

**Pro-Environmental Attitudes and Behaviors in Higher Education:
Investigating the Role of Formal and Informal Factors**

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Abstract

Scholars have documented the growing presence of environmental and sustainability education in higher education institutions around the world. However, we know little about how colleges and universities mobilize students to adopt pro-environmental attitudes and behaviors. Drawing on the *whole student* framework, this study examines the extent to which curricular and co-curricular factors are associated with students' engagement with environmentalism. Using survey data from 539 students at Indiana University and multivariate analysis, we demonstrate that (a) hearing about environmentalism and sustainability in class and (b) membership in campus-based environmental groups have positive and significant effects. These factors are associated with increased levels of care for the environment and increased levels of private and public pro-environmental behaviors. We discuss the implications of these findings in relation to the role of higher education institutions as incubators for the development of competent social actors.

Introduction

Over the past two decades, institutions of higher education have responded increasingly to national and international calls to protect the environment and promote sustainable development (Frank, Robinson, & Olesen, 2011). This process emerged with the inception of the Talloires Declaration in 1990, which stipulated that “universities bear profound responsibilities to increase the awareness, knowledge, technologies, and tools to create an environmentally sustainable future” (Talloires Declaration, 1990). Since then, higher education has undergone various initiatives that aim to increase students’ engagement with environmentalism and sustainability, including the introduction of new curriculum and co-curriculum. These initiatives range from establishing new academic programs (e.g., the Sustainable Development Institute at Monash University), to launching dedicated administrative units (e.g., Office of Environmental Stewardship at Columbia University), to individual instructors who infuse sustainability-related content in their classes.

Nevertheless, scholarship on the contributions higher education towards students’ engagement with sustainability is less extensive than what might be expected (Kagawa, 2007; Schoolman, Shriberg, Schwimmer & Tysman, 2008; Yavetz, Goldman, & Pe’er, 2009). Further, a careful review of the literature suggests that scholars have mostly examined separately the impact of curricular and co-curricular initiatives on students. Separation of the curricular and co-curricular is problematic for at least two reasons. First, students’ formal classroom learning is insufficient when they do not connect it with the real world (Kuh, 1995). Second, students’ informal out-of-class learning lacks deep meaning without its supplementary substantive subject matter learning (Kuh, 1995).

In this article, we rely on the *whole student* approach, because “cognitive mastery of knowledge should be integrated with the development of persons along with cultural awareness, skills, and community responsibility” (ACPA, 1974). This notion of educating the whole student,

cognitively and affectively, has been emphasized increasingly since the early 20th century, stemming from the work of John Dewey (1916). Higher education scholars (e.g., Kezar & Rhoads, 2001; King & Baxter Magolda, 1996; Kuh, 1996; Wolf-Wendel & Ruel, 1999) argue that there is no divide between cognitive and affective learning, or classroom and out-of-classroom learning. As such, scholars in the field of higher education have argued that it is important to consider not only in-class experiences, but also out-of-class experiences (Kuh, 1995; Pittman, 2012; Wolf-Wendel & Ruel, 1999). Through this lens, all facets of higher education shape students as citizens (Kezar & Rhoads, 2011; Kuh, 1995, 1996; Wolf-Wendel & Ruel, 1999), and therefore we use this concept to explore the overall impact of higher education on student engagement with environmentalism. We posit that it is at this intersection between curricular and co-curricular factors where higher education has the largest opportunity to mobilize students to engage with environmental and sustainability issues.

We present a study of students' engagement with environmentalism and sustainability. We conducted a survey of students at Indiana University (n=539). The survey asked students about their pro-environmental attitudes (e.g., level of care for the environment and environmental concerns), their pro-environmental behaviors, and their exposure to environmental and sustainability content in both the curriculum and in the co-curriculum. We use these data to address two related questions:

Research question 1: To what extent does the opportunity to learn about environmentalism and sustainability shape students' pro-environmental attitudes and behaviors?

Research question 2: To what extent does membership in an on-campus environmental group shape students' pro-environmental attitudes and behaviors?

Notably, our investigation draws on the whole student approach and examines, *simultaneously*, the effects of curricular and co-curricular factors net of other individual

characteristics. We find that although students show strong pro-environmental attitudes, they report on low engagement with pro-environmental behaviors. Importantly, we find that curricular and co-curricular factors have a significant effect on attitudes and behaviors. This suggests that in some contexts, institutions of higher education can mobilize students to be more engaged with environmental and sustainability issues.

What and How Students Learn

Pro-Environmental Attitudes and Behaviors

It is long recognized that environmental and sustainability education (ESE) is more than the sheer transmission of knowledge (Palmer, 1998). Early conceptualization of the desired outcomes of ESE includes a combination of knowledge, attitudes, and behaviors (Stapp et al. 1969; Tbilisi Declaration, 1977; UNEP/UNESCO, 1975). The same set of learning outcomes is evident in the emerging literature on ESE in higher education (Chalkley, 2006; Sipos et al., 2008; Svanström et al., 2008). The complexity of ESE is one of the factors that make it a challenging pedagogical movement for K-12 schools as well as higher education institutions. In this study we focus on two ESE outcomes: Attitudes and behaviors.

Pro-environmental attitudes are worthy of consideration because they can be translated into behaviors (Fishbein & Ajzen, 1975). Indeed, past research has found that pro-environmental attitudes are statistically associated with responsible behaviors (Arbuthnott, 2012; Joireman, Van Lange, & Van Vugt, 2004; Stern, 2000). Research on pro-environmental attitudes among students is inconclusive. On the one hand, students were found to demonstrate high levels of environmental concerns (e.g., Fernández-Manzanal, Rodríguez-Barreiro & Carrasquer, 2007; Wong, 2003). On the other hand, studies show considerable variation in students' attitudes towards climate change (Hanks, Odom, Roedl & Blevis, 2008).

Scholars have identified two types of pro-environmental behaviors: *private behaviors*, which include daily decisions and actions such as recycling, reusing, and reducing, and *public*

behaviors, which include collective activism in the form of protest/demonstration (Hadler & Haller, 2011, 2013; Hunter et al., 2004; Stern, 2000; Yates, Luo, Mobley, & Shealy, 2015).

While public behaviors are more political and reflect a form of active citizenship, private behaviors are less political and reflect a form of consumer behavior. Using survey data from 16 countries, Hadler and Haller (2013) argue that pro-environmental private behaviors are increasing whereas public behavior is decreasing. In this paper, we examine students' engagement with both modes of participation in environmental activism.

