2003; Kaiser & Scheuthle, 2003; Kaiser, 2006) to get a better overall feel for the ecological behaviors of individuals and not just the six ecological product use behaviors of participants.

Further research needs to be done to strengthen the argument that there is a reinforcing loop taking place. Basically once ecological behaviors are being performed, they strengthen the beliefs and attitudes of the individual towards behaving ecologically. Therefore, if organizations want more ecological employees they need to get those employees to engage in some amount of ecological behavior and that will facilitate other ecological behaviors.

Finally, the literature showed a common theme that age, gender, and education level were moderators of ecological concern. This research did not analyze these relationships but further research may want to analyze the collected demographic data with the NEP and TPB components.

Summary

The execution of this research has helped further the understanding regarding the relationship between ecological concern and behavior. The results of the questionnaire show that overall AFIT students support using Pro-E products and they report a fair use of the products as well. In addition, the Pro- E products that students felt they had the most control of using demonstrated significantly higher intentions to use and reported usage. Organizations that intervened in the use of Pro-E products showed high intentions and usage of those products.

In closing, this research suggests that if the Air Force wants to meet the energy efficiency or ecological goals of the future, a good way to do so is by engaging its employees in using Pro-E products. The use of these products will positively influence their ecological beliefs which will in turn influence future ecological behaviors. The research also indicates that sometimes the biggest stumbling block to acting Pro-E is whether or not the individual perceives they have control over the behavior.

Appendix A: Survey Package Used to Build Online Survey

Dear AFIT Member,

The Air Force is always looking to become more efficient and to lower the financial costs of performing our mission. Parts of these costs are associated with environmental or ecological costs that can be avoided by understanding the attitudes and behavior of Air Force employees. This research will ask about your use of certain products and your attitudes toward the environment. The following survey will ask questions pertaining to your attitudes and intentions towards the use of six products. The survey will also measure your attitudes toward the environment. All answers to the question are anonymous and untraceable back to you.

If you have any questions, feel free to contact Capt Josh Poulton at AFIT by calling 937-318-9177, or by email at joshua.poulton@afit.edu .

Thank you in advance for your cooperation.

Listed below are statements about the relationship between humans and the environment. Using the scale below, please indicate the extent to which you agree with each statement by clicking on the appropriate response.

1. We are approaching the limit of the number of people the earth can support.

   SD MD U MA SA

2. Humans have the right to modify the natural environment to suit their needs.

   SD MD U MA SA

3. When humans interfere with nature it often produces disastrous consequences.

   SD MD U MA SA

4. Human ingenuity will insure that we do NOT make the earth unlivable.

   SD MD U MA SA

5. Humans are severely abusing the environment.

   SD MD U MA SA

6. The earth has plenty of natural resources if we just learn how to develop them.

   SD MD U MA SA

7. Plants and animals have as much right as humans to exist.

   SD MD U MA SA

8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

   SD MD U MA SA

9. Despite our special abilities humans are still subject to the laws of nature.

   SD MD U MA SA

10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.

    SD MD U MA SA

11. The earth is like a spaceship with very limited room and resources.

SD MD U MA SA

12. Humans were meant to rule over the rest of nature.

SD MD U MA SA

13. The balance of nature is very delicate and easily upset.

SD MD U MA SA

14. Humans will eventually learn enough about how nature works to be able to control it.

SD MD U MA SA

15. If things continue on their present course, we will soon experience a major ecological catastrophe.

SD MD U MA SA

Please indicate how frequently you engage in the behavior expressed in each of the following statements by clicking on the appropriate response.

16. I use energy efficient light bulbs.

Never Seldom Occasionally Often Always

17. I use the AFIT hallway recycle containers.

Never Seldom Occasionally Often Always

18. I use energy efficient appliances (e.g. Energy Star).

Never Seldom Occasionally Often Always

19. I use a composter or compost pile.

Never Seldom Occasionally Often Always

20. I drive an energy efficient vehicle (greater than 33 mpg).

Never Seldom Occasionally Often Always

21. I use a programmable thermostat.

Never	Seldom	Occasionally	Often	Always

Please characterize your attitude toward the behavior expressed in each of the following statements by clicking on the appropriate response.

22. I use energy efficient light bulbs.

1	2	3	4	5
Bad				Good

23. I use the AFIT hallway recycle containers.

1	2	3	4	5
Bad				Good

24. I use energy efficient appliances (e.g. Energy Star).

1	2	3	4	5
Bad				Good

25. I use a composter or compost pile.

1	2	3	4	5
Bad				Good

26. I drive an energy efficient vehicle (greater than 33 mpg).

1	2	3	4	5
Bad				Good

27. I use a programmable thermostat.

1	2	3	4	5
Bad				Good

Please indicate the extent to which you think the behavior expressed in each of the following statements is appropriate for you by clicking on the proper response.

28. I do not use energy efficient light bulbs.

1	2	3	4	5
Inappropriate				Appropriate

29. I use the AFIT hallway recycle containers.

1	2	3	4	5
Inappropriate				Appropriate

30. I use energy efficient appliances (e.g. Energy Star).

1	2	3	4	5
Inappropriate				Appropriate

31. I do not use a composter or compost pile.

1	2	3	4	5
Inappropriate				Appropriate

32. I drive an energy efficient vehicle (greater than 33 mpg).

1	2	3	4	5
Inappropriate				Appropriate

33. I do not use a programmable thermostat.

1	2	3	4	5
Inappropriate				Appropriate

Please indicate the likelihood that others think you should participate in the behavior expressed in each of the following statements by clicking on the appropriate response.

34. Most people important to me think I should use energy efficient light bulbs.

1	2	3	4	5
Unlikely				Likely

35. Most people important to me think I should use the AFIT hallway recycle containers.

1	2	3	4	5
Unlikely				Likely

36. Most people important to me think I should not use energy efficient appliances (e.g. Energy Star).

1	2	3	4	5
Unlikely				Likely

37. Most people important to me think I should not use a composter or compost pile.

1	2	3	4	5
Unlikely				Likely

38. Most people important to me think I should drive an energy efficient vehicle (greater than 33 mpg).

1	2	3	4	5
Unlikely				Likely

39. Most people important to me think I should use a programmable thermostat.

1 2 3 4 5
Unlikely Likely

Please indicate the extent to which you agree with each statement by clicking on the appropriate response.

40. Most people important to me do not use energy efficient light bulbs.
1 2 3 4 5
Disagree Agree

41. Most people important to me do not use the AFIT hallway recycle containers.
1 2 3 4 5
Disagree Agree

42. Most people important to me use energy efficient appliances (e.g. Energy Star).
1 2 3 4 5
Disagree Agree

43. Most people important to me use a composter or compost pile.
1 2 3 4 5
Disagree Agree

44. Most people important to me do not drive an energy efficient vehicle (greater than 33 mpg).
1 2 3 4 5
Disagree Agree

45. Most people important to me do not use a programmable thermostat.
1 2 3 4 5
Disagree Agree

Please indicate the relative ease/difficulty (based on access and availability) associated with performing the behavior expressed in each statement below by clicking on the appropriate response.

46. I use energy efficient light bulbs.
1 2 3 4 5
Easy Difficult

47. I use the AFIT hallway recycle containers.
1 2 3 4 5
Easy Difficult

48. I use energy efficient appliances (e.g. Energy Star).
1 2 3 4 5

Easy Difficult

49. I use a composter or compost pile.

1 2 3 4 5

Easy Difficult

50. I drive an energy efficient vehicle (greater than 33 mpg).

1 2 3 4 5

Easy Difficult

51. I use a programmable thermostat.

1 2 3 4 5

Easy Difficult

Please indicate how simple/complicated it would be to adapt your lifestyle to include the behavior expressed in each statement below by clicking on the appropriate response.

52. I use energy efficient light bulbs.

1 2 3 4 5

Simple Complicated

53. I use the AFIT hallway recycle containers.

1 2 3 4 5

Simple Complicated

54. I use energy efficient appliances (e.g. Energy Star).

1 2 3 4 5

Simple Complicated

55. I use a composter or compost pile.

1 2 3 4 5

Simple Complicated

56. I drive an energy efficient vehicle (greater than 33 mpg).

1 2 3 4 5

Simple Complicated

57. I use a programmable thermostat.

1 2 3 4 5

Simple Complicated

Please indicate the likelihood of the intentions expressed in each of the following statements by clicking on the appropriate response.

58. I do not intend to use energy efficient light bulbs.

1	2	3	4	5
Unlikely				Likely

59. I do not intend to use the AFIT hallway recycle containers.

1	2	3	4	5
Unlikely				Likely

60. I intend to use energy efficient appliances (e.g. Energy Star).

1	2	3	4	5
Unlikely				Likely

61. I do not intend to use a composter or compost pile.

1	2	3	4	5
Unlikely				Likely

62. I intend to drive an energy efficient vehicle (greater than 33 mpg).

1	2	3	4	5
Unlikely				Likely

63. I intend to use a programmable thermostat.

1	2	3	4	5
Unlikely				Likely

Please indicate the level of determination associated with the intentions expressed in each of the following statements by clicking on the appropriate response.

