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Environmental Identity and Social Networks as Predictors of
Environmentally-Friendly Behaviors

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An abstract of

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Abstract

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By Lesley Watson

In an effort to understand why some university students engage in environmentally-friendly behaviors while others do not, I examine the independent and combined effects of environmental identity and behavior modeling by family and friends on the frequency of reported environmentally-friendly behaviors among entering freshmen. To do this, I use regression analysis on survey data collected from 133 undergraduate students at a private, Southeastern university. Three separate facets of environmentally-friendly behavior emerge: activism, conservation, and recycling. The findings reveal that environmental identity has consistent, positive effects on all types of behaviors. The effects of behavior modeling by friends and family, however, vary across the three different types of environmentally-friendly behaviors. These findings are useful in providing policy suggestions for universities seeking to encourage their student bodies to engage in environmentally-friendly and sustainable behaviors.

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Across the United States, both in places of business and homes, there is a trend toward an increased emphasis on environmental conscientiousness and sustainability. This trend has also gained considerable momentum on college and university campuses. Indeed, recent research conducted on university campuses focuses on the impact of university energy use and waste production on the community in which it resides (Venetoulis 2001), and the impact of energy-efficient dorm rooms (Kahler 2003) and educational programming on sustainability (Marcell, Agyeman, and Rappaport 2004) on overall energy consumption by students. A key question for campus administrators that these and other studies address is: why do some students act in environmentally conscious ways and others do not?

One response to this question draws upon the social psychology of attitudes (Ajzen 1985; 1988), suggesting that strong attitudes about the environment may foster environmentally-friendly behaviors such as recycling or conservation. Previous research shows, however, that because environmentally-friendly attitudes have become so widespread in western culture, these attitudes are often weakly correlated with corresponding environmentally-friendly behaviors (Derksen and Gartrell 1993; Oskamp et al. 1991; Rokicka 2002). As a result of this weak connection, researchers are examining other factors that may also predict environmentally-friendly behavior. One such key factor is environmental identity. Environmental identity represents a social understanding of who people are in relation to the natural environment, and how they interact with the natural environment. While individuals with strong environmental identities will likely have pro-environmental attitudes, attitudes refer to the natural

world as an object, while identities refer to the relationship between the natural world and the self (Stets and Biga 2003). Recent studies show that environmental identity has a positive, independent effect on environmentally-friendly behavior even when controlling for environmental attitudes (Clayton 2003; Sparks and Shepherd 1992; Stets and Biga 2003).

In addition to identity, research shows that influence from individuals' family and friends plays a role in determining behavior (Biddle, Bank, and Marlin 1980). While most research on social networks focuses on their influence on deviant behavior such as drinking or drug use, family and friends also exert influence on non-deviant behaviors (Corsaro and Eder 1995), such as environmentally-friendly behaviors. Specifically, behavior modeling by an individual's family and friends may moderate the impact of environmental identity on behavior such that behavior modeling will have more of an effect when environmental identity is weak. By looking at behaviors modeled by an individual's family and friends, we can gain a better understanding of how influence from different social networks may differentially affect environmentally-friendly behavior, and in so doing we can further the literature on the role of social networks in influencing non-deviant behaviors among adolescents.

In order to examine these antecedents of environmentally-friendly behavior, I draw upon survey data collected as a part of a larger longitudinal study of incoming freshmen in two different types of dorms at a southeastern university: "green" dorms and conventional dorms. The "green" dorms, built in accordance with U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards, opened in

Fall, 2008. These dorms save on energy and water, use renewable materials, and provide improved air quality. They also provide programming on environmentally-friendly behavior and encourage it among the residents. The conventional dorms were built prior to the establishment of LEED standards and do not have sustainability-specific programming for residents. For this paper, I utilize cross-sectional survey data on students' environmental attitudes, identities, and behaviors, and the students' perceptions of environmental behavior modeling by their friends and family, collected in the summer before their freshman year on campus.

I begin with a general discussion of the relationship between identity and behavior. I then examine how family and friends may exert influence through behavior modeling. Finally, I explore the moderating effect of behavior modeling by friends and family on the relationship between environmental identity and environmentally-friendly behavior.

BACKGROUND LITERATURE AND HYPOTHESES

Identity and Behavior

Identity refers to the set of meanings attached to the self that is a reference point and a guide for behavior in situations (Gecas and Burke 1995; Stets and Biga 2003). Individuals have many identities (Stryker and Burke 2000), and one of these identities is environmental identity. As previously stated, environmental identity consists of who a person is in relation to the natural environment, and how he or she interacts with it (Stets and Biga 2003). As such, a person has an environmental identity regardless of whether or not he or she identifies as pro-environmental, because individuals must relate and interact with the natural environment. I will refer to individuals who are

highly pro-environmental as having a *strong* environmental identity, and those individuals who identify less with the natural environment as having a *weak* or *moderate* environmental identity.

The connection between identity and behavior is well-formulated theoretically. People form, maintain, and confirm identities through interaction and as such, identities can serve as a motivation for action – particularly for actions that will confirm the identity (Burke and Reitzes 1981; 1991). Some even argue that identities exist only as potential until they are confirmed through behavior in interaction (Samuelson, Peterson, and Putnam 2003).

Studies directly related to environmentally-friendly behavior and identity show that environmental identity has a significant effect on environmentally-friendly behavior beyond the effect of environmental attitudes alone. For example, Sparks and Shepherd (1992) compared the effects of environmental attitudes and identification with “green” consumerism on environmentally-friendly behavior. They found that identification with green consumerism¹ had a positive, independent effect on behavioral intention to buy organically grown produce. They concluded that, “identification reflects more than an inference from past behavior and acts as more than an index of values concerning external consequences of action” (Sparks and Shepherd 1992: 394). That is, identification with “green” consumerism, or environmental identity, is more than a

¹ Sparks and Shepherd (1992) used two statements to measure identification with green consumerism: “I think of myself as a ‘green consumer;’” and “I think of myself as someone who is very concerned with ‘green issues.’” Self-identity was a composite of these two measures.

product of past behavior, attitudes, or values. While environmental identity may be shaped by past behavior, attitudes, and values, it acts independently to influence consumer behavior. In addition, Clayton's (2003) research shows that environmental identity is a significant predictor of behavior, even with attitudes held constant. In addition, when environmental identity is held constant, the correlation between attitudes and behavior decreases.

This previous research sets the stage for identity theory to take a more prominent place in studies of environmental behavior. Indeed, Stets and Biga (2003) bring identity theory to the foreground. Their findings show that environmental identity has a direct effect on environmentally-friendly behaviors, as well as an indirect effect via pro-environmental attitudes. They also found that controlling for attitudes did not diminish the effect of environmental identity on environmentally-friendly behavior. Based on these findings, they formed a model of behavior where identity shapes attitudes and behaviors, and attitudes and behaviors, in turn, confirm identities.

As shown by Stets and Biga (2003), behavior is a means of confirming identities. Self-verification is the confirmatory process through which individuals compare their identities with how others respond to their behavior (Burke and Stets 1999). People desire consistency between how they see themselves and how others see them (Stets and Burke 2000). In other words, "We desire confirmation from others as to who we are" (Burke and Stets 1999: 352). Two methods of self-verification are interaction strategies (Swann 1987; Burke and Stets 1999) and controlling resources (Freese and

Burke 1994; Burke and Stets 1999)². Interaction strategies refer to behavioral efforts an individual engages in order to elicit identity confirmation from others. Where identity cues are an attempt to “look the part,” interaction strategies are behavioral attempts to appear to fit within an identity (Swann 1987; Stets and Burke 1999). Freese and Burke (1994) integrate the idea of resources into identity theory. Much of what an identity means to people is connected to how they use resources personally and in interaction with others (Freese and Burke 1994; Stets and Burke 2000). For example, stock-brokers self-verify their occupational identities in part through how they manage their own finances, as well as how they manage the monetary resources of their clients. The idea of resources in identity is particularly important in studying environmental identity and environmentally-friendly behavior, given that the behaviors that are categorized as environmentally-friendly deal almost exclusively with how individuals use the Earth’s natural resources.