Curricular Factors and the Opportunity to Learn

There are two common methods for implementing environmental and sustainability education in the curriculum (Hungerford & Peyton, 1980; Hungerford, Volk, & Ramsey, 1989). The *diffusion* method is the creation of a new curriculum in which environmental content is organized in an interdisciplinary fashion. This model is exemplified in the establishment of new undergraduate and graduate degree programs (e.g., Environmental and Development Economics, and Environmental Engineering) and standalone courses (e.g., Introduction to Environmental Sociology). The *infusion* method integrates environmental content throughout the curriculum across different disciplines. This model is exemplified in courses that link environmental and sustainability challenges with other, broader topics as in Introduction to Sociology (Obach, 2009) or Introduction to Social Research Methods (Pizmony-Levy, 2015). The focus of these courses, however, is not the environment; rather, the environment is one of several topics that comprise the class.

To date, research has mostly focused on the impact of curricula inspired by the diffusion mode. For example, scholars have found that completing one unit that focuses on environmental and sustainability issues is associated with increased students' responsible behaviors (McMillan, Wright, & Beazley, 2004; Ryu & Brody, 2006; Smith-Sebasto, 1995; Stewart, 2010; Wolfe, 2001). This research, however, is more susceptible to selection bias because students choose to

engage with the specific curriculum. In other words, the reported impact of these courses may be related to students' pre-existing interests, motivations, and demographics. Therefore, we know little about the broader impact of environmental and sustainability education on students.

To address this limitation, we apply the opportunity to learn (OTL) concept, which researchers have used as an analytical concept in K-12 educational research (Suter, 2017). Scholars have used OTL in international and comparative studies to account for variation in student learning opportunities (e.g., intended curriculum; Carol, 1963; Schmidt et. al, 2015). OTL is also applied as a determinant variable that influences learning through the amount of time spent on a concept, ranging from no time to a lot. As we discuss in the data and methods section, we measure OTL in relation to environmental and sustainability issues by gauging student reports about the frequency that professors and instructors have mentioned "environmental issues" and "sustainable development," or discussed "ways to protect the environment." To our knowledge, OTL is rarely used in the field of environmental and sustainability education.

Co-Curricular Factors

Learning about environmental and sustainability issues also occurs within the co-curriculum as students learn from engaging with the broader community (Cortese, 2003; Tilbury, 1995). Co-curricular experiences are important because they move students beyond awareness and towards engaging with topics in their everyday lives. Research has shown that these out-of-class experiences are important to the whole college experience as they are associated with developing critical thinking, relational and organizational skills, peer interactions, and leadership skills (Astin, 1993; Kuh, 2005).

Co-curricular activities range from ad-hoc initiatives outside of classrooms, such as campaigns and competitions between residential halls or Greek houses (i.e., fraternities and sororities) to more formalized student clubs. Past research has investigated the role co-curricular

activities as a mechanism for increasing students' private pro-environmental behaviors in areas such as consumption (Schoolman et al., 2014), energy reduction (Kahler, 2003; Marcell, Agyeman, & Rappaport, 2004; Marans & Edelstein 2010), recycling (Pike, Shannon, Lawrimore, & McGee, 2003), and resource reduction (Smyth, Fredeen, & Booth, 2010). Peterson, Shunturov, Janda, Platt and Weinberger (2008), for example, found that when institutions provide students with information on environmental consequences, students decrease their electricity use.

In addition, scholars have also demonstrated the benefits students gain by being involved in organized student-run environmental groups on campus (Grady-Benson & Sarathy, 2015; Helferty & Clarke, 2009). Environmental groups and clubs contribute to awareness-raising, development of leadership skills, and provide opportunities to practice civic life. These organizations also serve as mobilization structures that facilitated the recruitments of students to activism in social movements. Importantly, scholars have found that the impact of environmental groups and clubs goes beyond students, and often play an important role in shaping institutional policy and planning (Lounsbury, 2001).

Data and Methods

Data

Data for this study come from the Survey of Students' Engagement with Social Issues (SSESI), a cross-sectional survey designed to examine undergraduate students' pro-environmental attitudes and behaviors (Pizmony-Levy, 2015). SSESI was conducted at Indiana University (IU) Bloomington, which is the flagship campus of the IU system. According to the Carnegie Classification of Institutions of Higher Education (n.d.), IU Bloomington is a public four-year or above institution and is classified as a higher education institution with very high research activity. In 2010, at the time of data collection, IU Bloomington had 42,347 students: 32,490 undergraduate students (76.7%) and 9,857 graduate/professional students (23.3%). At that time, less than one-third of all academic departments at IU Bloomington (28.7%) offered courses

related to sustainability.¹ Like many other institutions adopting sustainability offices within the past decade (AASHE, 2015), IU Bloomington established the Office of Sustainability in 2009 with a mission to “advance sustainable human-environment interactions within the Bloomington campus and community by facilitating collaborative academic and operational initiatives” (IU, 2018). A year after its inception, in 2010, Pizmony-Levy (2015) designed the SSES I to inform the work of the Office of Sustainability, and in turn, its impact within the campus community.

The SSES I instrument drew from previous studies that examined engagement with environmentalism, such as the 2010 Environmental Module of the International Social Survey Program (ISSP). Some items were used in their original form, whereas others were adapted to the context of young adults enrolled in higher education. To better adapt the survey to the IU Bloomington student population, the instrument also included original items based on educational materials the Office of Sustainability produced (e.g., Sustainability Handbook). Additionally, the survey instrument incorporated a rich set of background items from the National Survey of Student Engagement (NSSE) because they were pretested with students. Thus, the survey provided an unprecedented opportunity to examine the effect of curricular and co-curricular elements on students’ pro-environmental attitudes and behaviors. Prior to data collection, the survey was piloted with 20 undergraduate students. Revisions were then made to the instrument according to student feedback, aligned with survey research design recommendations. The final version of the survey included 90 items. On average, respondents completed the survey within 20 minutes.

Given the low response rate in prior student surveys that employed random sampling, the survey was based on a purposeful sample to ensure sufficient sample size and reflect the diversity of the IU Bloomington student population. Although the data was not based on a

¹ According to the Office of Sustainability, 158 courses were offered at the undergraduate level and 86 courses were offered at the graduate level.

random sampling technique, demographic characteristics of respondents are comparable to the population of IU Bloomington (see Appendix 1). The data collection staff included 20 research assistants, all of whom received at least three hours of training on the recruitment protocol and survey instrument. The protocol included a standardized introduction statement, frequently asked questions about the survey (and answers), and a minimum quota for gender (men and women) and race/ethnicity (white and minority). Research assistants were instructed to recruit students in different locations on campus (e.g., classroom buildings, libraries, and recreation centers) and at different times of the day (morning, afternoon, and evening). The research assistants collected data between October and December 2009. After removing respondents with missing or partial information, the analytical sample included 539 respondents.

Dependent Variables

To examine our research questions, we employed four dependent variables: care for the environment, environmental concern, environmental behaviors, and environmental activism. Table 1 presents definitions, metrics, and descriptive statistics for all variables in the analysis. Below we provide additional background and information about each variable.