64. I will use energy efficient light bulbs.

1	2	3	4	5
Undetermined				Determined

65. I will use the AFIT hallway recycle containers.

1	2	3	4	5
Undetermined				Determined

66. I will not use energy efficient appliances (e.g. Energy Star).

1	2	3	4	5
Undetermined				Determined

67. I will use a composter or compost pile.

1	2	3	4	5
Undetermined				Determined

68. I will not drive an energy efficient vehicle (greater than 33 mpg).

1	2	3	4	5
Undetermined				Determined

69. I will not use a programmable thermostat.

1	2	3	4	5
Undetermined				Determined

Please answer a few demographic questions by indicating the appropriate response as it pertains to you.

70. Gender? Male Female

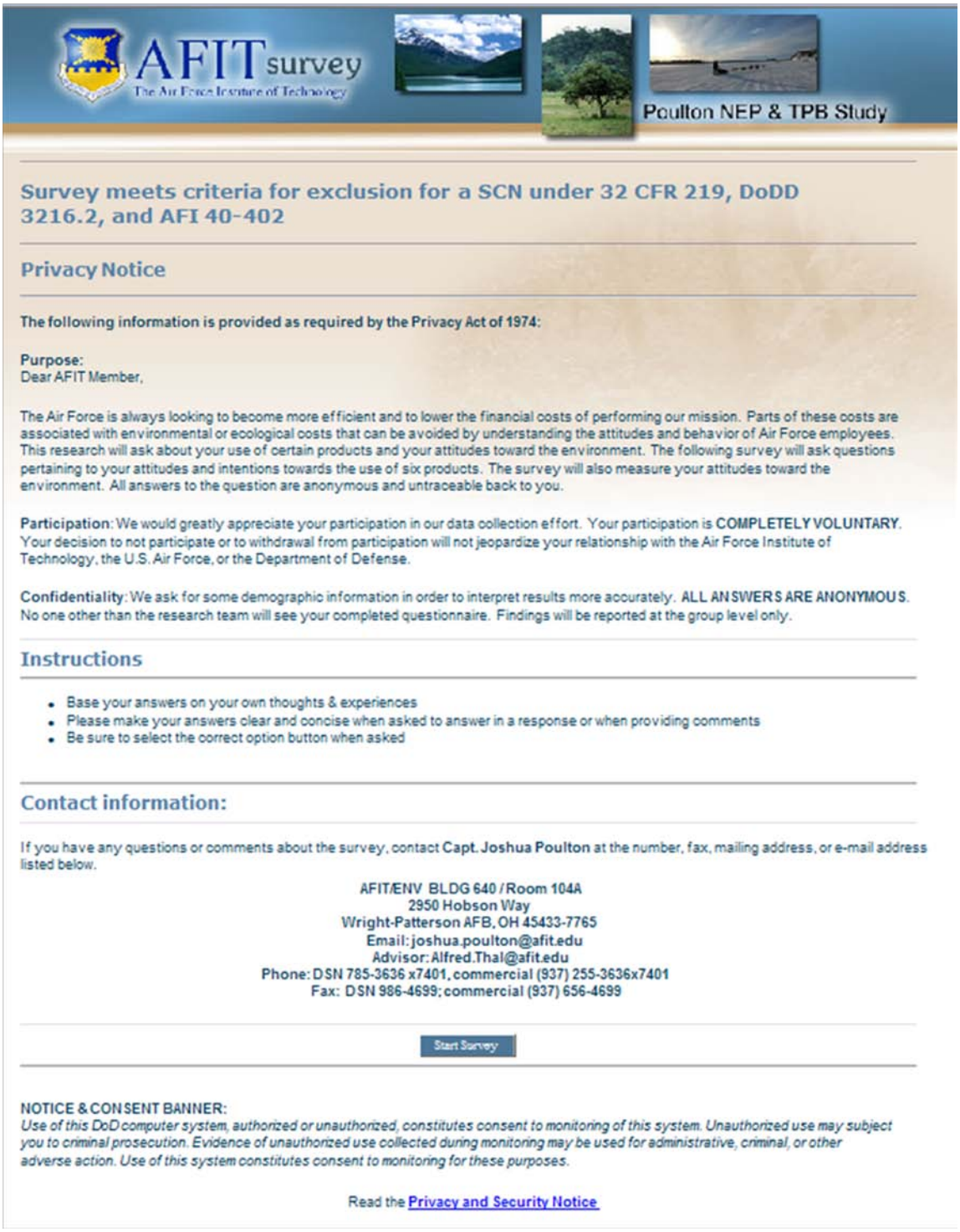
71. Marital Status Married Single

72. Children? Yes No

73. Age? _____

Appendix B: Online Survey Screenshots

First Page



Second page upper section

Listed below are statements about the relationship between humans and the environment. Using the scale below, please indicate the extent to which you agree with each statement by clicking on the appropriate response.

1	We are approaching the limit of the number of people the earth can support.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
2	Humans have the right to modify the natural environment to suit their needs.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
3	When humans interfere with nature it often produces disastrous consequences.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
4	Human ingenuity will insure that we do NOT make the earth unlivable.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
5	Humans are severely abusing the environment.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
6	The earth has plenty of natural resources if we just learn how to develop them.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
7	Plants and animals have as much right as humans to exist.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
8	The balance of nature is strong enough to cope with th impacts of modern industrial nations.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
9	Despite our special abilities humans are still subject t the laws of nature.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
10	The so-called "ecological crisis" facing humankind h been greatly exaggerated.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○

Second page lower section

11	The earth is like a spaceship with very limited room an resources.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
12	Humans were meant to rule over the rest of nature.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
13	The balance of nature is very delicate and easily upset	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
14	Humans will eventually learn enough about how natu works to be able to control it.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○
15	If things continue on their present course, we will soo experience a major ecological catastrophe.	Strongly Disagree	Mildly Disagree	Unsure	Mildly Agree	Strongly Agree
		1	2	3	4	5
		○	○	○	○	○

Continue

Third page

Please indicate how frequently you engage in the behavior expressed in each of the following statements by clicking on the appropriate response.

16	I use energy efficient light bulbs.	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○
17	I use the AFIT hallway recycle containers	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○
18	I use energy efficient appliances (e.g. Energy Star).	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○
19	I use a composter or compost pile.	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○
20	I drive an energy efficient vehicle (greater than 33 mpg	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○
21	I use a programmable thermostat.	Never	Seldom	Occasionally	Often	Always
		1	2	3	4	5
		○	○	○	○	○

Please characterize your attitude toward the behavior expressed in each of the following statements by clicking on the appropriate response.

22	I use energy efficient light bulbs.	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○
23	I use the AFIT hallway recycle containers	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○
24	I use energy efficient appliances (e.g. Energy Star).	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○
25	I use a composter or compost pile.	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○
26	I drive an energy efficient vehicle (greater than 33 mpg	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○
27	I use a programmable thermostat.	BAD	⇒	⇒	⇒	GOOD
		1	2	3	4	5
		○	○	○	○	○

Continue

Fourth page

Please indicate the extent to which you think the behavior expressed in each of the following statements is appropriate for you by clicking on the proper response.

28	I do not use energy efficient light bulbs.	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○
29	I use the AFIT hallway recycle containers.	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○
30	I use energy efficient appliances (e.g. Energy Star).	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○
31	I do not use a composter or compost pile.	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○
32	I drive an energy efficient vehicle (greater than 33 mpg).	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○
33	I do not use a programmable thermostat.	Inappropriate	⇒	⇒	⇒	Appropriate
		1	2	3	4	5
		○	○	○	○	○

Please indicate the likelihood that others think you should participate in the behavior expressed in each of the following statements clicking on the appropriate response.

34	Most people important to me think I should use energ efficient light bulbs.	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○
35	Most people important to me think I should use the AFIT hallway recycle containers.	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○
36	Most people important to me think I should not use energy efficient appliances (e.g. Energy Star).	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○
37	Most people important to me think I should not use a composter or compost pile.	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○
38	Most people important to me think I should drive an energy efficient vehicle (greater than 33 mpg).	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○
39	Most people important to me think I should use a programmable thermostat.	Unlikely	⇒	⇒	⇒	Likely
		1	2	3	4	5
		○	○	○	○	○

Continue

Fifth page

Please indicate the extent to which you agree with each statement by clicking on the appropriate response.

40	Most people important to me do not use energy efficient light bulbs.	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○
41	Most people important to me do not use the AFIT hallway recycle containers.	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○
42	Most people important to me use energy efficient appliances (e.g. Energy Star).	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○
43	Most people important to me use a composter or compost pile.	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○
44	Most people important to me do not drive an energy efficient vehicle (greater than 33 mpg).	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○
45	Most people important to me do not use a programmable thermostat.	Disagree	⇒	⇒	⇒	Agree
		1	2	3	4	5
		○	○	○	○	○

Please indicate the relative ease/difficulty (based on access and availability) associated with performing the behavior expressed in e statement below by clicking on the appropriate response.