Since people desire to confirm their identities with others, and this is done primarily through behaviors, I expect that the stronger an individual’s environmental identity, the more likely he or she will exhibit environmentally-friendly behaviors. Therefore, I propose the following hypothesis:

² According to Swann (1987), behavioral activities are only one class of self-verification strategies. The other class consists of cognitive processes in which an individual distorts his or her perception of reality to achieve self-verification of identities. Given the nature of our data, we will not be examining these cognitive strategies.

Hypothesis 1: Environmental identity will be positively related to claims about the frequency of environmentally-friendly behavior, independent of the effect of attitudes.

Behavior Modeling by Social Networks

In addition to examining the effects of environmental identity on environmentally-friendly behavior, I also examine the effects of behavior modeling by social networks. Individuals are exposed to multiple influential social networks at any given time. These networks include peers, family, and, for students, the people they are exposed to at school. Influence, defined broadly, occurs when the presence and pressures of other people and/or social groups affect an individual's behavior (Biddle et al. 1980). When an individual engages with someone in conversation, or witnesses the behavior of others, this helps him or her develop norms, or an understanding of what behavior is appropriate or preferable in a given situation, and these norms guide his or her behavior (Quigley et al. 2006).

Research on adults' environmentally-friendly behaviors finds that having friends and neighbors who recycle is the second best predictor of recycling ("living in a single-family dwelling" is the best predictor) (Oskamp et al. 1991). Another study, while focusing on pro-environmental attitudes rather than environmentally-friendly behaviors, shows that having friends who are interested in environmentally-friendly behavior may stimulate environmentally-friendly attitudes in adults (Rokicka 2002).

Little research examines how social networks influence the environmentally-friendly behaviors of adolescents. Instead, research on adolescents tends to focus on how

parents and peers influence problem behaviors such as smoking cigarettes (Bush, Weinfurt, and Iannotti 1994), drinking (Kandel et al. 1976; Margulies, Kessler, and Kandel 1977; Bush et al. 1994), drug use (Kandel et al. 1976; Bush et al. 1994), aggression (Quigley et al. 2006), or violence in dating relationships (Arriaga and Foshee 2004). While some studies examine non-deviant behaviors such as religious expression (Rosen 1955) or school achievement (Biddle et al. 1980), these are in the minority. By studying the influence of social networks on environmentally-friendly behaviors, I have the opportunity to extend this literature further into the realm of non-deviant behavior. In order to do so, I hypothesize the following:

Hypothesis 2: Behavior modeling by peer and family social networks will have an effect on the frequency of environmentally-friendly behaviors, independent of respondent's environmental identity.

Parents and peers may influence adolescents' behaviors in at least two ways: through the expression of normative standards or through behavior modeling (Biddle et al. 1980). Influence through normative standards occurs when parents or peers express notions of what adolescents should or should not do. Influence through behavior modeling occurs when parents or peers model the appropriate behavior (Kandel and Lesser 1969; Biddle et al. 1980).

Upon reviewing 28 studies on parent/peer influence on adolescents' behaviors, both deviant and non-deviant, and conducting independent research, Biddle et al. (1980) propose that adolescents may be influenced in different ways by parents and peers, depending upon the topic area and the kind of influence they employ. Their review

shows that studies that examine influence through normative standards find parents more influential, while studies that examine influence through behavior modeling find peers more influential. These results hold for deviant behaviors such as drinking and drug use, as well as non-deviant behaviors such as religious observance. Other studies also support the idea that peers are more influential when studying behavior rather than norms (Bush et al. 1994; Arriaga and Foshee 2004).

Several of the studies reviewed by Biddle et al. (1980), as well as more recent research, show that influence can also vary by age. While younger adolescents are more influenced by their parents, peers increase in importance over time so that older adolescents are more influenced by their peers (Bush et al. 1994; see Kandel 1996). Another recent study shows that peers and parents have a similar impact on adolescent behavior so long as the behaviors being modeled are recent, suggesting that the most proximate influences in time and space will have the most impact on adolescent behavior (Quigley et al. 2006). This suggests that as adolescents enter college and leave home, peers will have increasing influence, while parents may have decreasing influence.

While both Oskamp et al. (1991) and Rokicka (2002) find that friends' behaviors are important predictors of environmentally-friendly attitudes and behaviors for adults, they do not compare the effect of friends to the effect of behavior modeling by any other groups, such as family. My study allows for a comparison of the effects of behavior modeling by friends and family on environmentally-friendly behaviors. Given that my research deals with incoming college freshmen, I believe that I can effectively

extend research on peer and parent influence on adolescents through behavior modeling to a population of young adults. Because my study involves asking respondents about the behaviors of their families and friends, rather than their expression of normative standards, it is possible that my results will mirror Biddle et al.'s (1980) findings that peers exert a stronger influence on adolescents through their behaviors than parents. Therefore, I propose the following:

Hypothesis 3: Behavior modeling by individuals' friend networks will have a stronger effect on claims about the frequency of environmentally-friendly behavior than behavior modeling by their parents.

While I hypothesize that environmental identity and behavior modeling by social networks will each have an independent effect on the frequency of environmentally-friendly behaviors, and that peers will be more influential than parents, it is possible that environmental identity and behavior modeling by family and friends will interact in affecting environmentally-friendly behaviors.

The behaviors of an individual's social groups are tied to his or her identity. Some conceptions of identity may even include the norms of the social group. For example, Opatow and Brook's (2003) measure of environmental identity is comprised of personal identity, ecological identity, and social identity, with social identity defined as shared characteristics with others in a network, such as gender, political orientation, or orientation toward nature. This implies that the members of an individual's social network influence his or her environmental identity. To the extent that social networks help shape identities, and behavior is a means of confirming identities (Stets and Biga

2003), influence from social networks may interact with environmental identity to produce a higher frequency of environmentally-friendly behaviors.

Other sources suggest that behavior modeling by an individual's social networks may not increase the likelihood that an individual will act on an identity if the individual's identity is strong. Charng, Pilliavin, and Callero (1988) find that in some cases, once an identity reaches a certain strength, influence from social networks can become a negative predictor of intended behavior. This could be because once people have applied an identity label to themselves, they are sensitive to suggestions that their behaviors are based on social pressure. Instead, they want it to appear that their behavior is their choice, not a manifestation of their peer's behavior. Furthermore, the more certain an individual is of his or her identity or self-concept, the more likely he or she will rely on that identity to guide behavior (Swann 1987), and thus may not need support from social networks or subjective norms to encourage behavior in line with the identity.

Using my data, I examine the moderating effect of influence from social networks on the relationship between identity and behavior. I expect that behavior modeling within individuals' social networks will have a different effect on this relationship based on the strength of his or her environmental identity. When an individual does not have a strong identity, external factors such as influence from social networks will help predict his or her behavior. When an individual has a strong identity, however, it is the identity that will drive his or her behavior, rather than external factors. As such, I hypothesize the following:

Hypothesis 4a: For those with weaker environmental identities, behavioral modeling from friends and family will have a positive effect on the frequency of environmentally-friendly behaviors.

Hypothesis 4b: For those with strong environmental identities, behavioral modeling from friends and family will have no effect on the frequency of environmentally-friendly behaviors.