Care for the environment. To measure a general attitude toward the environment, we used items from the Carnegie Foundation Political Engagement Survey (Colby, Beaumont, & Ehrlich, 2007). The survey asked respondents to indicate how much they care about eight different public/social topics, using a six-point scale that ranges from “not at all” (coded 1) to “a great deal” (coded 6).

Environmental concern. To measure environmental concern, we used respondents’ evaluation of the seriousness of 12 environmental challenges. The survey asked respondents to evaluate each challenge using a four-point scale that ranges from “this is not a problem at all” (coded 1) to “this is a very serious problem” (coded 4). Factor analysis indicated that responses to these items cluster together along a single dimension and produce a reliable scale (alpha

Cronbach=.84). Therefore, we constructed a scale with the average of all items, with higher values meaning stronger higher environmental concern.

Private environmental behaviors. Previous research on environmental behavior distinguished between private and public pro-environmental behaviors (e.g., Hadler & Haller, 2011; Hunter et al., 2004; Stern, 2000). As such, to measure private environmental behaviors, we used respondents' evaluation of the frequency of engaging in 14 pro-environmental behaviors. These items represented different behaviors that align with the three Rs: reduce (e.g., "avoid printing when possible"), reuse (e.g., "utilize reusable grocery bags") and recycle (e.g., "recycle newspapers, cardboard, fine paper, aluminum, glass, plastic, and other materials"). The survey asked respondents to indicate how often they engage in these behaviors using a four-point scale that ranges from "never" (coded 1) to "always" (coded 4). Factor analysis indicates that responses to these items cluster together along a single dimension and produce a reliable scale (alpha Cronbach=.84). Therefore, we constructed a scale with the average of all items, with higher values meaning frequent engagement in with pro-environmental behaviors.

Public environmental behaviors. To measure participation in public environmental behaviors (i.e., activism), we used pretested items from the 2010 Environmental Module of the ISSP. Respondents were asked to indicate whether, in the past five years, they have: (a) participated in a protest or demonstration about an environmental issue; (b) signed a petition about an environmental issue; and (c) given money to an environmental group. We measured these questions in a binary form: yes (coded 1) and no (coded 0) and analyzed them separately.

Independent Variables

Drawing from our theoretical framework, we examined the effect of two independent variables on students' engagement with sustainability. The first variable is the opportunity to learn about environmental and sustainability topics (hereafter OTL), which is an indicator of curricular experience. Respondents were asked to indicate how often the following situations happened:

“professors and instructors mention environmental issues in class,” “professors and instructors discuss ways for students to protect the environment,” and “professors and instructors mention sustainable development in class.” Following recent work on OTL (Schmidt et al., 2015), we assume that hearing professors and instructors discuss environmental and sustainability issues reflects a greater degree of OTL. The survey asked respondents to use a four-point scale that ranges between “never” (coded 1) to “often” (coded 4). Factor analysis indicates that responses to these items cluster together along a single dimension and produce a reliable scale (alpha Cronbach=.83). Overall, students reported low OTL ($M=2.35$, $SD=.68$). Slightly more than half of the sample (53.6%) reported that environmental issues were mentioned in class sometimes or often. Less than two-fifths of the sample reported that their instructors mentioned ways to protect the environment and the concept of sustainable development sometimes or often (38.0% and 36.6%, respectively).

The second variable is membership in an environmental group on campus, which is an indicator of co-curricular experience. The survey presented respondents with a three-point scale: “no, never,” “yes, but in the past four years,” and “yes, currently.” For simplicity, we recoded the information into a binary form: no (coded 0) and yes (coded 1). One-seventh (14.0%) of the sample reported being affiliated with an environmental group on campus.²

Controls

We controlled for several theoretically relevant student background characteristics. The first group consisted of *school-related characteristics*. Because higher education is found to be correlated with progressive attitudes and behaviors (e.g., Yates, Luo, Mobley, & Shealy, 2015; Pizmony-Levy & Ponce, 2013), we controlled for class standing and overall grade point average (GPA). Class standing is a four-category variable: freshman, sophomore, junior, and senior (with

² In supplementary analysis (available upon request), we used the original three-point scale. We received very similar patterns.

freshman being the reference category). Overall GPA is a self-reported ordinal measure with a five-point scale (below 2.0, 2.0 to 2.5, 2.6 to 3.0, 3.1 to 3.5, and 3.6 to 4.0). Because majors vary in their inclusion of environmental content, we control for discipline by coding all reported majors through Biglan's schema (1973): delineated paradigm (hard versus soft), domain (life systems versus non-life systems), and orientation (pure versus applied). To isolate the effects of membership in other student groups in which mobilization to civic action might take place, we controlled for membership in other groups on campus. Membership in other groups is a simple count of all memberships (ranges from 0 to 10). Finally, research has suggested that affiliation with social fraternities and sororities impact college student development. Therefore, we controlled for membership in the Greek system; membership is measured in a binary form: no (coded 0) and yes (coded 1).

The second group of controls consisted *sociodemographic characteristics*. Past research has suggested that engagement with environmentalism varies across sociodemographic variables, including gender, race/ethnicity, and socioeconomic background. These variables also correlate with educational outcomes and academic engagement. Gender is measured with a binary variable: man (coded 0) and women (coded 1). We measure race and ethnicity with a series of binary variables: white, African American, Asian American, Latinx, and other (with white being the reference category). Parental education is measured in a binary form, with both parents do not hold an academic degree (coded 0) and at least one parent holds an academic degree (coded 1). Subjective social class is measured in a five-point scale (i.e., lower class, working class, middle class, upper-middle class, and upper class).

Results

Descriptive Patterns

We begin by exploring descriptive statistics of students' engagement with sustainability.

Students reported medium-high levels of care for the environment (M=4.53; SD=1.22). More

than half of the sample expressed a high level of care (“great deal,” 24.0% and the next category, 30.5%) and only small fraction of the sample expressed a low level of care (“not at all,” 1.3% and next category, 4.8%). Figure 1 shows that the environment is ranked fourth among all the issues. Students care more about the economy, education, and healthcare than they care about the environment. But, they care more about the environment than they care about international relations and national defense. There was no significant difference between care for the environment and care for poverty and homelessness and racial issues in the United States.³

Figure 1 – About Here

The context of students caring more about the economy, healthcare, and education is important. At the time of data collection in fall 2009, two events captured public discourse and attention. The first was the economy. The United States was slowly emerging from the Great Recession—the largest economic downturn since the Great Depression—resulting in high unemployment, challenging job prospects after graduation, and student and family concerns about how to pay tuition. The second notable event at the time of our data collection was President Barack Obama’s proposal for the Affordable Health Care for America Act, or Obamacare. The contentious public and government debate drove headlines and news programs daily.