46	I use energy efficient light bulbs.	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○
47	I use the AFIT hallway recycle containers.	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○
48	I use energy efficient appliances (e.g. Energy Star).	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○
49	I use a composter or compost pile.	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○
50	I drive an energy efficient vehicle (greater than 33 mpg).	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○
51	I use a programmable thermostat.	Easy	⇒	⇒	⇒	Difficult
		1	2	3	4	5
		○	○	○	○	○

Continue

Sixth page upper section

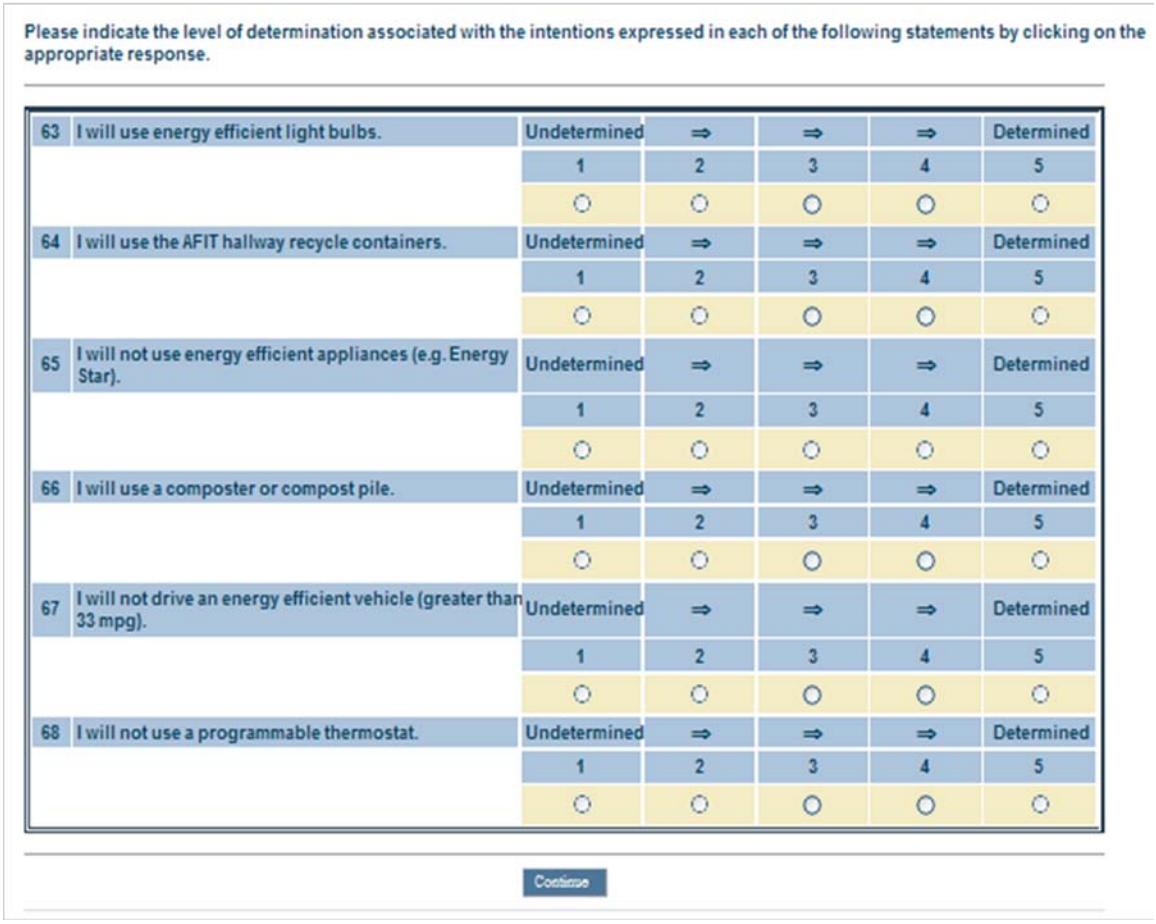
Please indicate how simple/complicated it would be to adapt your lifestyle to include the behavior expressed in each statement below by clicking on the appropriate response.

52	I use energy efficient light bulbs.	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○
53	I use the AFIT hallway recycle containers.	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○
54	I use energy efficient appliances (e.g. Energy Star).	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○
55	I use a composter or compost pile.	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○
56	I drive an energy efficient vehicle (greater than 33 mpg).	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○
57	I use a programmable thermostat.	Simple	⇒	⇒	⇒	Complicated
		1	2	3	4	5
		○	○	○	○	○

Please indicate the likelihood of the intentions expressed in each of the following statements by clicking on the appropriate response.

58	I do not intend to use energy efficient light bulbs.	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○
59	I do not intend to use the AFIT hallway recycle containers.	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○
60	I intend to use energy efficient appliances (e.g. Energy Star).	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○
61	I do not intend to use a composter or compost pile.	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○
62	I intend to drive an energy efficient vehicle (greater tha 33 mpg).	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○
63	I intend to use a programmable thermostat.	Unlikely	⇒	⇒	⇒	Lilkely
		1	2	3	4	5
		○	○	○	○	○

Sixth page lower section

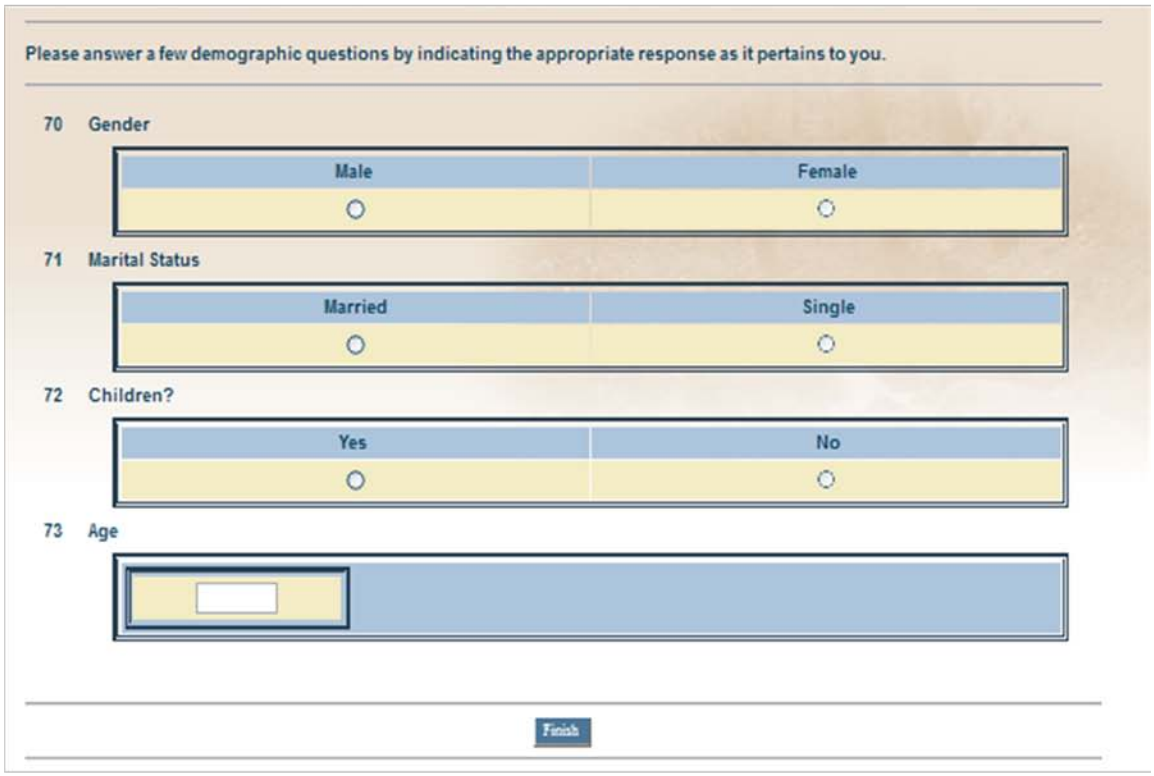


Please indicate the level of determination associated with the intentions expressed in each of the following statements by clicking on the appropriate response.