In order to test these hypotheses, I examine the effects of environmental identity and behavior modeling by friends and family independently. I further examine the results for behavior modeling by social networks to determine the relative strength of the effects of parents and peers. Finally, I test for the effects of social networks on environmentally-friendly behaviors, stratified by level of environmental identity.

METHODS

Sample

In the fall of 2008, the southeastern university from which the sample is drawn opened two new “green” dorms intended solely for freshmen. Future residents were recruited from these two green dorms and two traditional dorms during the summer before their freshman year. Incoming students were mailed an informational letter in the summer of 2008, followed by two emails containing links to the survey – one in the summer, and one at the beginning of the fall semester³. The survey took approximately 15-20 minutes to complete. Respondents were entered in a giveaway for a chance to

³ Only 14 of the respondents participated in the survey after the second round of recruitment. Preliminary analysis indicated no patterns of differences between summer and early fall respondents.

win one of five \$100 Visa gift cards. Question topics included environmentally-friendly behaviors, attitudes and emotions towards the environment, environmental identity, perceived environmentally-friendly behaviors from social networks, perceptions of environmental justice, and demographics.

A total of 158 students participated in the survey, for a response rate of 29%. Of those 158 students, 133 completed the survey in its entirety. While this response rate is somewhat low, the sample reflects the demographics of the incoming freshmen population overall. The entering class is 52% female, 45% Caucasian, 31% Asian, 9% African American, 4% Hispanic, and 1% Native American. As shown in Table 1A, the sample is 58% female, predominantly Caucasian (64%), followed by Asian students (21%), African Americans (8%), multiracial students (5%), and Hispanics (3%).

(Table 1A about here.)

Measures

In this study, the dependent, independent, and control measures are comprised of multiple indicators. From these indicators, I created several additive scales, standardized by the number of items in the scale. First, I discuss the indicators that were included in the survey for each measure and how these items are coded. I then describe factor analysis, and the creation and reliability of the scales.

Dependent Measures. The environmentally-friendly behavior measure includes 15 items, drawn from various sources (Harland et al. 1999; Korfiatis 2004; Milfont 2004) that ask about behavior over the last six months, and six items that ask about behavior at any time in the past. Examples of the items over the last six months include: turning

off the faucet while brushing your teeth; avoiding using products harmful for the environment; and unplugging “chargers” for phones, iPods, etc. when not in use. The response categories range from “Never” (coded 1) to “Always” (coded 7).⁴

Independent Measures. To measure environmental identity I use Clayton’s (2003) Environmental Identity Scale. Clayton argues that environmental identity encompasses more than attitudes, and measures the extent to which individuals include the natural environment in their self-concepts. A person’s environmental identity is a social identity: “An understanding of oneself in a natural environment cannot be fully separated from social meanings given to nature and to environmental issues, which will vary according to culture, world view, and religion” (Clayton 2003: 53).

For the sake of brevity, I use an abbreviated version of the Environmental Identity Scale that consists of eleven of Clayton’s 24 bipolar statements. This abbreviated scale was pretested and proved reliable in factor analysis⁵, and continues to be reliable for this sample ($\alpha=.851$). Each question asks respondents to report how “true” a statement is of themselves. The responses range from “Not at All True of Me” (coded 1) to “Completely True of Me” (coded 7). Examples of these items are: I think of myself as part of nature, not separate from it; being a part of the ecosystem is an important part of who I am; and my own interests usually seem to coincide with the position advocated by environmentalists.

⁴ A complete list of the indicators for each measure is located in Appendix A.

⁵ The pretest survey and factor analysis were done in a seminar course at the same university by Drs. Johnson and Hegtvedt.

Respondents were asked about the frequency of environmentally-friendly behaviors by their families and friends to measure behavior modeling in social networks. I gathered these perceptions of the behaviors of others, rather than self report data from the respondents' friends and family members themselves, because it is the respondents' perceptions that influence their own behaviors, regardless of the accuracy of that perception, rather than the objective behaviors of the others themselves (Turner 1956; Fiske and Taylor 2008). Furthermore, research shows that perceived friends' behaviors explain five to seven times more of the variation in adolescent behaviors than actual friends' behaviors (Huizinga, Weiber, and Esbensen 1992).

The behaviors for friends and family are analogous to those in the measure of respondents' environmentally-friendly behaviors, such as recycling, conserving water, and belonging to environmental groups. Possible responses include "Don't Know," which was considered missing data, and subsequently range from "Not at all" (coded 1) to "A Great Deal" (coded 7).

Control Measures. I controlled for attitudes to examine whether environmental identity and behavior modeling by social networks have independent effects on environmental behaviors. These items were taken from various sources (Stern, Dietz, and Kalof 1993; Stern and Dietz 1994; Stern, Dietz, and Guagnano 1995; Barkan 2004; Johnson et al. 2004; Thapa 2007). Respondents were asked questions concerning the relationship between people and the environment, the current state of the environment, what measures should be taken in response to the condition of the environment, and possible other effects of environmental change. The response

categories range from “Strongly Disagree” (coded 1) to “Strongly Agree” (coded 7).

Examples of items include: The environmental crisis has been greatly exaggerated; the government should tax companies who pollute the natural environment; and the green house effect is dangerous to the environment.

In addition, I also controlled for several demographic variables. I control for gender and race because they have been found to be significant predictors of environmentally-friendly behaviors in previous research (see Saphores et al. 2006). Gender is coded with female as 1, male as 0. Race is coded with white as 1, non-white as 0. I also control for socioeconomic status, using indicators of estimated household income and mother’s and father’s education, because living in a single-family dwelling has been a marker of increased recycling (Derksen and Gartrell 1993), and living in a single-family dwelling is positively related to socio-economic status. The income measure has eight response categories ranging from “Less than \$25,000” (coded 1) to “More than \$250,000,” (coded 8). There are 7 response categories for mother’s and father’s education, coded as follows: “High school graduate/GED or less than high school” (1), “Technical/Vocational” (2), “Some college or Associate’s degree” (3), “Bachelor’s degree” (4), “Master’s degree (e.g., MA, MBA, MPH, MSW)” (5), “Professional school degree (e.g., MD, JD, DVM, DDS)” (6), “Doctorate degree (e.g., PhD, EdD)” (7), and “Not Applicable” (0).⁶

⁶ Due to skew in the sample on measures of estimated household income and mother’s and father’s education, we ran several different analyses to ensure these variables are accurately represented in the results. We created dummies for each category of income, and also created dummies for mother’s education and father’s education along meaningful cut-points in the sample. For mother’s education, we

Factor Analysis

I examined the individual indicators for respondents' environmentally-friendly behaviors, the behaviors of their friends and family, and environmental attitudes using factor analysis. In order to create scales for these measures, I applied principal components factor analysis with a varimax rotation.⁷

Environmentally-Friendly Behaviors for Self. In the original factor analysis for respondents' environmentally-friendly behaviors over the last six months, five components emerged. While 13 of the 15 items loaded well on one of the first four components, two indicators did not. The indicator concerning bringing your own bag to stores, rather than using plastic bags, did not load particularly well on any of the components, and the indicator regarding carpooling loaded by itself on a fifth component. Since neither of these items fit particularly well with any of the others, I dropped both from subsequent analyses.

After removing the previously discussed indicators, four components remain. The first component includes items such as giving up meat, advocating for environmental solutions, avoiding products known to be harmful to the environment, and attending meetings for environmental groups. This component is referred to as the *activism scale*, and has a reliability of $\alpha=.759$.

compared those with less than a bachelor's degree to those with a bachelor's degree or higher. For father's education, we compared those with a bachelor's degree or less to those with a master's degree or more. In each of these analyses, the patterns for the focal factors did not change. Thus, the regression analyses presented here use these variables in their original form.