The fact that students care more about the environment than they care about international relations and national defense could be explained by generational differences. Most SESSI participants are part of Generation Y—born between 1986 and 1991—and are the first generation to come of age in the new millennium. Taylor and Keeter (2009) have suggested that generational differences influence attitudes toward national security policy. Compared to others,

³ We conducted seven paired t-tests to compare the means of care for the environment and care for other social/public issues. Results are available upon request.

members of Generation Y “appear distinctively less hawkish in 2009 [...]” (Taylor & Keeter, 2009, p.78).

On average, students perceive environmental issues as somewhat serious problems ($M=3.15$; $SD=.59$). As illustrated in Figure 2, students perceive some issues as more serious than others. For example, more than half of the sample perceive “pollution of drinking water or scarcity of fresh water”, “air pollution,” and “loss of natural places for fish and wildlife to live” as a very serious problem (57.1%, 56.6%, and 52.0%, respectively). But, a much smaller portion of the sample perceives “acid rain” and “suburban sprawl” as a very serious problem (20.4% and 13.0%, respectively).

Figure 2 – About Here

The top two environmental concerns suggest that students hold anthropocentric views toward the environment (Thompson & Barton, 1994). That is, students show greatest concern for environmental issues that directly affect humans. Nevertheless, students still have biocentric and ecocentric views toward the environment, showing concern for animals (“loss of natural places for fish and wildlife to live” and “loss of species diversity”) and the ecological system (“depletion of the ozone layer” and “global warming or climate change”).

Although students express a relatively high level of care for the environment and they perceive environmental issues as somewhat serious, they rarely take part in pro-environmental behaviors (Figure 3). The mean of the pro-environmental behaviors scale was 2.4 ($SD=.58$), which falls between “rarely” and “sometimes.” For their most common behaviors, students reported that they “recycle newspapers, cardboard, fine paper, aluminum, glass, plastic, and other materials” and “walk and/or ride bike, instead of using car” (27.3% and 21.8% reported always doing so, respectively). For their least common behaviors, students reported that they “turn off the screen saver option on personal computer” and “unplug appliances when not in use” (40.3% and 35.5% reported never doing so, respectively).

Figure 3 – About Here

Overall, students tend to participate in “light green” pro-environmental behaviors that pose little challenge to daily routines. This pattern is also evident in students’ responses to the concluding question in the survey in which they were asked to suggest environmental activities they would like to participate in to make the campus sustainable or environmentally friendly. To summarize the open-ended responses, we present visual depiction of the most common words used by the respondents in Figure 4.⁴ This “word cloud” gives greater visual prominence to words that appear more frequently in the text. Among the words most frequently used, we see an emphasis on behaviors related to waste management: recycling, bins, trash, waste, paper, and plastic. The open-ended responses suggest that students would like to engage more with recycling. As one respondent wrote, “Increase the number of recycling bins! I've always thought there should be can/bottle recycling bins next to each trash can. The number [of items] I've seen that get tossed in the trash simply because the recycling box is 20 yards further away.” Further, students would like to this behavior to be more seamless. One student stated, “I just want it to be easier to recycle things and I want it to be really clear exactly what can and cannot be recycled.”

Figure 4 – About Here

As for environmental activism, close to three-fifths of the sample (59.0%) participated in at least one form of activism. Signing a petition about an environmental issue was the most common form of activism (44.0%). The next most common form of activism was giving money to an environmental group (23.5%). Taking part in a protest or demonstration about an environmental issue, however, was the least common form of activism (7.9%). In other words,

⁴ We created the word cloud using www.wordle.net. About two-fifths (38.4%) of the students responded to the open-ended question. Logistic regression of the likelihood of responding to the question (available upon request) shows no significant effect for OTL and membership in environmental group. However, students who attended college longer and who are academically engaged are more likely than others to respond to the open-ended question.

students were more likely to participate in low-risk and conventional modes of environmental activism.

How do these variables relate to each other? Table 2 presents the correlation matrix between all the dependent variables in the analysis. We found weak (below the .50 threshold), positive, and significant correlations between all the variables. In other words, the dependent variables are related conceptually, but they are measuring different aspects of engagement with environmentalism and sustainability.

Table 2 – About Here

Multivariate Analysis of Students' Attitudes toward Sustainability

Table 3 presents coefficients from two ordinary least squares (OLS) regression models estimating students' attitudes toward sustainability. We begin with a baseline model that includes the main effect of OTL and membership in environmental group (Model 1). Then, we introduce controls for student background characteristics (Model 2). Looking first to the results for care for the environment, the strong positive coefficients indicate that OTL ($b=.396$, $p<.001$) and membership in an environmental group ($b=.480$, $p<.01$) is associated with a higher level of care for the environment. Once controls are introduced (Model 2), there is little effect on either coefficient.

Table 3 – About Here

The results for environmental concern appear to challenge the findings presented above. Across both models, the effect for OTL is weak and positive ($b=.076$ and $b=.074$, $p<.05$). Also, across both models, the effect of membership in environmental group is weak and positive ($b=.186$ and $b=.161$, $p<.05$). That is, greater exposure to environmental and sustainability topics in the curriculum and membership in environmental group are associated with very little change in students' environmental concern.

To compare the models, we used fully standardized estimates (i.e., standardized dependent and independent variables). For OTL, the standardized coefficient on care for the environment is stronger than the standardized coefficient on environmental concern ($\beta=.215$ vs. $\beta=.086$). A similar pattern is found for membership in environmental group ($\beta=.132$ vs. $\beta=.096$).

Of the control variables we introduced in Model 2, we found that class standing, GPA, majors, membership in social fraternities or sororities, gender, and race/ethnicity are significant predictors of environmental attitudes. Students who attended college longer and who are academically engaged reported higher levels of care for the environment. Students in applied majors (e.g., interior design, management, and public affairs) display lower levels of environmental concern. Members of social fraternities or sororities reported lower levels of care for the environment. Women reported higher levels of pro-environmental attitudes: care for the environment and environmental concern. Finally, among racial/ethnic groups, Asian American students displayed lower levels of environmental concern.

Multivariate Analysis of Students' Behaviors

Table 4 focuses on students' private pro-environmental behaviors. The organization of the statistical models is similar to the one we use above. The strong positive coefficients in Model 1 indicate that OTL ($b=.220$, $p<.001$) and membership in an environmental group ($b=.258$, $p<.001$) are associated with more frequent engagement with private pro-environmental behaviors. These patterns hold even after we control for background characteristics (Model 2). Of the control variables we introduced in Model 2, we found that class standing, GPA, majors, membership in social fraternities or sororities, gender, and race/ethnicity are significant predictors of public pro-environmental behaviors. We discuss these patterns later.

Table 4 – About Here

Table 5 focuses on students' public pro-environmental behaviors, also known as environmental activism. Here, we present two models for each of the three modes of activism:

signing petition, giving money to a group or a cause, and participating in a protest or demonstration. Because these behaviors are measured in a binary form (where yes is coded 1, and no is coded 0), we used logistic regression to predict the probability of taking part in different types of environmental activism.