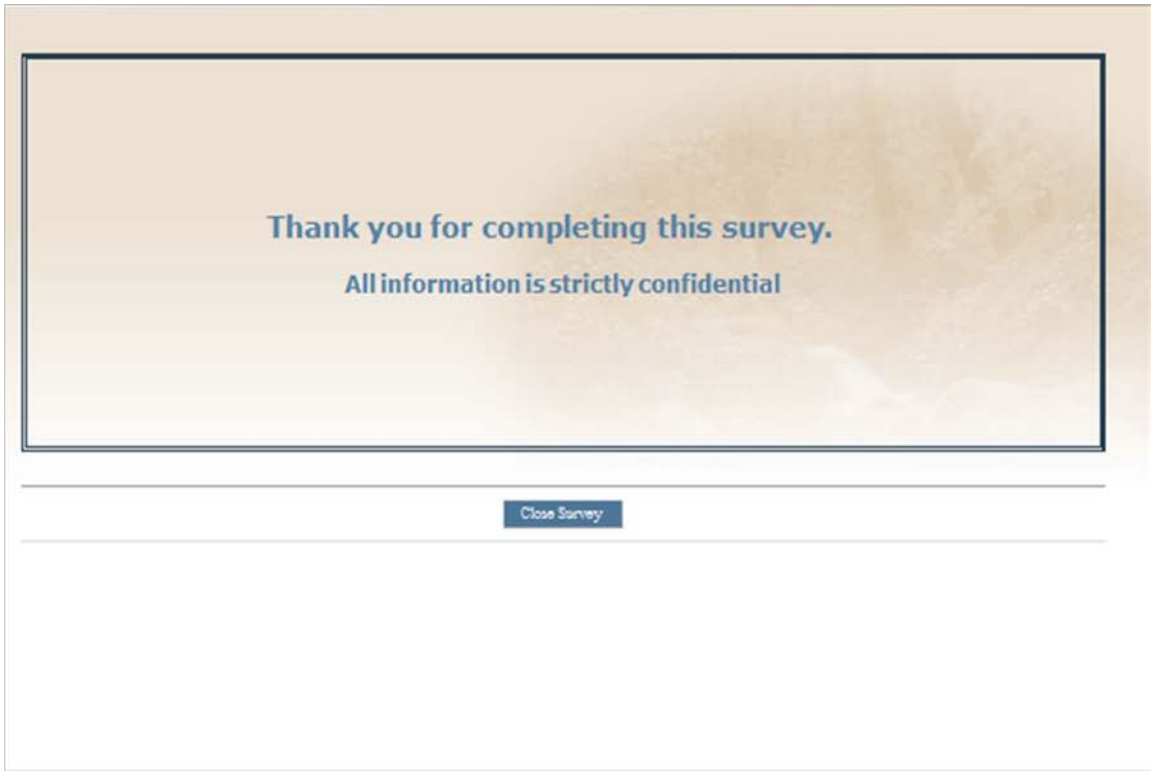
63	I will use energy efficient light bulbs.	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○
64	I will use the AFIT hallway recycle containers.	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○
65	I will not use energy efficient appliances (e.g. Energy Star).	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○
66	I will use a composter or compost pile.	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○
67	I will not drive an energy efficient vehicle (greater than 33 mpg).	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○
68	I will not use a programmable thermostat.	Undetermined	⇒	⇒	⇒	Determined
		1	2	3	4	5
		○	○	○	○	○

Continue

Seventh page



Eighth page



Appendix C: Emails Received About the Survey

- "I completed the survey, but about 75% of it did not make any sense. Therefore, my answers may make no sense either."

- "Looked pretty good to me. I assume you meant to keep swapping from "intend to" and "not intend to" in order to reverse code, but it did get a little confusing. If people weren't paying attention they could easily miss that. Just my thoughts."

- "I know you already published the survey, but it was very difficult to deal with positive, negative, and double negative statements and answers all mixed up together. Some people might answer differently just because the read or misread the questions and answers carefully."

- "That was a long one. I think the questions got confusing with the "not" positions in some of them."

- "One note of feedback on the survey. Many of the questions I do not know the answer to. I don't know if I have energy efficient appliances, and I have no idea if people important to me do any of the items asked about them.

  May help to provide I don't know as a response."

- "I took your survey for you but had a comment on it for you to think about concerning the results you may get. They may be intentional or not but the constant change between positive statements and negative statements made it hard to follow and be accurate. It sometimes got confusing how to answer some statements. In some circumstances there were double negatives (not and un-) which could throw your results off with some questions.

  I just wanted to give you a heads up on my take. Good luck with the survey, results and thesis."

Appendix D: Frequency Tables

NEP Questions

Do you agree or disagree that:	SD	MD	U	MA	SA	N	M	Std
1. We are approaching the limit of the number of people the earth can support.	49	43	29	36	15	172	2.56	1.33
2. Humans have the right to modify the natural environment to suit their needs.	9	26	13	85	39	172	2.31	1.14
3. When humans interfere with nature it often produces disastrous consequences.	28	47	19	66	12	172	2.92	1.26
4. Human ingenuity will insure that we do NOT make the earth unlivable.	17	36	30	54	35	172	2.69	1.28
5. Humans are severely abusing the environment.	32	40	13	60	27	172	3.06	1.40
6. The earth has plenty of natural resources if we just learn how to develop them.	7	19	13	79	54	172	2.10	1.09
7. Plants and animals have as much right as humans to exist.	23	39	11	56	42	171	3.32	1.41
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	21	56	24	52	18	171	3.06	1.24
9. Despite our special abilities humans are still subject to the laws of nature.	2	2	9	57	102	172	4.48	0.75
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.	11	29	30	39	63	172	2.34	1.30
11. The earth is like a spaceship with very limited room and resources.	34	47	20	52	19	172	2.85	1.34
12. Humans were meant to rule over the rest of nature.	26	31	24	32	59	172	2.61	1.48
13. The balance of nature is very delicate and easily upset.	20	66	22	56	8	172	2.80	1.15
14. Humans will eventually learn enough about how nature works to be able to control it.	38	49	44	30	11	172	3.42	1.19
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	45	38	38	35	16	172	2.65	1.31

Do you agree or disagree that:	SD	MD	U	MA	SA	N	M	Std
1. We are approaching the limit of the number of people the earth can support.	28.5%	25.0%	16.9%	20.9%	8.7%	172	2.56	1.33
2. Humans have the right to modify the natural environment to suit their needs.	5.2	15.1	7.6	49.4	22.7	172	2.31	1.14
3. When humans interfere with nature it often produces disastrous consequences.	16.3	27.3	11.0	38.4	7.0	172	2.92	1.26
4. Human ingenuity will insure that we do NOT make the earth unlivable.	9.9	20.9	17.4	31.4	20.3	172	2.69	1.28
5. Humans are severely abusing the environment.	18.6	23.3	7.6	34.9	15.7	172	3.06	1.40
6. The earth has plenty of natural resources if we just learn how to develop them.	4.1	11.0	7.6	45.9	31.4	172	2.10	1.09
7. Plants and animals have as much right as humans to exist.	13.4	22.7	6.4	32.6	24.4	171	3.32	1.41
8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.	12.2	32.6	14.0	30.2	10.5	171	3.06	1.24
9. Despite our special abilities humans are still subject to the laws of nature.	1.2	1.2	5.2	33.1	59.3	172	4.48	0.75
10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.	6.4	16.9	17.4	22.7	36.6	172	2.34	1.30
11. The earth is like a spaceship with very limited room and resources.	19.8	27.3	11.6	30.2	11.0	172	2.85	1.34
12. Humans were meant to rule over the rest of nature.	15.1	18.0	14.0	18.6	34.3	172	2.61	1.48
13. The balance of nature is very delicate and easily upset.	11.6	38.4	12.8	32.6	4.7	172	2.80	1.15
14. Humans will eventually learn enough about how nature works to be able to control it.	22.1	28.5	25.6	17.4	6.4	172	3.42	1.19
15. If things continue on their present course, we will soon experience a major ecological catastrophe.	26.2	22.1	22.1	20.3	9.3	172	2.65	1.31

Attitude Questions

Please characterize your attitude toward the behavior expressed in each of the following statements by clicking on the appropriate response

		Bad				Good	N	M	Std
		1	2	3	4	5			
1.	I use energy efficient light bulbs.	6	6	19	31	107	169	4.34	1.05
2.	I use the AFIT hallway recycle containers.	2	1	8	29	130	170	4.67	0.70
3.	I use energy efficient appliances (e.g. Energy Star).	1	2	22	33	111	169	4.49	0.81
4.	I use a composter or compost pile.	8	10	56	29	67	170	3.81	1.16
5.	I drive an energy efficient vehicle (greater than 33 mpg).	3	8	39	41	79	170	4.09	1.02
6.	I use a programmable thermostat.	4	4	22	42	97	169	4.33	0.95

Please indicate the extent to which you think the behavior expressed in each of the following statements is appropriate for you by clicking on the proper

		Inappropriate				Appropriate	N	M	Std
		1	2	3	4	5			
8.	I do not use energy efficient light bulbs.	50	40	34	19	26	169	3.41	1.41
9.	I use the AFIT hallway recycle containers.	22	8	17	30	92	169	3.96	1.42
10.	I use energy efficient appliances (e.g. Energy Star).	11	15	41	41	60	168	3.74	1.22
11.	I do not use a composter or compost pile.	22	20	66	23	38	169	2.79	1.28
12.	I drive an energy efficient vehicle (greater than 33 mpg).	23	25	49	33	39	169	3.24	1.33
13.	I do not use a programmable thermostat.	45	27	57	17	22	168	3.33	1.33

Please characterize your attitude toward the behavior expressed in each of the following statements by clicking on the appropriate response

		Bad				Good	N	M	Std
		1	2	3	4	5			
1.	I use energy efficient light bulbs.	3.5%	3.5%	11.0%	18.0%	62.2%	169	4.34	1.05
2.	I use the AFIT hallway recycle containers.	1.2	0.6	4.7	16.9	75.6	170	4.67	0.70
3.	I use energy efficient appliances (e.g. Energy Star).	0.6	1.2	12.8	19.2	64.5	169	4.49	0.81
4.	I use a composter or compost pile.	4.7	5.8	32.6	16.9	39.0	170	3.81	1.16
5.	I drive an energy efficient vehicle (greater than 33 mpg).	1.7	4.7	22.7	23.8	45.9	170	4.09	1.02
6.	I use a programmable thermostat.	2.3	2.3	12.8	24.4	56.4	169	4.33	0.95