⁷ Factor analysis tables are available in Appendix B.

I developed a second scale using both the second and third components from the factor analysis. The second component includes using alternative transportation and unplugging chargers when not in use. These two indicators have an R^2 of .389, which is significant at the .01 level. The third component includes turning off the faucet and turning off lights. These two indicators have an R^2 of .291, which is significant at the .01 level. By combining all four of these items, the reliability is $\alpha=.579$. Given the theoretical consistency of these items – all of which involve conserving resources – and the reliability for all of the items combined, I collapsed these two components into one *conservation scale*.

The final scale, referred to as the *recycling scale*, includes indicators of recycling paper, containers, and encouraging family and friends about recycling, as well as an indicator of purchasing products in reusable containers. While the final indicator is not recycling specific, it is similar to recycling in that it also involves a reduction in waste. The reliability for this scale is $\alpha=.895$.

Environmentally-Friendly Behaviors for Family and Friends. I created corresponding scales for family and friends' behaviors. The indicators of perceived family behaviors loaded on three components, which correspond to the scales developed for respondents' behaviors. The *activism scale*, comprised of advocating for solutions, belonging to environmental groups, donating money, and talking about environmental issues, has a reliability of $\alpha=.831$. The *conservation scale* includes four indicators on conserving water and energy in general, and specifically through turning off lights and water, and has a reliability of $\alpha=.815$. The *recycling scale* includes two

indicators, recycling paper and containers, which have an R^2 of .786, significant at the .01 level.

Using the indicators for perceived environmentally-friendly behaviors from friends, only two components emerge. The *activism scale* contains the same items for friends as for family, with the omission of the indicator for donating money to environmental groups, and has a reliability of $\alpha=.854$. For friends, indicators of conservation and recycling load on the same factor. In the interest of having analogous scales for respondents', family, and friends' behaviors, I have broken this component down into two scales. The *conservation scale* contains items on conserving water and energy, and turning off lights and water, and has a reliability of $\alpha=.873$. The *recycling scale*, which includes recycling paper and containers, has an R^2 of .884, significant at the .01 level.

Attitudes. In my initial factor analysis of the attitude indicators, four components emerged. Most indicators loaded on the first two components, with three exceptions. An indicator concerning the right of humans to modify their environment loaded moderately well on the third component, but did not load well with any other items. The indicators on the ability of science and technology to solve environmental problems, and protecting the environment posing a threat to future jobs, did not load well on any of the components. These three components were deleted from future analysis.

With the three aforementioned items removed, three components remain. The first component contains indicators on the importance of the environmental problem, how people should pay higher taxes for the sake of the environment, and the importance of

taxes and funding for the environmental problem. The reliability for these five items is $\alpha=.735$. The second component is comprised of two indicators, one that says there should be laws in place to regulate company energy use, and another that promotes taxes for companies who pollute. These two indicators have an R^2 of .712, which is significant at the .01 level. Since these components are theoretically similar, in that both concern the importance of the environmental problem and policy solutions to address it, I have combined these seven indicators to create the *government attitudes scale*, which has a reliability of $\alpha=.804$. The final component concerns the environmental crisis, with items on a pending ecological catastrophe, the severe abuse to the environment, and the dangers of the green house effect and pesticides. The reliability of this *crisis attitudes scale* is $\alpha=.865$.

RESULTS

Table 1B presents the descriptive statistics for each of the dependent, independent, and attitude variables. Several patterns emerge here. First, activism behaviors are the least common for respondents, family, and friends. Second, while conservation and recycling are more common across the board, respondents perceive that their family members engage in these behaviors with higher frequency than themselves or their friends. It is also important to note that the dependent variables measure frequency of the respondents' behaviors, while the independent variables on social networks measure the respondents' perception of their family and friends' behaviors. Table 2 presents the bivariate correlations between all dependent and independent variables, as well as the attitude measures.

(Table 1B about here.)

(Table 2 about here.)

I used OLS regression to test the effects of environmental identity and behavior modeling by friends and family on the three types of environmentally-friendly behaviors⁸. Table 3 reports the unstandardized coefficients for model. As predicted in Hypothesis 1, environmental identity is positively related to self-reported activism ($b=.399, p<.01$), conservation ($b=.361, p<.01$), and recycling behaviors ($b=.521, p<.001$). These results for environmental identity are independent of the effect of the two sets of attitudes on behavior.

(Table 3 about here.)

Hypothesis 2 states that behavior modeling by social networks will have an effect on the frequency of respondents' environmentally-friendly behaviors, independent of environmental identity. Concerning activism, the perceived friends' behaviors have a positive, significant relationship with respondents' behaviors independent of the effects of environmental identity ($b=.301, p<.001$). The relationship between perceived family behaviors and respondents' reported activism is not statistically significant. For conservation behaviors, perceived friends' behaviors have a significant effect on respondent's conservation ($b=.105, p<.05$), but perceived family conservation does not

⁸ We also ran tests for the impact of expressed behavior norms in the student's high school on the three types of environmentally-friendly behaviors. Since a student's high school is an institution, rather than an actor, these questions measured the same types of behavior – recycling, advocacy, conserving energy, etc. – but did so by asking "How much did your high school encourage students to...?" High school norms did not impact any of the respondents' behaviors.

have a statistically significant effect. Regarding recycling, both friends' and family behaviors have a significant, positive relationship with respondents' recycling. Perceived family recycling ($b=.352, p<.001$), however, has a stronger effect than perceived friends' recycling ($b=.115, p<.05$). Given that at least one, if not both, of the social networks has a significant effect on each of the respondents' environmentally-friendly behaviors, independent of environmental identity, hypothesis 2 is supported.

Hypothesis 3 suggests that behavior modeling by respondents' friends will have a stronger impact on respondents' environmentally-friendly behaviors than will behavior modeling by their family. As shown in Table 3, perceived friends' activism has a strong positive relationship with respondents' activism behaviors ($b=.301, p<.001$), while family activism does not. A similar, albeit slightly less strong, pattern exists for conservation behaviors. Perceived friends' conservation has a positive significant effect on respondent's conservation ($b=.105, p<.05$), while perceived family conservation does not have a significant effect. In the case of recycling, however, the expected relationship is reversed. Perceived friends' recycling behaviors do have a positive relationship with respondent's recycling ($b=.115, p<.05$), but the effect of perceived family recycling behaviors is stronger ($b=.352, p<.001$). Thus, hypothesis 3 is supported for activism and conservation, but is not supported for recycling.⁹

⁹ Control variables are statistically significant in the full model (see Table 3) in two cases. Governmental attitudes have a significant, positive effect on conservation ($b=.268, p<.05$), which makes sense, given that these attitudes reflect an opinion that environmental protection is important for everyone, and it is important for laws and government spending to reflect this. Race is also has a significant effect on recycling behaviors ($b=.469, p<.05$), with respondents who are white more likely to recycle than non-white respondents.

Hypothesis 4 predicts a differing effect of perceived family and friends' behaviors across different levels of the respondents' environmental identity. In order to test this hypothesis, I divided environmental identity into three groups based on strength – weak, moderate, and strong.¹⁰ Table 1B shows that the mean for environmental identity is 4.54. A closer examination of this variable shows that the mode for environmental identity is 4.64, and 32.5% of the respondent's environmental identity scores fell between 4.00 and 4.99. I recoded the variable so that responses falling between 1.00 and 3.99 are coded as weak, responses between 4.00 and 4.99 are coded as moderate, and responses between 5.00 and 7.00 are coded as strong. Based on this recoding, approximately 31% of respondents have a weak environmental identity, 31% moderate, and 38% strong.