Across all three types of activism, we found strong positive coefficients for OTL and membership in an environmental group (Model 1). Pro-environmental activism is more likely among students who were exposed to environmental and sustainability issues in the curriculum and students who are members in environmental group. These patterns hold and become stronger after we control for background characteristics (Model 2).

Table 5 – About Here

For a more concrete interpretation of these results, Figure 5 contains predicted probabilities based on Model 2 in Table 5. For signing a petition, when other independent variables are at their mean levels, students with no exposure to environmental and sustainability topics in the curriculum and who are not members of environmental group have a .25 probability of signing petition. The probability increases to .82 for students with maximum exposure to environmental and sustainability topics in the curriculum and who are members of an environmental group. We found similar patterns in the case of giving money to an environmental group or a cause (.12 probability versus .63 probability) and in the case of participating in an environmental protest or demonstration (.02 probability versus .40 probability).

Figure 5 – About Here

In addition to the independent variables, several control variables are associated with pro-environmental behaviors. We begin with *school-related characteristics*. Students who attended college longer and who are academically engaged reported higher levels of private behaviors. This pattern is not evident in the case of public behaviors. Students in applied majors are less likely to engage with pro-environmental behaviors. The direction of the coefficient is

consistently negative, but the coefficient is significant only in two models (i.e., private behaviors, and protest and demonstration). Students in “soft” majors (e.g., business, education, psychology, and sociology) are more likely than others to participate in protest and demonstration. Members of social fraternities or sororities reported lower levels of private behaviors. Members of other groups on campus, however, are more likely to sign a petition and participate in protests and demonstrations.

As for *socio-demographic characteristics*, we found that gender, race/ethnicity, social class are significant predictors of pro-environmental behaviors. Women reported higher levels of private behaviors and a higher likelihood of signing a petition. Overall, white students reported higher levels of private behaviors than students of other racial and ethnic groups. Finally, we found that students from higher socioeconomic classes are more likely to give money to an environmental group or cause. We suspect that this pattern is a result of access to more financial resources.

Discussion

The past two decades have seen the proliferation of environmental and sustainability education in higher education institutions. By analyzing students’ survey responses at a public university in the United States, we have found a gap between high pro-environmental attitudes (care for the environment and environmental concerns) and relatively low reports of pro-environmental behaviors. In other words, among college students, pro-environmental attitudes do not necessarily translate into action. And when they do act, students engage with light green behaviors, such as recycling and reusing materials.

Following the *whole student* framework, we posit that exposure to environmental and sustainability education could take the form of curriculum (courses and lectures) and/or the co-curriculum (e.g., an environmental group). Our study points to an interesting pattern. Exposure to environmental content in college shapes active engagement with environmentalism, such as care

for the environment and pro-environmental behaviors. This exposure, however, has a limited impact on students' passive engagement with environmentalism, such as environmental concerns. We speculate that passive engagement is developed prior to college and thus increased exposure to environmental content has little effect on students.

While OTL and membership in an environmental group have significant effects on students, we found inconsistent patterns for school-related and socio-demographic variables. Academic engagement (measured by GPA), for example, has positive and significant effect on students' care for the environment and private pro-environmental behaviors but has no significant effect on other outcomes. This inconsistency is true for all variables, except for gender. Across four out of six outcomes, we found significant gender differences. Similar to previous research (Yates, Luo, Mobley, & Shealy, 2015), women hold stronger pro-environmental attitudes than men. Furthermore, women participate in more private pro-environmental behavior, and they are more likely to sign a petition about environmental challenges. We conclude that this pattern may be linked to gender socialization theory, which suggests that society conditions girls to be more nurturing and caring than boys (Moahi, 1992).

Our study has three limitations. First, the survey does not gauge students' environmental knowledge. Therefore, we cannot assess the role of knowledge in shaping students' engagement with environmentalism. It is possible that enhancing knowledge is one of the mechanisms through which exposure to environmental and sustainability content influence engagement. Future research could address this limitation by including a short battery of items measuring environmental knowledge. Second, the survey includes only one measure of co-curricular activities. Thus we might underestimate the effect of co-curricular factors on students. Third, the survey is based on a single four-year public research institution. Social context is likely to affect college student development. Replication of this study in various types of institutions—two-

versus four-year, private versus public, research versus undergraduate focus—will strengthen the conclusions of this study.

Higher education institutions are often seen as incubators for the development of competent social actors (Nussbaum, 1998, 2010; Stevens, Armstrong & Arum, 2008). Throughout its history, higher education has evolved in concert with changing economic, political, and social conditions, while simultaneously aiming to graduate students who are motivated to be responsible, engaged members of society. In turn, higher education institutions have the capacity to be a powerful force for social change (Crossley, 2008; Gaston-Gayles, Wolf-Wendel, Tuttle, Twombly, & Ward, 2005; Kezar, 2010; Rhoads, 2009). A brief scan of American history offers many examples of higher education's success in helping to address sociopolitical problems and meaningful engagement with the civil rights, LGBT rights, and women's liberation movements as well as the HIV/AIDS epidemic (Beemyn, 2003; Eisenmann, 2005; Giroux & Giroux, 2004; Hightow et al., 2005; Jacobs, 1996; Kelly, 2005; Rojas, 2007; Young & McKibban, 2014). In particular, some scholars argue that it was students' formal learning experiences that inspired them to drive these social causes (Kezar, 2010; Rhoads, 2009; Wade, 2013). Environmental sustainability is no different from these examples.

This study illuminates important considerations for higher education policymakers. The results call for increased infusion of environmental and sustainability content across the curriculum and the co-curriculum. We expect this would result in more students engaging with environmentalism throughout their higher education experiences, and in turn, throughout their lives as they transition into responsible citizens. In the face of global climate change, it is time for higher education institutions to realize their civic mission by taking serious actions to promote environmental citizenship. Time is running out.