Please indicate the extent to which you think the behavior expressed in each of the following statements is appropriate for you by clicking on the proper

		Inappropriate				Appropriate	N	M	Std
		1	2	3	4	5			
8.	I do not use energy efficient light bulbs.	29.1	23.3	19.8	11.0	15.1	169	3.41	1.41
9.	I use the AFIT hallway recycle containers.	12.8	4.7	9.9	17.4	53.5	169	3.96	1.42
10.	I use energy efficient appliances (e.g. Energy Star).	6.4	8.7	23.8	23.8	34.9	168	3.74	1.22
11.	I do not use a composter or compost pile.	12.8	11.6	38.4	13.4	22.1	169	2.79	1.28
12.	I drive an energy efficient vehicle (greater than 33 mpg).	13.4	14.5	28.5	19.2	22.7	169	3.24	1.33
13.	I do not use a programmable thermostat.	26.2	15.7	33.1	9.9	12.8	168	3.33	1.33

Subjective Norm Questions

Please indicate the likelihood that others think you should participate in the behavior expressed in each of the following statements by clicking on the

		Unlikely				Likely	N	M	Std
		1	2	3	4	5			
1.	Most people important to me think I should use energy efficient light bulbs.	36	24	53	36	21	170	2.89	1.30
2.	Most people important to me think I should use the AFIT hallway recycle containers.	24	13	43	45	45	170	3.44	1.34
3.	Most people important to me think I should not use energy efficient appliances (e.g. Energy Star).	68	32	37	19	14	170	3.71	1.32
4.	Most people important to me think I should not use a composter or compost pile.	70	28	55	7	10	170	3.83	1.19
5.	Most people important to me think I should drive an energy efficient vehicle (greater than 33 mpg).	39	30	56	25	20	170	2.75	1.29
6.	Most people important to me think I should use a programmable thermostat.	33	15	61	32	28	169	3.04	1.32

Please indicate the extent to which you agree with each statement by clicking on the appropriate response.

		Disagree				Agree	N	M	Std
		1	2	3	4	5			
8.	Most people important to me do not use energy efficient light bulbs.	21	44	65	29	10	169	3.22	1.06
9.	Most people important to me do not use the AFIT hallway recycle containers.	42	47	48	14	18	169	3.48	1.25
10.	Most people important to me use energy efficient appliances (e.g. Energy Star).	5	18	79	48	18	168	3.33	0.91
11.	Most people important to me use a composter or compost pile.	74	38	40	10	7	169	2.04	1.14
12.	Most people important to me do not drive an energy efficient vehicle (greater than 33 mpg).	13	33	55	37	30	168	2.77	1.18
13.	Most people important to me do not use a programmable thermostat.	23	41	76	18	9	167	3.31	1.02

Please indicate the likelihood that others think you should participate in the behavior expressed in each of the following statements by clicking on the

		Unlikely				Likely	N	M	Std
		1	2	3	4	5			
1.	Most people important to me think I should use energy efficient light bulbs.	20.9%	14.0%	30.8%	20.9%	12.2%	170	2.89	1.30
2.	Most people important to me think I should use the AFIT hallway recycle containers.	14.0	7.6	25.0	26.2	26.2	170	3.44	1.34
3.	Most people important to me think I should not use energy efficient appliances (e.g. Energy Star).	39.5	18.6	21.5	11.0	8.1	170	3.71	1.32
4.	Most people important to me think I should not use a composter or compost pile.	40.7	16.3	32.0	4.1	5.8	170	3.83	1.19
5.	Most people important to me think I should drive an energy efficient vehicle (greater than 33 mpg).	22.7	17.4	32.6	14.5	11.6	170	2.75	1.29
6.	Most people important to me think I should use a programmable thermostat.	19.2	8.7	35.5	18.6	16.3	169	3.04	1.32

Please indicate the extent to which you agree with each statement by clicking on the appropriate response.

		Disagree				Agree	N	M	Std
		1	2	3	4	5			
8.	Most people important to me do not use energy efficient light bulbs.	12.2	25.6	37.8	16.9	5.8	169	3.22	1.06
9.	Most people important to me do not use the AFIT hallway recycle containers.	24.4	27.3	27.9	8.1	10.5	169	3.48	1.25
10.	Most people important to me use energy efficient appliances (e.g. Energy Star).	2.9	10.5	45.9	27.9	10.5	168	3.33	0.91
11.	Most people important to me use a composter or compost pile.	43.0	22.1	23.3	5.8	4.1	169	2.04	1.14
12.	Most people important to me do not drive an energy efficient vehicle (greater than 33 mpg).	7.6	19.2	32.0	21.5	17.4	168	2.77	1.18
13.	Most people important to me do not use a programmable thermostat.	13.4	23.8	44.2	10.5	5.2	167	3.31	1.02

Perceived Behavioral Control Questions

Please indicate the relative ease/difficulty (based on access and availability) associated with performing the behavior expressed in each statement below by clicking on the appropriate response.

		Easy				Difficult	N	M	Std
		1	2	3	4	5			
1.	I use energy efficient light bulbs.	126	28	8	7	1	170	4.59	0.81
2.	I use the AFIT hallway recycle containers.	139	18	7	4	2	170	4.69	0.76
3.	I use energy efficient appliances (e.g. Energy Star).	42	40	51	23	14	170	3.43	1.23
4.	I use a composter or compost pile.	7	3	33	48	76	167	1.90	1.05
5.	I drive an energy efficient vehicle (greater than 33 mpg).	12	21	45	49	42	169	2.48	1.20
6.	I use a programmable thermostat.	64	39	31	18	17	169	3.68	1.34

Please indicate how simple/complicated it would be to adapt your lifestyle to include the behavior expressed in each statement below by clicking on the appropriate response.

		Simple				Complicated	N	M	Std
		1	2	3	4	5			
8.	I use energy efficient light bulbs.	137	23	5	4	0	169	4.734	0.632
9.	I use the AFIT hallway recycle containers.	149	9	8	3	0	169	4.799	0.603
10.	I use energy efficient appliances (e.g. Energy Star).	53	31	45	27	13	169	3.497	1.292
11.	I use a composter or compost pile.	7	15	37	47	62	168	2.155	1.142
12.	I drive an energy efficient vehicle (greater than 33 mpg).	27	17	30	41	54	169	2.538	1.435
13.	I use a programmable thermostat.	79	36	24	15	15	169	3.882	1.327

Please indicate the relative ease/difficulty (based on access and availability) associated with performing the behavior expressed in each statement below by clicking on the appropriate response.

		Easy				Difficult	N	M	Std
		1	2	3	4	5			
1.	I use energy efficient light bulbs.	73.2%	16.3%	4.7%	4.1%	0.6%	170	4.59	0.81
2.	I use the AFIT hallway recycle containers.	80.8	10.5	4.1	2.3	1.2	170	4.69	0.76
3.	I use energy efficient appliances (e.g. Energy Star).	24.4	23.3	29.7	13.4	8.1	170	3.43	1.23
4.	I use a composter or compost pile.	4.1	1.7	19.2	27.9	44.2	167	1.90	1.05
5.	I drive an energy efficient vehicle (greater than 33 mpg).	7.0	12.2	26.2	28.5	24.4	169	2.48	1.20
6.	I use a programmable thermostat.	37.2	22.7	18.0	10.5	9.9	169	3.68	1.34

Please indicate how simple/complicated it would be to adapt your lifestyle to include the behavior expressed in each statement below by clicking on the appropriate response.

		Simple				Complicated	N	M	Std
		1	2	3	4	5			
8.	I use energy efficient light bulbs.	79.7	13.4	2.9	2.3	0.0	169	4.734	0.632
9.	I use the AFIT hallway recycle containers.	86.6	5.2	4.7	1.7	0.0	169	4.799	0.603
10.	I use energy efficient appliances (e.g. Energy Star).	30.8	18.0	26.2	15.7	7.6	169	3.497	1.292
11.	I use a composter or compost pile.	4.1	8.7	21.5	27.3	36.0	168	2.155	1.142
12.	I drive an energy efficient vehicle (greater than 33 mpg).	15.7	9.9	17.4	23.8	31.4	169	2.538	1.435
13.	I use a programmable thermostat.	45.9	20.9	14.0	8.7	8.7	169	3.882	1.327

Behavioral Intentions Questions

Please indicate the likelihood of the intentions expressed in each of the following statements by clicking on the appropriate response.