Table 4 shows the unstandardized coefficients for the effects of behavior modeling by social networks on environmentally-friendly behaviors when environmental identity is stratified into weak, moderate, and strong. Hypothesis 4a states that for respondents with *weaker* environmental identities, meaning those with weak or moderate environmental identities, behavior modeling by friends and family will have a positive effect on the frequency of their environmentally-friendly behaviors. Hypothesis 4b

¹⁰ We also tested hypothesis 4 using an interaction model, and found that the interaction terms did not produce any significant results. By dividing the environmental identity scale into weak, moderate, and strong, however, we do obtain some significant findings. It is possible that these results show significant effects, while the interaction models do not, because these relationships are nonlinear. A prime example of this is family recycling, where family behaviors have the strongest, most significant effect for those with weak environmental identity, the smallest effect for those with a moderate identity, and an increasingly strong and significant effect for those with strong environmental identity.

states that for those with *strong* environmental identities, behavior modeling by family and friends will not have an effect on respondents' environmentally-friendly behaviors. These hypotheses combined posit that behavior modeling by social networks is only influential in the absence of strong environmental identity. These hypotheses garner mixed results depending upon the behavior in question.

Contrary to hypothesis 4, perceived friends' behaviors have a *stronger* positive relationship with respondents' activism and conservation behaviors when environmental identity is strong – a reinforcement effect. Perceived friends' activism has a significant positive effect on respondents' behavior for those with strong environmental identity ($b=.442, p<.001$), and those with moderate environmental identity ($b=.451, p<.01$). The results for activism support hypothesis 4a, but do not support hypothesis 4b. For conservation, perceived friends' behaviors have a positive, significant relationship with respondents' conservation when environmental identity is strong ($b=.287, p<.01$). The results for conservation do not support hypothesis 4a or 4b. Interestingly, perceived friends' activism and conservation have no effect for those with weak environmental identity.

(Table 4 about here.)

The results for recycling are unique, relative to the other types of environmentally-friendly behavior. It is not surprising that perceived family behaviors have a significant positive relationship and perceived friends' behaviors do not, given the results for hypothesis 3. What is interesting about these results, however, is that family behaviors have a significant positive relationship with respondents' behaviors regardless of their

level of environmental identity. For those with strong environmental identity, perceived family behaviors have a significant positive effect ($b=.318, p<.01$). The same is true for respondents with a moderate environmental identity ($b=.264, p<.05$), although the effect is smaller. For respondents with weak environmental identity, the positive effect of perceived family behaviors on their own recycling is highly significant ($b=.575, p<.001$). The results for recycling are more consistent with hypothesis 4a than are those for activism or conservation, given that family behavior modeling is more important for those with low environmental identity. Hypothesis 4b is not supported, however, because family behaviors have an independent effect even when environmental identity is strong.

DISCUSSION

My goal in this paper is to show how environmental identity and behavior modeling by social networks work both independently and jointly to help determine environmentally-friendly behaviors. Four key findings emerged that have implications for future research on factors that affect environmentally-friendly behaviors, as well as implications for sustainability policies on university campuses.

First, there are three separate facets of environmentally-friendly behavior, which load on different factors and have differing results in regression analysis: activism, conservation, and recycling. Activism, which consists of changing consumption patterns as well as participating in groups and advocating for change, is distinct from both conservation and recycling. Conservation behaviors include being mindful of resources such as water and electricity, as well as energy use in transportation and with

electronics. My respondents identify buying products in reusable/recyclable containers as similar to recycling, rather than conservation. This could represent a distinction between energy use and waste production. By purchasing products in reusable/recyclable containers, people are decreasing the amount of waste they produce.

Second, my findings show that recycling behaviors operate distinctly from activism and conservation in regard to influence of social networks in this sample. Previous studies show that peers' behaviors matter more for adolescents than parents' behaviors (Bush et al. 1994; Arriaga and Foshee 2004), and the results for activism and conservation support these findings. This is not the case for recycling, however, where perceived family behaviors have a stronger effect than perceived friends' behaviors. Also, perceived family behaviors have an effect regardless of how strong the respondent's environmental identity, but these perceived behaviors have the strongest effect when a person has a weak environmental identity. This may be a product of habituation (Biel 2003) – people recycle, not because it is important to them or a part of their identity, but because it is what the members of their household do, and as such it requires less effort and mental application. The same habituation could be acting on those with moderate or strong environmental identity, but these individuals may have internalized the meaning of the behavior.

Nevertheless, this does not answer the question of why family members exert a stronger influence than friends for recycling, at least for these incoming freshmen. One possible explanation is that family may exert more influence because recycling is

primarily done at home. However, conservation efforts, like turning off the water while brushing your teeth, are largely done at home as well, and yet friends' behaviors are more influential for conservation.

Another possible explanation is that there may be a generational difference in behaviors. Recycling was one of the first big pushes in the movement for promoting more environmentally-friendly behaviors. As such, more adults may engage in recycling than in other environmentally-friendly behaviors. Descriptive statistics, however, show that the mean for perceived conservation behaviors among family members is slightly higher than recycling behaviors. Respondents also perceive that their parents engage in higher rates of recycling than friends. It is important to note, though, that we are measuring respondent's *perceptions* of the behaviors of their family and friends. While respondents perceive that their family members recycle and conserve more, they may believe that their parents turn off lights and conserve water for financial purposes, rather than for the explicit purpose of helping the environment, while recycling may be predominantly associated with environmental purposes, rather than financial savings.

As previously discussed, a review of the literature shows that peers exert greater influence on adolescents through behavior modeling, while parents exert greater influence on adolescents through expression of norms (Biddle et al. 1980). It is possible that the results for recycling are representative of the influence of family through the expression of norms, which I cannot measure with my data. Thus, in order to develop a more complete understanding of the impact of family influence on recycling,

researchers would be well served to measure the expression of norms in various social groups, as well as identities and behavior modeling.

A third key finding is that regardless of the type of environmentally-friendly behavior in question, environmental identity and influence through behavior modeling operate independently of one another in determining behavior.¹¹ Respondents who see themselves as more environmentally-friendly tend to engage in more environmentally-friendly behaviors. Having friends who engage in activism and conservation behaviors increases the likelihood that respondents will engage in activism and conservation themselves, apart from their environmental identity. Similarly, having family members who recycle increases the likelihood that respondents will recycle. An implication of these findings is that both identity theories (Burke and Reitzes 1981; 1991) and research on sources of influence (Biddle et al. 1980; Kandel 1996) are important for understanding behavior, and may even be complementary.

A fourth and unexpected finding is that, contrary to my hypothesis, the environmentally-friendly actions of others actually matter more when a person's environmental identity is strong. This seems to speak to how influence from social networks operates. As long as people identify with environmentalism at least moderately, they will participate in activism if their friends do. If they do not identify

¹¹ Research by Biddle et al. (1985) finds that peer behaviors exert a greater influence on adolescents' identities than parents' behaviors, and that identity has an independent effect on behavior. Their findings suggest a model where social networks predict identity, which in turn predicts behavior. We ran tests for the effects of family and friends' behavior modeling on environmental identity, and found no significant results.

with environmentalism at all, however, they will not participate in activism regardless of what their friends do. Environmentalism has to be a part of who people conceive of themselves to be in order for them to advocate or conserve.

It is also possible that friends' behavior can serve as a form of identity confirmation. According to Burke and Stets (1999), individuals seek to verify their identities, and once individuals achieve self-verification, their behavioral commitment to that identity increases. Therefore, if friends' behaviors serve as a form of verification of an environmental identity that is already strong, it would be reasonable to expect that the strong environmental identity and high levels of environmentally-friendly behaviors among an individual's friends would both have a positive effect on the individual's behavioral commitment (ie., activism and conservation behaviors).