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Table 1: Definition, Metrics, and Descriptive Statistics for All Variables in the Analysis (n=539)

Variable	Description / Metrics	Mean	Standard Deviation
<i>Dependent Variables</i>			
Care for the environment	How much do you care about each of the following issues? Range: 1=not at all to 6=a great deal	4.53	1.22
Environmental concern	Average of 12 items. Here is a list of environmental issues that are in the news these days. Some people think these are serious problems, while other people think these are not really problems at all. We would like to know what you think. 1=this is not a problem at all, 2=this is not a very serious problem, 3=this is a somewhat serious problem, 4=this is a very serious problem	3.15	.59
Pro-environmental private behaviors	Average of 14 items. How often you do the following activities? 1=never, 2=rarely, 3=sometimes, and 4=always	2.44	.56
Petition	In the last five years...have you signed a petition about an environmental issue? 1=yes, 0=no	.44	
Donate money	In the last five years...have you given money to an environmental group? 1=yes, 0=no	.24	
Protest/demonstration	In the last five years...have you taken part in a protest or demonstration about an environmental issue? 1=yes, 0=no	.32	
<i>Independent Variables</i>			
Opportunity to learn	Average of three items: "professors and instructors mention environmental issues in class", "professors and instructors discuss ways for students to protect the environment", "professors and instructors mention sustainable development in class". 1=never, 2=rarely, 3=sometimes, and 4=always	2.35	.68
Membership in environmental group	Do you belong to any of these kinds of campus or community groups, or have you belonged to them in the past 4 years...environmental group? 1=yes, 0=no	.14	
Female	1=female, 0=male	.58	
Race/ethnicity			
White	1=white, 0=other	.72	
African American	1=African American, 0=other	.12	
Asian American	1=Asian American, 0=other	.09	
Hispanic	1=Hispanic, 0=other	.02	

Variable	Description / Metrics	Mean	Standard Deviation
Other	1=other groups, 0=other	.05	
Social class	If you were asked to use one of five names for your socio-economic background or social class, which would you say your family belongs in? 1=lower class, 2=working class, 3=middle class, 4=upper middle class, 5=upper class	3.32	.85
First generation student	What is the highest level of education that your parent(s) completed? 1=neither parents hold an academic degree, 0=one or both parents hold an academic degree	.30	
Class standing	What is your current classification in college? 1=freshman/first-year, 2=sophomore, 3=junior, 4=senior	2.32	1.16
Grade point average (GPA)	Which best describes your overall GPA at college? (If this is your first semester of college, please report your expected GPA). 1=Below 2.0, 2=2.0-2.5, 3=2.6-3.0, 4=3.1-3.5, 5=3.6-4.0	3.96	.85
Soft discipline	Following Biglan (1973): hard disciplines have single paradigms and soft disciplines have multiple paradigms. 1=soft, 0=hard	.84	
Applied discipline	Following Biglan (1973): pure disciplines produce knowledge for discovery and applied disciplines produce applied knowledge. 1=applied, 0=pure	.65	
Non-life major	Following Biglan (1973): life majors concern life systems and non-life majors concern. 1=non-life major, 0=life major	.52	
Membership in other groups	Percentage of memberships in campus groups out of 11 groups.	.29	.23
Membership in Greek system	Are you a member of a social fraternity or sorority? 1=yes, 0=no	.13	

Table 2: Pearson Correlation Matrix for All Dependent Variables

	V1	V2	V3	V4	V5
V1 Care for the environment					
V2 Environmental concern	.43***				
V3 Pro-environmental private behaviors	.47***	.26***			
V4 Petition	.33***	.27***	.31***		
V5 Donate money	.22***	.20***	.17***	.24***	
V6 Protest/demonstration	.21***	.19***	.22***	.21***	.27***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: OLS Regression Unstandardized Estimates for Environment Attitudes on Selected Independent Variables (n=539)

	Care for the Environment		Environmental Concerns	
	Model 1	Model 2	Model 1	Model 2
Opportunity to learn	.396*** (.075)	.386*** (.075)	.076* (.037)	.074* (.037)
Membership in environmental group	.480** (.146)	.462** (.151)	.186* (.072)	.161* (.074)
Class standing		.098* (.045)		-.013 (.022)
GPA		.165** (.063)		-.002 (.031)
Major: Soft		.070 (.153)		.068 (.075)
Discipline: Non-life		-.011 (.110)		.023 (.054)
Discipline: Applied		-.122 (.119)		-.103 (.058)
Membership in Greek system		-.487** (.157)		-.094 (.077)
Membership in other groups		-.311 (.237)		-.084 (.116)
Female		.309** (.106)		.265*** (.052)
Race/ethnicity				
Black		.099 (.167)		-.111 (.082)
Asian		-.321 (.234)		-.286* (.115)
Hispanic		-.171 (.378)		.083 (.186)
Other		-.348 (.245)		.061 (.121)
Social class		-.059 (.070)		-.016 (.034)
First generation student		.022 (.128)		-.011 (.063)
Intercept	3.530***	2.884***	2.945***	2.952***
Adjusted R ²	.070	.118	.018	.079

Standard errors in parentheses | * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: OLS Regression Unstandardized Estimates for Private Pro-Environmental Behaviors on Selected Independent Variables (n=539)

	Model 1	Model 2
Opportunity to learn	.220*** (.034)	.213*** (.032)
Membership in environmental group	.258*** (.065)	.206** (.065)
Class standing		.073*** (.019)
GPA		.102*** (.027)
Major: Soft		.024 (.066)
Discipline: Non-life		.005 (.048)
Discipline: Applied		-.115* (.051)
Membership in Greek system		-.274*** (.068)
Membership in other groups		.106 (.103)
Female		.148** (.046)
Race/ethnicity		
Black		-.104 (.072)
Asian		-.254* (.101)
Hispanic		-.472** (.164)
Other		-.086 (.106)
Social class		-.027 (.030)
First generation student		-.023 (.056)
Intercept	1.895*** (.082)	1.449*** (.190)
Adjusted R ²	.102	.210

Standard errors in parentheses | * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Logistic Regression Odds-Ratio Estimates for Public Pro-Environmental Behaviors on Selected Independent Variables (n=539)

	Sign Petition		Give Money		Protest	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Opportunity to learn	.527*** (.138)	.542*** (.144)	.365* (.158)	.403* (.164)	.524* (.260)	.608* (.276)
Membership in environmental group	1.442*** (.280)	1.166*** (.300)	1.295*** (.258)	1.354*** (.287)	2.073*** (.339)	1.897*** (.382)
Class standing		.080 (.085)		.054 (.097)		.019 (.163)
GPA		.222 (.118)		-.049 (.134)		.080 (.218)
Major: Soft		.023 (.293)		.329 (.338)		1.357* (.650)
Discipline: Non-life		.193 (.209)		-.287 (.240)		.370 (.392)
Discipline: Applied		-.236 (.223)		-.174 (.253)		-1.005* (.394)
Membership in Greek system		-.399 (.302)		-.259 (.345)		-.557 (.634)
Membership in other groups		1.123* (.447)		.263 (.500)		1.745* (.749)
Female		.522** (.201)		.010 (.231)		.185 (.394)
Race/ethnicity						
Black		-.144 (.320)		-.431 (.387)		-.730 (.640)
Asian		-.428 (.457)		.527 (.470)		-.931 (1.132)
Hispanic		.014 (.707)		.283 (.749)		.209 (1.148)
Other		-.103 (.470)		.797 (.472)		.749 (.693)
Social class		-.234 (.134)		.381* (.152)		.090 (.235)
First generation student		-.216 (.244)		.468 (.276)		.093 (.462)
Intercept	-1.686***	-2.419**	-2.286***	-3.844***	-4.320***	-6.590***
Pseudo R^2	.066	.107	.054	.079	.137	.208