		Unlikely				Likely	N	M	Std
		1	2	3	4	5			
1.	I do not intend to use energy efficient light bulbs.	104	18	15	12	18	167	4.07	1.41
2.	I do not intend to use the AFIT hallway recycle containers.	127	22	5	1	11	166	4.52	1.07
3.	I intend to use energy efficient appliances (e.g. Energy Star).	21	16	29	38	62	166	3.63	1.39
4.	I do not intend to use a composter	24	17	28	25	72	166	2.37	1.48
5.	I intend to drive an energy efficient vehicle (greater than 33 mpg).	36	36	33	23	38	166	2.95	1.47
6.	I intend to use a programmable thermostat.	24	6	27	33	77	167	3.80	1.42

Please indicate the level of determination associated with the intentions expressed in each of the following statements by clicking on the appropriate

		Undetermined				Determined	N	M	Std
		1	2	3	4	5			
8.	I will use energy efficient light bulbs.	19	13	30	44	61	167	3.69	1.34
9.	I will use the AFIT hallway recycle containers.	10	1	25	38	92	166	4.21	1.11
10.	I will not use energy efficient appliances (e.g. Energy Star).	53	34	45	15	21	168	3.49	1.35
11.	I will use a composter or compost pile.	70	20	43	19	15	167	2.34	1.36
12.	I will not drive an energy efficient vehicle (greater than 33 mpg).	44	30	54	20	20	168	3.35	1.31
13.	I will not use a programmable thermostat.	64	34	39	13	18	168	3.67	1.34

Please indicate the likelihood of the intentions expressed in each of the following statements by clicking on the appropriate response.

		Unlikely				Likely	N	M	Std
		1	2	3	4	5			
1.	I do not intend to use energy efficient light bulbs.	60.5%	10.5%	8.7%	7.0%	10.5%	167	4.07	1.41
2.	I do not intend to use the AFIT hallway recycle containers.	73.8	12.8	2.9	0.6	6.4	166	4.52	1.07
3.	I intend to use energy efficient appliances (e.g. Energy Star).	12.2	9.3	16.9	22.1	36.0	166	3.63	1.39
4.	I do not intend to use a composter	14.0	9.9	16.3	14.5	41.9	166	2.37	1.48
5.	I intend to drive an energy efficient vehicle (greater than 33 mpg).	20.9	20.9	19.2	13.4	22.1	166	2.95	1.47
6.	I intend to use a programmable thermostat.	14.0	3.5	15.7	19.2	44.8	167	3.80	1.42

Please indicate the level of determination associated with the intentions expressed in each of the following statements by clicking on the appropriate

		Undetermined				Determined	N	M	Std
		1	2	3	4	5			
8.	I will use energy efficient light bulbs.	11.0	7.6	17.4	25.6	35.5	167	3.69	1.34
9.	I will use the AFIT hallway recycle containers.	5.8	0.6	14.5	22.1	53.5	166	4.21	1.11
10.	I will not use energy efficient appliances (e.g. Energy Star).	30.8	19.8	26.2	8.7	12.2	168	3.49	1.35
11.	I will use a composter or compost pile.	40.7	11.6	25.0	11.0	8.7	167	2.34	1.36
12.	I will not drive an energy efficient vehicle (greater than 33 mpg).	25.6	17.4	31.4	11.6	11.6	168	3.35	1.31
13.	I will not use a programmable thermostat.	37.2	19.8	22.7	7.6	10.5	168	3.67	1.34

Behavior Questions

Please indicate how frequently you engage in the behavior expressed in each of the following statements by clicking on the appropriate response

		1	2	3	4	5	N	M	Std
1.	I use energy efficient light bulbs.	12	22	38	76	24	172	3.45	1.10
2.	I use the AFIT hallway recycle containers.	4	6	14	75	73	172	4.20	0.90
3.	I use energy efficient appliances (e.g. Energy Star).	4	14	36	88	30	172	3.73	0.92
4.	I use a composter or compost pile.	111	30	16	11	2	170	1.61	0.98
5.	I drive an energy efficient vehicle (greater than 33 mpg).	91	18	15	28	20	172	2.23	1.51
6.	I use a programmable thermostat.	40	11	17	26	78	172	3.53	1.64

1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Often, 5 = Always

Please indicate how frequently you engage in the behavior expressed in each of the following statements by clicking on the appropriate response

		1	2	3	4	5	N	M	Std
1.	I use energy efficient light bulbs.	7.0	12.8%	22.1%	44.2%	14.0%	172	3.45	1.10
2.	I use the AFIT hallway recycle containers.	2.3	3.5	8.1	43.6	42.4	172	4.20	0.90
3.	I use energy efficient appliances (e.g. Energy Star).	2.3	8.1	20.9	51.2	17.4	172	3.73	0.92
4.	I use a composter or compost pile.	64.5	17.4	9.3	6.4	1.2	170	1.61	0.98
5.	I drive an energy efficient vehicle (greater than 33 mpg).	52.9	10.5	8.7	16.3	11.6	172	2.23	1.51
6.	I use a programmable thermostat.	23.3	6.4	9.9	15.1	45.3	172	3.53	1.64

1 = Never, 2 = Seldom, 3 = Occasionally, 4 = Often, 5 = Always

Appendix E: Factor Analysis

NEP Scale

		Factors			
		1	2	3	4
NEP1	(Limits)	**0.74**	0.05	-0.02	-0.17
NEP2	(Anti-Anthro)	0.34	**0.65**	-0.26	0.11
NEP3	(Balance)	**0.57**	0.33	-0.10	0.10
NEP4	(Anti-Exempt)	**0.48**	0.07	0.38	0.41
NEP5	(Eco-Crisis)	**0.68**	0.32	0.22	0.09
NEP6	(Limits)	**0.65**	-0.06	0.10	0.19
NEP7	(Anti-Anthro)	0.09	**0.75**	0.18	-0.02
NEP8	(Balance)	**0.65**	0.32	0.06	0.04
NEP9	(Anti-Exempt)	0.04	0.13	**0.90**	-0.03
NEP10	(Eco-Crisis)	**0.76**	0.32	0.07	-0.02
NEP11	(Limits)	**0.76**	0.09	-0.01	-0.04
NEP12	(Anti-Anthro)	0.21	**0.66**	0.15	0.03
NEP13	(Balance)	**0.62**	0.35	0.03	-0.08
NEP14	(Anti-Exempt)	-0.11	0.05	-0.05	**0.91**
NEP15	(Eco-Crisis)	**0.76**	0.35	0.04	-0.13
Eigenvalue (Extraction)		5.76	1.25	1.07	1.03
Percentage of variance		38.39	8.3	7.16	6.87
Eigenvalue (Rotation)		4.71	2.12	1.15	1.12
Percentage of variance		31.40	14.15	7.69	7.48

Note: Loadings in bold represent strongest loadings for each item and green shows all loadings greater than 0.30

Communalities

	Initial	Extraction
Q1	1.000	.576
Q2	1.000	.621
Q3	1.000	.456
Q4	1.000	.548
Q5	1.000	.616
Q6	1.000	.475
Q7	1.000	.600
Q8	1.000	.537
Q9	1.000	.824
Q10	1.000	.683
Q11	1.000	.592
Q12	1.000	.499
Q13	1.000	.517
Q14	1.000	.847
Q15	1.000	.718

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.758	38.388	38.388	5.758	38.388	38.388	4.710	31.397	31.397
2	1.245	8.302	46.690	1.245	8.302	46.690	2.123	14.151	45.548
3	1.074	7.158	53.848	1.074	7.158	53.848	1.153	7.687	53.235
4	1.030	6.870	60.718	1.030	6.870	60.718	1.122	7.483	60.718
5	.827	5.515	66.232						
6	.797	5.316	71.548						
7	.739	4.925	76.473						
8	.599	3.991	80.464						
9	.541	3.605	84.070						
10	.534	3.562	87.631						
11	.502	3.344	90.975						
12	.441	2.942	93.917						
13	.381	2.539	96.456						
14	.308	2.052	98.508						
15	.224	1.492	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component			
	1	2	3	4
Q1	.663	-.354	.100	-.038
Q2	.574	.166	-.424	.290
Q3	.647	-.020	-.064	.181
Q4	.513	.290	.447	.018
Q5	.770	.082	.113	-.057
Q6	.560	-.109	.372	.106
Q7	.443	.438	-.436	-.144
Q8	.732	-.015	.010	.028
Q9	.198	.462	.302	-.693
Q10	.822	-.084	.017	-.003
Q11	.710	-.258	.139	.048
Q12	.506	.361	-.325	-.079
Q13	.709	-.075	-.087	-.026
Q14	-.048	.593	.332	.619
Q15	.830	-.148	-.062	-.056

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Q1	.738	.047	-.017	-.168
Q2	.341	.652	-.258	.112
Q3	.571	.333	-.098	.098
Q4	.479	.073	.381	.410
Q5	.675	.319	.222	.091
Q6	.650	-.064	.098	.195
Q7	.088	.749	.177	-.018
Q8	.654	.323	.063	.039
Q9	.038	.128	.897	-.029
Q10	.758	.323	.067	-.017
Q11	.763	.092	-.013	-.035
Q12	.210	.657	.148	.032
Q13	.622	.350	.029	-.078
Q14	-.111	.051	-.045	.911
Q15	.760	.350	.043	-.126

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Component Transformation Matrix

Component	1	2	3	4
1	.878	.462	.118	.034
2	-.366	.530	.474	.600
3	.297	-.711	.440	.462
4	.081	-.008	-.753	.652