The unexpected findings for hypothesis 4a and 4b may also speak to the importance of identity prominence and salience. Prominent identities are those identities that are central to an individual's self-concept. Prominence reflects the importance of an identity (Stets and Biga 2003). Identity salience represents the likelihood that an individual will invoke a particular identity in multiple situations. The more salient an identity, the more likely a person will be to engage in behaviors that confirm that identity (Stryker 2000). In this study I captured respondents' environmental identities, but I did not examine how this identity ranks with other identities on prominence and salience. For example, an individual may score high on environmental identity, but this identity may not be ranked highly for that individual in importance. It is possible that hypotheses 4a and 4b may have been supported if the strength of respondents' environmental identity also

included measures of prominence and salience. That is, individuals with a strong environmental identity that is both prominent and salient may use the identity as a foundation for behavior, independent of the behaviors of their social networks.

Limitations and Directions for Future Research

There are several limitations to this study that are important to consider, primarily related to the sample. While this sample is a good representation of the entering freshman class to which they belong, there is a bias toward being white, from families with middle to high income, and high levels of education. The mean household income level for respondents is between \$100,000 and \$150,000 per year, which limits my ability to generalize toward the similarly aged population that may be of a lower socioeconomic status. Also, almost half of the sample is from the South, and may not represent individuals from other regions of the country.¹² Furthermore, this sample consists solely of entering freshmen, all age 17 or 18. Despite these limitations, I have contributed to the knowledge about the impact of environmental identity and social networks for participating in environmentally-friendly behaviors for this age group – an age group that will have a large impact on the future of environmental sustainability.

Another limitation of this research is that it is based on cross-sectional data. As noted by Kandel (1996), cross-sectional data is problematic for teasing out the differing effects of parental versus peer influence because, “parents are a given while, by and large, peers are chosen” (1996: 290). This speaks to the inability of cross-sectional data

¹² Approximately 45% of the respondents are from the South, 29% are from the Northeast, 16% are from the Midwest, 7% are from the West, and 3% are not from the United States.

to rule out selection effects. Kandel (1996) summarizes literature on the influence from peers and parents on adolescents, and concludes that the influence of peers is most likely over-stated in research on adolescents for two reasons. First, adolescents are not only influenced by their peers; they also select their peers based on their preferences. Second, parents exert influence on with whom their children associate.

While Kandel (1996) is well-founded in her critiques of cross-sectional data, longitudinal studies exist that show a greater impact of peers influence over parents influence (Rosen 1955; Bush et al. 1994; Arriaga and Foshee 2004). Furthermore, Arriaga and Foshee (2004) provide longitudinal evidence for both selection and influence. In their study of perpetration and victimization of dating violence, they found that for perpetration of dating violence, both influence and selection were at play. Having friends who are in violent dating relationships at time one significantly predicted perpetration of dating violence at time two, controlling for time one perpetration. At the same time, however, perpetration at time one significantly predicted having friends involved in dating violence at time two, controlling for friend dating violence at time one. For victimization, Arriaga and Foshee (2004) found both influence and selection effects, but they varied by gender. For boys, they found only a selection effect, and for girls, only an influence effect. These results suggest that the relationship between influence or socialization and selection is a complicated one, and one that is unlikely to be completely teased out.

Given the longitudinal evidence that both selection and influence play a role in the relationship between adolescent behavior and the behaviors of their peers, it seems

premature to discount all results from cross-sectional studies. That being said, longitudinal research in the future may facilitate a better understanding of how different social networks may have varying effects over time. For example, will family recycling behaviors be as strong a predictor of recycling behaviors for young adults as they age and are no longer living at home? Based on past research on influence as adolescents age (Margulies et al. 1977; Bush et al. 1994), and Quigley et al.'s (2006) findings that proximal influences are the most important, I suspect that future longitudinal research will find an increasing trend for peers to have a greater influence than family on environmentally-friendly behaviors, including recycling. In addition to longitudinal research, I also recommend that future research involve a qualitative component, using in-depth interviews, to examine how individuals view the behavior of others and its meaning for their own actions. This will guide us to further understand how behavior modeling works differently depending upon the social network enacting the behaviors.

Policy Implications

In addition to guiding future research on identity, behavior modeling by social networks, and environmentally-friendly behaviors, these findings also have implications for sustainability policies on university campuses. First, these findings suggest that programs designed to promote environmentally-friendly behaviors in one area – such as conservation – may not be sufficient to stimulate behaviors in another area, such as activism or recycling. These behaviors seem to operate distinctly from each other, and may require behavior-specific incentives or programs. Second, in order to elicit more

environmentally-friendly behaviors from university students, administrators and staff should focus less on changing students' attitudes toward the environment, and more on creating strong environmental identities among students. According to my findings, a feeling of connectedness or personal meaning associated with the natural environment is a stronger predictor of environmentally-friendly behaviors than pro-environmental attitudes. Finally, in developing and promoting environmentally-friendly activities, universities should focus on group activities, such as energy conservation as a dorm floor, writing petitions as a class, or participating in seminars on fostering a sense of place, rather than promoting individuals to engage in more conservation or activism in isolation. This will provide increased opportunities for environmentally-friendly behavior modeling by friends and peers, as well as facilitating opportunities for individuals to confirm their environmental identities through social behavior.

Table 1A: Demographics

| | % |
|---------------------------------------|------|
| Female | 57.9 |
| Race | |
| Asian/Asian American/Pacific Islander | 21.2 |
| Hispanic/Latino/Chicano | 3.0 |
| African American/Black | 7.6 |
| Caucasian/White | 63.6 |
| Multiracial/Multiethnic | 4.5 |
| Income | |
| Less than \$25,000 | 6.7 |
| \$25,001-\$50,000 | 7.6 |
| \$50,001-\$75,000 | 9.2 |
| \$75,001-\$100,000 | 9.2 |
| \$100,001-\$150,000 | 19.3 |
| \$150,001-\$200,000 | 10.1 |
| \$200,001-\$250,000 | 11.8 |
| More than \$250,000 | 26.1 |
| Mother's Education | |
| High School Graduate/GED | 7.2 |
| Technical/Vocational | 2.4 |
| Some college/Associate's Degree | 14.4 |
| Bachelor's Degree | 31.2 |
| Master's Degree | 27.2 |
| Professional Degree | 10.4 |
| Doctorate Degree | 6.4 |
| Father's Education | |
| High School Graduate/GED | 12.0 |
| Technical/Vocational | 1.6 |
| Some college/Associate's Degree | 8.0 |
| Bachelor's Degree | 19.2 |
| Master's Degree | 24.0 |
| Professional Degree | 12.8 |
| Doctorate Degree | 20.8 |

Table 1B: Descriptive Statistics

| | Mean | St. Dev. | Min. | Max. |
|-------------------------------|-------------|-----------------|-------------|-------------|
| <i>Dependent Variables</i> | | | | |
| Activism | 2.98 | 1.33 | 1.00 | 7.00 |
| Conservation | 4.65 | 1.14 | 2.00 | 7.00 |
| Recycling | 4.47 | 1.60 | 1.20 | 7.00 |
| <i>Independent Variables</i> | | | | |
| Environmental Identity | 4.54 | 1.10 | 1.82 | 7.00 |
| Family Activism | 2.44 | 1.46 | 0.00 | 7.00 |
| Family Conservation | 4.97 | 1.56 | 0.00 | 7.00 |
| Family Recycling | 4.88 | 2.10 | 0.00 | 7.00 |
| Friend Activism | 2.73 | 1.74 | 0.00 | 7.00 |
| Friend Conservation | 3.09 | 2.10 | 0.00 | 7.00 |
| Friend Recycling | 3.64 | 2.12 | 0.00 | 7.00 |
| <i>Controls</i> | | | | |
| Government Attitudes | 4.83 | 1.01 | 2.00 | 6.71 |
| Crisis Attitudes | 5.47 | 1.02 | 1.83 | 7.00 |