Standard errors in parentheses | * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 1: Care for Social/Public Issues

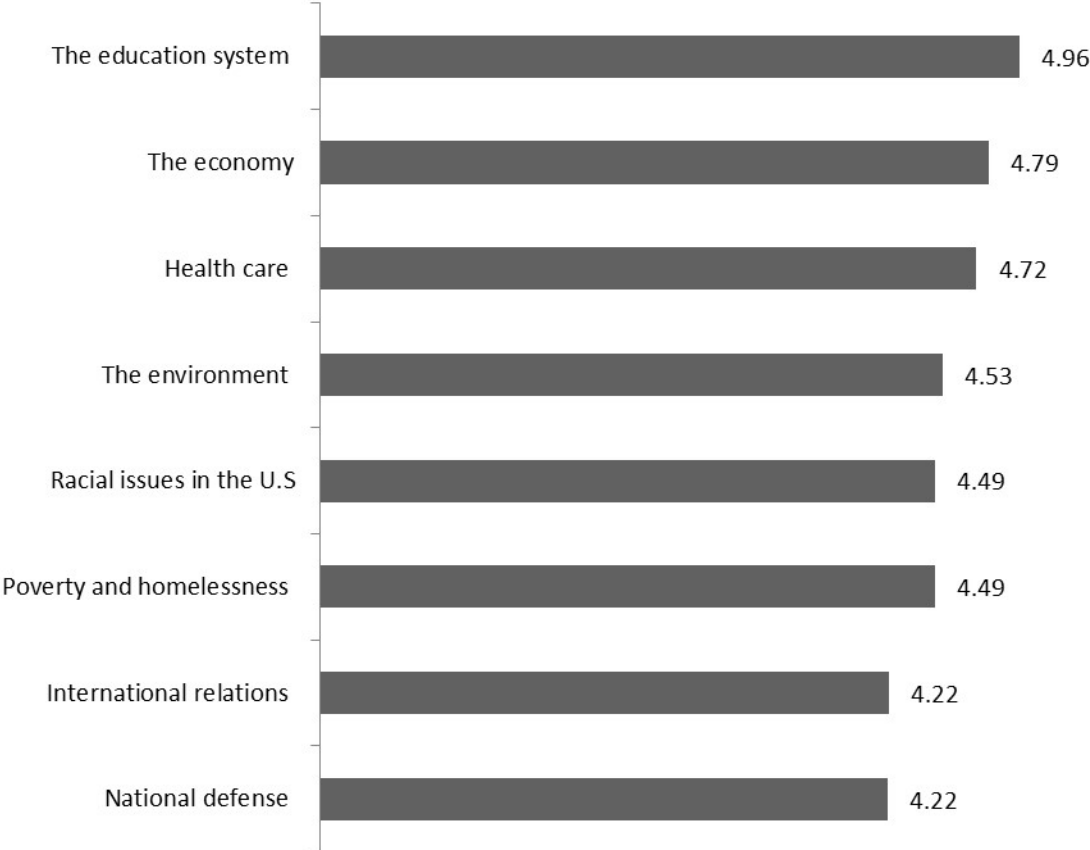


Figure 2: Environmental Concerns

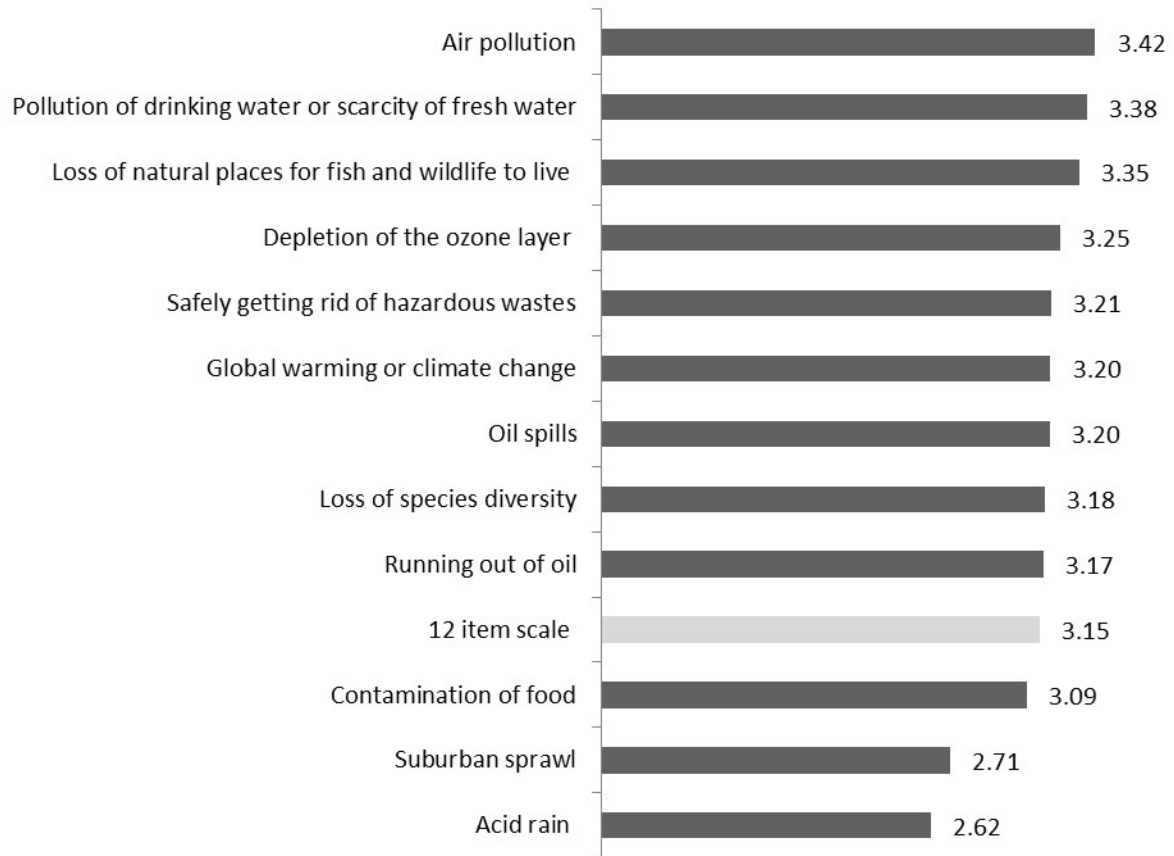


Figure 3: Private Pro-Environmental Behaviors

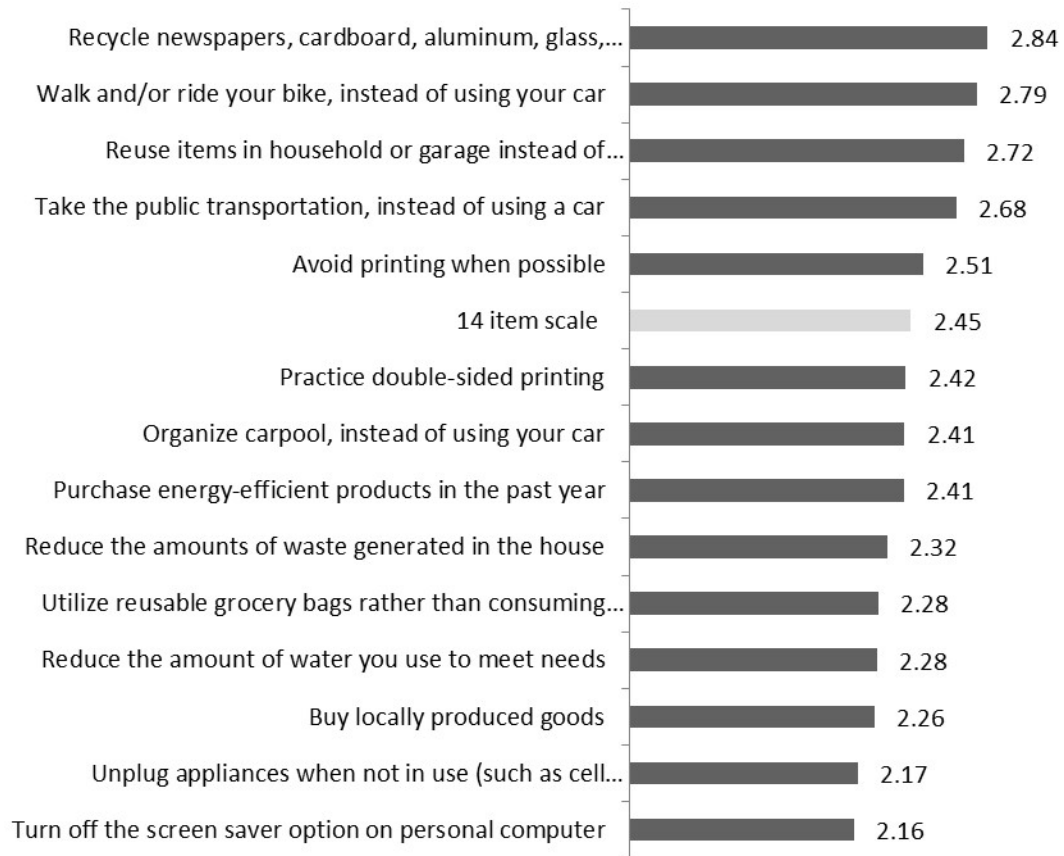
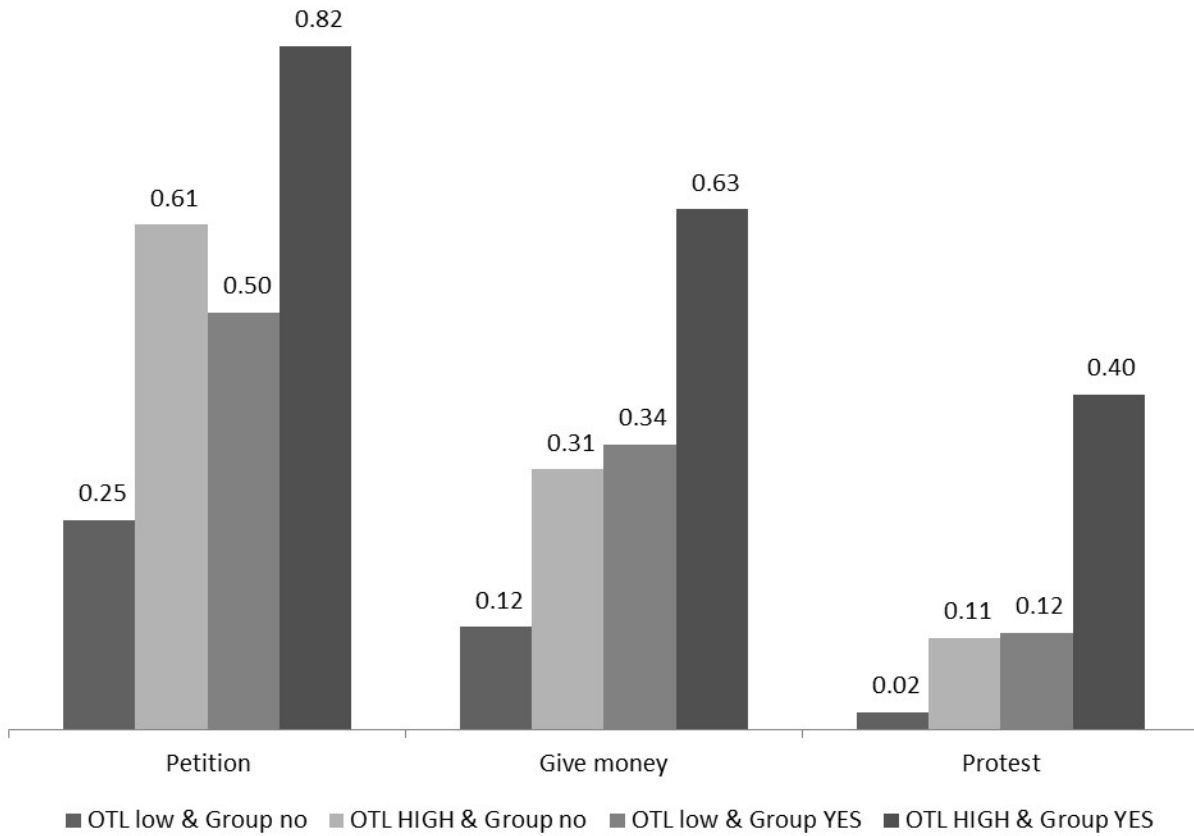


Figure 4: Most Common Words in Open-Ended Responses



Figure 5: Predicted Probabilities of Students' Participation in Public Environmental Behaviors: Signing Petition, Giving Money, Protesting



Note: Predictions are based on Model 2 of Table 5 and are adjusted to reflect the mean levels of other independent variables.

Appendix 1: Key Socio-Demographics of Student Population and Sample

	Student Population Indiana University	Student Sample
Female	.50	.58
Race/ethnicity		
White	.85	.76
African American	.05	.12
Asian American	.04	.05
Hispanic	.04	.02
Other	.02	.05
International students	.07	.06
Class standing		
Freshman	.25	.33
Sophomore	.25	.24
Junior	.23	.19
Senior	.27	.23

Source: https://www.iu.edu/~uirr/doc/reports/diversity/student/1-IU_BL_base_05_14.pdf