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

TPB Components

Att1

Communalities

	Initial	Extraction
Q22	1.000	.547
Q23	1.000	.526
Q24	1.000	.662
Q25	1.000	.405
Q26	1.000	.636
Q27	1.000	.548

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.324	55.405	55.405	3.324	55.405	55.405
2	.822	13.707	69.111			
3	.684	11.402	80.514			
4	.529	8.815	89.328			
5	.365	6.091	95.419			
6	.275	4.581	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Q22	.740
Q23	.725
Q24	.813
Q25	.636
Q26	.798
Q27	.740

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Att2

Rotated Component Matrix[a]

	Component	
	1	2
Q28	.018	.760
Q29	.870	-.055
Q30	.886	-.148
Q31	-.106	.435
Q32	.591	.030
Q33	.016	.821

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Communalities

	Initial	Extraction
Q28	1.000	.579
Q29	1.000	.759
Q30	1.000	.807
Q31	1.000	.200
Q32	1.000	.350
Q33	1.000	.674

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.968	32.796	32.796	1.968	32.796	32.796	1.903	31.716	31.716
2	1.402	23.368	56.164	1.402	23.368	56.164	1.467	24.448	56.164
3	.967	16.114	72.278						
4	.835	13.914	86.191						
5	.558	9.303	95.494						
6	.270	4.506	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q28	-.241	.722
Q29	.837	.243
Q30	.884	.161
Q31	-.247	.373
Q32	.546	.229
Q33	-.263	.778

Extraction Method: Principal Component Analysis.
a. 2 components extracted.

Component Transformation Matrix

Component	1	2
1	.941	-.338
2	.338	.941

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Att

Communalities

	Initial	Extraction
Q22	1.000	.589
Q23	1.000	.542
Q24	1.000	.626
Q25	1.000	.433
Q26	1.000	.651
Q27	1.000	.552
Q28	1.000	.569
Q29	1.000	.755
Q30	1.000	.808
Q31	1.000	.288
Q32	1.000	.376
Q33	1.000	.712

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.525	29.373	29.373	3.525	29.373	29.373	3.479	28.993	28.993
2	1.987	16.562	45.935	1.987	16.562	45.935	1.940	16.167	45.160
3	1.390	11.580	57.515	1.390	11.580	57.515	1.483	12.355	57.515
4	.998	8.318	65.833						
5	.933	7.779	73.612						
6	.806	6.714	80.326						
7	.657	5.478	85.804						
8	.459	3.824	89.628						
9	.422	3.516	93.144						
10	.350	2.913	96.057						
11	.255	2.121	98.178						
12	.219	1.822	100.000						

Component Matrix[a]

	Component		
	1	2	3
Q22	.761	-.011	-.100
Q23	.706	.059	-.200
Q24	.783	.030	-.105
Q25	.632	-.131	-.128
Q26	.803	.080	.007
Q27	.737	.082	.052
Q28	.434	-.189	.587
Q29	-.021	.841	.218
Q30	-.095	.880	.156
Q31	-.043	-.248	.474
Q32	.180	.565	.156
Q33	.117	-.234	.802

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix[a]

	Component		
	1	2	3
Q22	.767	-.014	.016
Q23	.729	.023	-.105
Q24	.791	.025	.003
Q25	.643	-.141	.007
Q26	.794	.105	.098
Q27	.722	.117	.131
Q28	.342	.002	.672
Q29	-.045	.867	-.039
Q30	-.108	.884	-.120
Q31	-.114	-.103	.514
Q32	.160	.592	.010
Q33	-.004	.010	.844

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

Component Transformation Matrix

Component	1	2	3
1	.989	.033	.142
2	.009	.957	-.288
3	-.146	.287	.947

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Sub1

Communalities

	Initial	Extraction
Q34	1.000	.728
Q35	1.000	.685
Q36	1.000	.282
Q37	1.000	.247
Q38	1.000	.608
Q39	1.000	.714

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.264	54.399	54.399	3.264	54.399	54.399
2	.953	15.888	70.287			
3	.707	11.776	82.063			
4	.484	8.068	90.131			
5	.321	5.343	95.474			
6	.272	4.526	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Q34	.853
Q35	.828
Q36	-.531
Q37	-.497
Q38	.780
Q39	.845

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Sub2

Communalities

	Initial	Extraction
Q40	1.000	.522
Q41	1.000	.584
Q42	1.000	.407
Q43	1.000	.715
Q44	1.000	.364
Q45	1.000	.537

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.065	34.423	34.423	2.065	34.423	34.423	1.763	29.380	29.380
2	1.065	17.745	52.168	1.065	17.745	52.168	1.367	22.788	52.168
3	.883	14.710	66.878						
4	.798	13.297	80.176						
5	.622	10.361	90.537						
6	.568	9.463	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q40	.691	.213
Q41	.708	-.288
Q42	-.427	.474
Q43	.247	.809
Q44	.560	.224
Q45	.727	-.091

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q40	.460	.558
Q41	.750	.149
Q42	-.617	.161
Q43	-.238	
Q44	.344	.495
Q45	.658	.324

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.835	.550
2	-.550	.835

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Sub

Communalities

	Initial	Extraction
Q34	1.000	.754
Q35	1.000	.783
Q36	1.000	.386
Q37	1.000	.306
Q38	1.000	.615
Q39	1.000	.759
Q40	1.000	.481
Q41	1.000	.629
Q42	1.000	.320
Q43	1.000	.621
Q44	1.000	.412
Q45	1.000	.557

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.565	29.706	29.706	3.565	29.706	29.706	3.330	27.752	27.752
2	1.949	16.241	45.947	1.949	16.241	45.947	2.013	16.777	44.529
3	1.111	9.262	55.209	1.111	9.262	55.209	1.282	10.680	55.209
4	.956	7.963	63.172						
5	.851	7.088	70.260						
6	.824	6.869	77.129						
7	.708	5.903	83.032						
8	.637	5.306	88.338						
9	.595	4.958	93.296						
10	.317	2.643	95.939						
11	.282	2.349	98.288						
12	.205	1.712	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component		
	1	2	3
Q34	.852	-.168	-.008
Q35	.798	-.179	.340
Q36	-.531	.038	.320
Q37	-.461	.225	.209
Q38	.739	-.262	.012
Q39	.840	-.106	.208
Q40	.413	.542	-.129
Q41	.253	.675	.330
Q42	.096	-.553	-.070
Q43	.251	.129	-.736
Q44	.207	.506	-.336
Q45	.328	.654	.150

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix[a]

	Component		
	1	2	3
Q34	.846	.064	.187
Q35	.862	.121	-.161
Q36	-.449	-.028	-.428
Q37	-.461	.139	-.273
Q38	.773	-.049	.124
Q39	.855	.169	-.012
Q40	.195	.585	.317
Q41	.090	.776	-.137
Q42	.247	-.509	-.005
Q43	.060	.013	.786
Q44	-.023	.449	.458
Q45	.133	.733	.048

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3
1	.934	.261	.244
2	-.307	.936	.171
3	.183	.235	-.955

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

PBC1

Communalities

	Initial	Extraction
Q46	1.000	.666
Q47	1.000	.698
Q48	1.000	.425
Q49	1.000	.522
Q50	1.000	.511
Q51	1.000	.370

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.909	31.816	31.816	1.909	31.816	31.816	1.652	27.534	27.534
2	1.282	21.375	53.190	1.282	21.375	53.190	1.539	25.656	53.190
3	.877	14.621	67.811						
4	.749	12.481	80.292						
5	.694	11.559	91.851						
6	.489	8.149	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q46	.639	-.508
Q47	.668	-.502
Q48	.581	.296
Q49	.294	.660
Q50	.515	.496
Q51	.605	.063

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q46	.816	.019
Q47	.834	.043
Q48	.257	.599
Q49	-.197	.695
Q50	.078	.711
Q51	.424	.436

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.768	.640
2	-.640	.768

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

PBC2

Communalities

	Initial	Extraction
Q52	1.000	.721
Q53	1.000	.741
Q54	1.000	.605
Q55	1.000	.522
Q56	1.000	.530
Q57	1.000	.315

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.106	35.103	35.103	2.106	35.103	35.103	1.877	31.283	31.283
2	1.329	22.149	57.252	1.329	22.149	57.252	1.558	25.969	57.252
3	.847	14.109	71.361						
4	.709	11.816	83.177						
5	.589	9.822	92.998						
6	.420	7.002	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q52	.556	.642
Q53	.523	.684
Q54	.706	-.327
Q55	.498	-.523
Q56	.689	-.235
Q57	.551	-.111

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q52	.118	.841
Q53	.068	.858
Q54	.770	.108
Q55	.702	-.169
Q56	.706	.177
Q57	.523	.206

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.840	.543
2	-.543	.840

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

PBC

Communalities

	Initial	Extraction
Q46	1.000	.591
Q47	1.000	.735
Q48	1.000	.799
Q49	1.000	.775
Q50	1.000	.855
Q51	1.000	.884
Q52	1.000	.647
Q53	1.000	.694
Q54	1.000	.867
Q55	1.000	.826
Q56	1.000	.817
Q57	1.000	.824