Table 2: Correlation Matrix

| | Respondent Activism | Respondent Conservation | Respondent Recycling | Environmental Identity | Family Activism | Family Conservation | Family Recycling | Friend Activism | Friend Conservation | Friend Recycling | Govt. Attitudes | Crisis Attitudes |
|----------------------------|------------------------|----------------------------|-------------------------|---------------------------|--------------------|------------------------|---------------------|--------------------|------------------------|---------------------|--------------------|---------------------|
| Respondent Activism | 1 | | | | | | | | | | | |
| Respondent Conservation | .414** | 1 | | | | | | | | | | |
| Respondent Recycling | .526** | .380** | 1 | | | | | | | | | |
| Environmental Identity | .546** | .471** | .412** | 1 | | | | | | | | |
| Family Activism | .279** | -.015 | .257** | .308** | 1 | | | | | | | |
| Family Conservation | .171 | .199* | .302** | .183* | .403** | 1 | | | | | | |
| Family Recycling | .129 | .005 | .584** | .071 | .387** | .509** | 1 | | | | | |
| Friend Activism | .507** | .112 | .354** | .320** | .370* | .237** | .270** | 1 | | | | |
| Friend Conservation | .322** | .265** | .319** | .179 | .173 | .306** | .164 | .466** | 1 | | | |
| Friend Recycling | .285** | .160 | .517** | .213* | .273** | .329** | .539** | .576** | .606** | 1 | | |
| Govt. Attitudes | .472** | .367** | .373** | .487** | .304** | .113 | .018 | .216* | .139 | .125 | 1 | |
| Crisis Attitudes | .480** | .269** | .353** | .566** | .203* | .100 | .020 | .183* | .202* | .099 | .638** | 1 |

*Significant at the .05 level.

**Significant at the .01 level.

Table 3: Unstandardized Regression Coefficients for the Effects of Environmental Identity and Behavior Modeling on Environmentally-Friendly Behaviors

| | Activism | Conservation | Recycling |
|-------------------------------|-----------------|---------------------|------------------|
| Environmental Identity | .306** | .367** | .404** |
| Family Behaviors | -.025 | -.018 | .352*** |
| Friend Behaviors | .301*** | .105* | .115* |
| <i>Controls</i> | | | |
| Female (vs. male) | -.140 | -.180 | .194 |
| White (vs. non-white) | .070 | .179 | .469* |
| Income | -.010 | -.086 | .065 |
| Mother's Education | -.047 | .024 | .052 |
| Father's Education | .000 | -.095 | .097 |
| Government Attitudes | .239 | .268* | .220 |
| Crisis Attitudes | .227 | -.165 | .189 |
| R² | .463 | .309 | .597 |

*Significant at the .05 level.

**Significant at the .01 level.

***Significant at the .001 level.

Table 4: Unstandardized Regression Coefficients for the Effects of Environmental Identity (Stratified by Level of Environmental Identity) and Behavior Modeling on Environmentally-Friendly Behaviors

| | Activism | | | Conservation | | | Recycling | | |
|--------------------------|------------------------|----------|---------|------------------------|----------|--------|------------------------|----------|--------|
| | Environmental Identity | | | Environmental Identity | | | Environmental Identity | | |
| | Weak | Moderate | Strong | Weak | Moderate | Strong | Weak | Moderate | Strong |
| Family Behaviors | .091 | -.253 | .021 | .176 | -.083 | -.035 | .575*** | .264* | .318** |
| Friend Behaviors | .085 | .451** | .442*** | .003 | -.030 | .287** | .055 | .237* | .014 |
| <i>Controls</i> | | | | | | | | | |
| Female (vs. male) | -.107 | .081 | .000 | .114 | -.367 | -.102 | .669 | -.065 | .159 |
| White (vs. non) | .322 | -.042 | .041 | .131 | .150 | .075 | 1.034 | .103 | .424 |
| Income | -.126 | .035 | .105 | -.105 | -.171 | -.006 | -.050 | .020 | .214** |
| Mother's Ed | .261 | -.045 | -.289* | -.027 | .200 | -.077 | .030 | .142 | -.017 |
| Father's Ed | -.102 | .133 | -.055 | -.108 | -.212 | -.104 | -.125 | -.147 | -.128 |
| Govt. Attitudes | .363 | .208 | .242 | .086 | .331 | .307 | .337 | -.136 | .739** |
| Crisis Attitudes | .159 | .308 | .380 | .000 | -.256 | -.155 | -.025 | .656 | .118 |
| R² | .390 | .453 | .563 | .212 | .233 | .427 | .705 | .482 | .685 |

*Significant at the .05 level.

**Significant at the .01 level.

***Significant at the .001 level.

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APPENDIX A – MEASURES

Respondents' Behavior Scales

Activism

During the last 6 months, how often did you...?

- limit your consumption of meat for environmental reasons
- advocate for solutions to environmental problems
- avoid using products harmful for the environment
- attend a meeting or event sponsored by an environmental group

Conservation

During the last 6 months, how often did you...?

- turn off the faucet while brushing your teeth
- turn off the lights when exiting a room
- walk, ride a bike, or take public transportation instead of driving or riding in a car
- unplug “chargers” for phones, iPods, etc. when not in use

Recycling

During the last 6 months, how often did you...?

- recycle paper
- recycle containers (e.g. plastic, glass, aluminum)
- encourage family members to recycle
- encourage friends to recycle
- purchase products in reusable or recyclable containers

Environmental Identity Scale

How “true” of you are each of the following statements?

- Engaging in environmental behaviors is important to me.
- I think of myself as part of nature, not separate from it.
- If I had enough time or money, I would certainly devote some of it to working for environmental causes.
- Being a part of the ecosystem is an important part of who I am.
- I feel that I have roots to a particular geographical location that had a significant impact on my self development.
- Behaving responsibly toward the earth – living a sustainable lifestyle – is part of my moral code.
- I spend a lot of time in natural settings (woods, mountains, desert, lakes, ocean).
- I believe that learning about the natural world should be an important part of every child’s upbringing.

- In general, being part of the natural world is an important part of my self image.
- I am a spiritual person.
- My own interests usually seem to coincide with the position advocated by environmentalists.

Behavior Modeling Scales - Family

Activism

How much do your *immediate family members* ...?

- advocate for environmental solutions (e.g., writing letters, protesting, signing petitions)
- belong to environmental groups
- donate money to an environmental cause or group
- talk about environmental issues/problems

Conservation

How much do your *immediate family members* ...?

- conserve water
- conserve energy (e.g., electrical)
- turn off lights when exiting a room
- turn off the faucet while brushing their teeth

Recycling

How much do your *immediate family members* ...?

- recycle paper
- recycle containers (e.g., plastic, glass, aluminum)

Behavior Modeling Scales – Friends

Activism

How much do your *close friends* ...?

- advocate for environmental solutions (e.g., writing letters, protesting, signing petitions)
- belong to environmental groups
- talk about environmental issues/problems

Conservation

How much do your *close friends* ...?

- conserve water
- conserve energy (e.g., electrical)
- turn off lights when exiting a room
- turn off the faucet while brushing their teeth

Recycling

How much do your *close friends* ...?

- recycle paper
- recycle containers (e.g., plastic, glass, aluminum)

Attitude Scales

Government Attitudes

How much do you disagree or agree with each of the following statements?

- There are other problems more pressing than the environmental crisis. (reverse coded)
- The government should tax companies who pollute the natural environment.
- People should pay higher taxes in order to protect the environment.
- Laws to protect the environment limit my choices and personal freedoms. (reverse coded)
- There should be laws that require companies to make their products more energy efficient.
- Funding for environmental protection is a bigger priority than funding for the creation of new jobs.
- Environmental protection benefits everyone.

Crisis Attitudes

How much do you disagree or agree with each of the following statements?

- Humans are severely abusing the environment.
- If things continue on their present course, we will soon experience an ecological catastrophe.
- The environmental crisis has been greatly exaggerated. (reverse coded)
- We are approaching the limits the earth can support.
- The greenhouse effect is dangerous to the environment.
- Pesticides and chemicals are dangerous to the environment.

APPENDIX B – FACTOR ANALYSIS

Principle Components Factor Analysis of Behaviors within the Past Six Months

| <i>During the last 6 months how often did you...?</i> | Component | | | | |
|---|-------------|--------------|-------------|-------------|-------------|
| | Activism | Conservation | Recycling | Carpool | |
| limit your consumption of meat... | .667 | -.148 | .202 | .250 | -.150 |
| turn off the faucet while brushing your teeth | -.062 | .185 | .532 | .291 | .353 |
| turn off the lights when exiting a room | .210 | .100 | .851 | .047 | -.020 |
| recycle paper | .046 | .112 | .038 | .816 | .223 |
| recycle containers | .034 | -.027 | -.147 | .894 | .067 |
| advocate for solutions to environmental problems | .798 | .233 | .113 | .248 | .069 |
| walk, bike, use public transportation... | .212 | .668 | -.029 | .113 | .444 |
| avoid products harmful to the environment | .499 | .397 | .258 | .401 | .070 |
| encourage family to recycle | .229 | .087 | .303 | .806 | -.087 |
| encourage friends to recycle | .331 | .024 | .319 | .773 | -.024 |
| purchase products in reusable containers | .280 | .330 | .147 | .670 | .080 |
| use your own bag at stores | .376 | .423 | -.137 | .376 | -.237 |
| unplug chargers when not in use | -.022 | .841 | .262 | .037 | -.118 |
| carpool to a destination | .071 | -.024 | .068 | .086 | .869 |
| attend environmental meetings | .763 | .083 | -.030 | -.009 | .170 |

Principle Components Factor Analysis of Behaviors within the Past Six Months (with two indicators removed)

| <i>During the last 6 months how often did you...?</i> | Component | | | |
|---|-------------|--------------|-------------|-------------|
| | Activism | Conservation | Recycling | |
| limit your consumption of meat... | .665 | -.201 | .236 | .231 |
| turn off the faucet while brushing your teeth | -.086 | .332 | .481 | .314 |
| turn off the lights when exiting a room | .202 | .083 | .873 | .029 |
| recycle paper | .059 | .197 | .004 | .836 |
| recycle containers | .039 | -.025 | -.124 | .898 |
| advocate for solutions to environmental problems | .796 | .228 | .131 | .245 |
| walk, bike, use public transportation... | .222 | .784 | -.059 | .150 |
| avoid products harmful to the environment | .517 | .387 | .267 | .397 |
| encourage family to recycle | .245 | .043 | .324 | .790 |
| encourage friends to recycle | .350 | .004 | .330 | .763 |
| purchase products in reusable containers | .302 | .308 | .172 | .666 |
| unplug chargers when not in use | .019 | .761 | .278 | .022 |
| attend environmental meetings | .774 | .169 | -.100 | .008 |

Principle Components Factor Analysis of Family Behaviors

| <i>How much do your immediate family members...?</i> | Component | | |
|--|-------------|--------------|-------------|
| | Activism | Conservation | Recycling |
| advocate for solutions to environmental problems | .825 | .212 | .156 |
| belong to environmental groups | .895 | .157 | .104 |
| donate money to an environmental cause or group | .801 | -.028 | .037 |
| recycle paper | .218 | .244 | .893 |
| recycle containers | .114 | .205 | .915 |
| conserve water | .217 | .721 | .435 |
| conserve energy | .146 | .832 | .294 |
| talk about environmental issues/problems | .624 | .321 | .328 |
| turn off lights when exiting a room | .036 | .794 | .229 |
| turn off the faucet while brushing their teeth | .165 | .732 | -.032 |

Principle Components Factor Analysis of Friends' Behaviors

| <i>How much do your close friends...?</i> | Component | | |
|--|-------------|--------------|-------------------|
| | Activism | Conservation | Recycling |
| advocate for solutions to environmental problems | .894 | .143 | |
| belong to environmental groups | .904 | .082 | |
| recycle paper | .582 | .568 → | moved to |
| recycle containers | .408 | .674 → | this scale |
| conserve water | .223 | .842 | |
| conserve energy | .108 | .910 | |
| talk about environmental issues/problems | .694 | .459 | |
| turn off lights when exiting a room | .171 | .820 | |
| turn off the faucet while brushing their teeth | .155 | .712 | |

Principle Components Factor Analysis of Environmental Attitudes

| <i>Indicators</i> | Component | | | |
|---|-------------|-------------|-----------|-------|
| | Govt. | Crisis | Remaining | |
| Humans are severely abusing the environment. | .286 | .804 | .074 | .031 |
| Humans have the right to modify the environment... | .307 | .373 | .555 | .055 |
| ...we will soon experience an ecological catastrophe. | .147 | .817 | .094 | .101 |
| The environmental crisis has been greatly exaggerated. | .266 | .640 | .435 | .138 |
| There are other problems more pressing than the environment... | .549 | .434 | .410 | -.129 |
| We are approaching the limits the earth can support. | .322 | .697 | .161 | -.137 |
| Science and technology will...solve...damage. | .125 | .057 | -.799 | -.113 |
| Environmental protection benefits everyone. | .562 | .377 | .032 | .242 |
| ...laws require companies to make...products more energy efficient. | .603 | .399 | -.231 | .381 |
| ...tax companies who pollute the natural environment. | .686 | .228 | -.150 | .337 |
| People should pay higher taxes in order to protect the environment. | .621 | .143 | .037 | .168 |
| Laws to protect the environment limit my...freedom. | .410 | .027 | .255 | .629 |
| The green house effect is dangerous to the environment. | .191 | .757 | -.018 | .285 |
| Pesticides and chemicals are dangerous to the environment. | .107 | .700 | -.122 | .365 |
| Funding...bigger priority than funding...the creation of new jobs. | .754 | .163 | .171 | -.139 |
| Protecting the environment will threaten future jobs... | -.030 | -.186 | -.064 | -.788 |

Principle Components Factor Analysis of Environmental Attitudes (with three indicators removed)

| <i>Indicators</i> | Component | | |
|---|-------------|-------------|-------------|
| | Government | Crisis | |
| Humans are severely abusing the environment. | .270 | .169 | .785 |
| ...we will soon experience an ecological catastrophe. | .169 | .161 | .804 |
| The environmental crisis has been greatly exaggerated. | .393 | .018 | .714 |
| There are other problems more pressing than the environment... | .665 | -.127 | .514 |
| We are approaching the limits the earth can support. | .154 | .206 | .704 |
| Environmental protection benefits everyone. | .517 | .352 | .337 |
| ...laws require companies to make...products more energy efficient. | .281 | .807 | .276 |
| ...tax companies who pollute the natural environment. | .368 | .767 | .129 |
| People should pay higher taxes in order to protect the environment. | .625 | .244 | .131 |
| Laws to protect the environment limit my...freedom. | .568 | .339 | .022 |
| The green house effect is dangerous to the environment. | .122 | .418 | .687 |
| Pesticides and chemicals are dangerous to the environment. | -.108 | .571 | .580 |
| Funding...bigger priority than funding...the creation of new jobs. | .718 | .096 | .204 |