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.333	27.773	27.773	3.333	27.773	27.773	2.616	21.796	21.796
2	2.238	18.653	46.426	2.238	18.653	46.426	1.704	14.202	35.998
3	1.468	12.231	58.657	1.468	12.231	58.657	1.683	14.021	50.019
4	1.251	10.427	69.084	1.251	10.427	69.084	1.669	13.905	63.925
5	1.024	8.532	77.616	1.024	8.532	77.616	1.643	13.691	77.616
6	.818	6.820	84.436						
7	.629	5.241	89.677						
8	.412	3.434	93.111						
9	.290	2.416	95.527						
10	.210	1.752	97.279						
11	.205	1.707	98.986						
12	.122	1.014	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component				
	1	2	3	4	5
Q46	.538	-.512	-.075	.183	.023
Q47	.601	-.607	-.025	.011	.065
Q48	.532	.293	.142	-.521	.372
Q49	.364	.512	-.179	.571	.148
Q50	.517	.292	-.346	-.163	-.597
Q51	.476	.058	.758	.075	-.272
Q52	.583	-.480	-.253	.096	.056
Q53	.592	-.553	-.124	.021	.145
Q54	.560	.445	.002	-.438	.405
Q55	.354	.535	-.176	.559	.266
Q56	.604	.365	-.361	-.186	-.392
Q57	.527	.129	.689	.197	-.126

Extraction Method: Principal Component Analysis.

a. 5 components extracted.

Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
Q46	.754	.122	-.055	.050	.043
Q47	.836	.141	.072	-.104	.028
Q48	.083	.157	.870	.005	.108
Q49	-.002	.082	.047	.861	.157
Q50	.083	.071	.065	.078	.913
Q51	.088	.928	.087	-.026	.081
Q52	.788	-.034	.033	.064	.142
Q53	.823	.035	.117	-.026	.023
Q54	.035	.064	.890	.191	.184
Q55	-.011	.047	.125	.896	.077
Q56	.115	.035	.254	.187	.838
Q57	.120	.873	.134	.171	.023

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Component Transformation Matrix

Component	1	2	3	4	5
1	.640	.383	.427	.287	.423
2	-.718	.085	.349	.509	.311
3	-.194	.858	.080	-.218	-.416
4	.136	.166	-.619	.722	-.220
5	.139	-.288	.553	.298	-.709

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Int1

Communalities

	Initial	Extraction
Q58	1.000	.644
Q59	1.000	.687
Q60	1.000	.701
Q61	1.000	.229
Q62	1.000	.468
Q63	1.000	.613

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.964	32.738	32.738	1.964	32.738	32.738	1.881	31.342	31.342
2	1.378	22.972	55.710	1.378	22.972	55.710	1.462	24.369	55.710
3	.960	16.000	71.710						
4	.722	12.028	83.739						
5	.583	9.708	93.447						
6	.393	6.553	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q58	.413	.688
Q59	.359	.747
Q60	.822	-.159
Q61	.200	-.435
Q62	.610	-.309
Q63	.759	-.193

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q58	.123	.793
Q59	.050	.827
Q60	.821	.164
Q61	.349	-.327
Q62	.682	-.055
Q63	.775	.108

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.926	.378
2	-.378	.926

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Int2

Communalities

	Initial	Extraction
Q64	1.000	.705
Q65	1.000	.648
Q66	1.000	.700
Q67	1.000	.156
Q68	1.000	.550
Q69	1.000	.685

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.867	31.123	31.123	1.867	31.123	31.123	1.854	30.899	30.899
2	1.576	26.272	57.395	1.576	26.272	57.395	1.590	26.497	57.395
3	.994	16.571	73.966						
4	.616	10.266	84.232						
5	.548	9.133	93.365						
6	.398	6.635	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q64	-.190	.818
Q65	-.043	.804
Q66	.835	-.052
Q67	-.216	.331
Q68	.638	.378
Q69	.824	.078

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q64	-.009	.840
Q65	.131	.794
Q66	.804	-.231
Q67	-.139	.370
Q68	.704	.232
Q69	.822	-.102

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.977	-.215
2	.215	.977

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Int

Communalities

	Initial	Extraction
Q58	1.000	.582
Q59	1.000	.544
Q60	1.000	.739
Q61	1.000	.718
Q62	1.000	.443
Q63	1.000	.693
Q64	1.000	.652
Q65	1.000	.496
Q66	1.000	.712
Q67	1.000	.606
Q68	1.000	.534
Q69	1.000	.685

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.892	24.104	24.104	2.892	24.104	24.104	2.105	17.538	17.538
2	1.949	16.245	40.348	1.949	16.245	40.348	1.907	15.894	33.432
3	1.536	12.796	53.145	1.536	12.796	53.145	1.810	15.079	48.512
4	1.026	8.546	61.691	1.026	8.546	61.691	1.582	13.179	61.691
5	.939	7.826	69.517						
6	.864	7.197	76.714						
7	.750	6.246	82.960						
8	.602	5.014	87.974						
9	.508	4.234	92.208						
10	.423	3.527	95.735						
11	.338	2.817	98.552						
12	.174	1.448	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component			
	1	2	3	4
Q58	.425	.525	-.348	.065
Q59	.383	.363	-.467	.219
Q60	.678	-.183	.042	-.494
Q61	.317	-.046	.648	.442
Q62	.557	-.045	.313	-.180
Q63	.647	-.160	.019	-.498
Q64	.478	.650	.025	.012
Q65	.479	.481	-.085	.164
Q66	.397	-.677	-.168	.260
Q67	.281	.172	.699	.091
Q68	.584	-.290	-.007	.330
Q69	.490	-.502	-.389	.203

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Rotated Component Matrix[a]

	Component			
	1	2	3	4
Q58	.751	.002	.093	-.097
Q59	.689	.201	-.040	-.165
Q60	.093	.193	.832	.027
Q61	-.005	.190	-.031	.825
Q62	.103	.109	.538	.362
Q63	.102	.169	.809	-.002
Q64	.720	-.199	.199	.231
Q65	.673	.021	.096	.181
Q66	-.166	.815	.138	.014
Q67	.036	-.158	.181	.740
Q68	.172	.634	.169	.273
Q69	.079	.788	.183	-.154

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3	4
1	.525	.480	.635	.301
2	.732	-.657	-.153	.094
3	-.369	-.320	.139	.862
4	.228	.485	-.745	.398

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Beh

Communalities

	Initial	Extraction
Q16	1.000	.467
Q17	1.000	.526
Q18	1.000	.575
Q19	1.000	.581
Q20	1.000	.291
Q21	1.000	.358

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.723	28.722	28.722	1.723	28.722	28.722	1.518	25.298	25.298
2	1.076	17.931	46.653	1.076	17.931	46.653	1.281	21.354	46.653
3	.928	15.470	62.123						
4	.831	13.845	75.968						
5	.796	13.265	89.234						
6	.646	10.766	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component	
	1	2
Q16	.676	-.099
Q17	.522	-.504
Q18	.689	-.317
Q19	.387	.657
Q20	.478	.250
Q21	.375	.466

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Rotated Component Matrix[a]

	Component	
	1	2
Q16	.615	.299
Q17	.715	-.123
Q18	.748	.126
Q19	-.050	.761
Q20	.254	.476
Q21	.048	.597

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Component Transformation Matrix

Component	1	2
1	.826	.563
2	-.563	.826

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Appendix F: Cronbach's Alpha

NEP Scale

Case Processing Summary

		N	%
Cases	Valid	170	98.8
	Excluded[a]	2	1.2
	Total	172	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.867	15

Attitude Items

Case Processing Summary

		N	%
Cases	Valid	163	94.8
	Excluded[a]	9	5.2
	Total	172	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.628	12

Subjective Norm Items

Case Processing Summary

		N	%
Cases	Valid	165	95.9
	Excluded[a]	7	4.1
	Total	172	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.534	12

Perceived Behavioral Control Items

Case Processing Summary

		N	%
Cases	Valid	166	96.5
	Excluded[a]	6	3.5
	Total	172	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.750	12

Behavioral Intentions Items

Case Processing Summary

		N	%
Cases	Valid	161	93.6
	Excluded[a]	11	6.4
	Total	172	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.699	12

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14. ABSTRACT

To be sustainable an organization must be balanced in the three principles of economy, environment, and society. Advances in pro-environmental technology have overcome roadblocks limiting the economic and environmental principles. The remaining hurdle to becoming sustainable is having society's beliefs and behaviors aligned. Understanding the interaction between an individual's environmental belief and environmental behaviors is essential to bringing them into alignment. To explore this relationship a model was used that included the new ecological paradigm (NEP) scale and a generalized version of the theory of planned behavior (TPB). The attitudes, intentions, and use of six pro-environmental products were measured in an electronic survey. It was found that the model was adequate in measuring the general attitudes, intentions, and behaviors of individuals. In addition, environmental concern was shown to correlate with the attitudes of and individual. It was also found that the survey questionnaire should be modified to strengthen the relationships found.

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