Investigating environmental values and psychological barriers to sustainable behaviors among college students

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ABSTRACT

Sustainable and pro-environmental actions at the individual level are influenced by a myriad of external and internal factors. The "value-action gap" describes the disconnect between one's environmental values and attitudes, and their actual behaviors. While many acknowledge that climate change is a major threat in today's world, a multitude of structural and psychological barriers exist which prevent individuals from engaging in eco-friendly practices. The Honors Culture of Sustainability Lab is a campus living laboratory in which Honors undergraduate students at a North American University engage in interdisciplinary research exploring cultural and social aspects of sustainability. As part of a course-based undergraduate research experience under the coordination of a faculty advisor, the team undertook a study investigating values and ideas about sustainability and psychological barriers to sustainable behavior among their university's student population. Data was collected through a survey that received 765 responses (undergraduate and graduate students from several colleges and diverse demographic backgrounds). The survey was developed using the New Ecological Paradigm - NEP and the Dragons of Inaction Psychological Barriers - DIPB measurement scales. Students at the university widely expressed environmental values and concern about climate change. Agreement or strong agreement with statements reflecting the New Ecological Paradigm ranged from 67% to 92%. Respondents agreed that action should be taken to promote sustainability, but they might need help to translate beliefs into action. The most influential psychological barriers showed: resistance to transforming habits and lifestyles, need for more information on how to change, and a feeling of unfairness in face of industry-caused environmental degradation. Most students would be willing to engage in a sustainability-related campaign. Identifying what prevents students from changing their habits and behaviors will help guide institutional efforts to promote a culture of sustainability on our campus. By understanding how students view and practice sustainability on an individual level, measures can be implemented that more effectively address and overcome psychological barriers to pro-environmental behaviors. Based on these findings, it may be beneficial to provide more education on how to get involved in sustainable behaviors and offer potential incentives to change habits.

Introduction

Given the current condition of our climate and environment, it is important that people adopt pro-environmental mindsets and participate in behaviors that align with these

mindsets. Committing to more sustainable behaviors and actions is dependent on social, psychological, and structural factors. While many understand that climate change is a major issue, they are aware that changes must be made to address this issue, and even if they have pro-environmental values, several are reluctant to change their behavior patterns so that their actions are more sustainable. Identifying and understanding the psychological barriers that people struggle with is an important part of explaining and resolving the dissonance between sustainable values and sustainable action.

To investigate values and attitudes regarding the environment and understand how this value-action gap manifests itself among college students, the undergraduate research team in the Virginia Tech Honors Culture of Sustainability Lab undertook, under the coordination of a faculty advisor, a study investigating values and ideas about sustainability and psychological barriers to sustainable behavior among their university's student population. The present study is part of this campus living laboratory in which Honors undergraduate students engage in interdisciplinary research exploring cultural and social aspects of sustainability.

The study aims to answer the following research questions: What are Virginia Tech students' values and opinions regarding the environment? What are the most prominent psychological barriers to pro environmental behavior among these students? For each set of constructs, the study investigates: how they manifest in the overall sample, differences between demographic groups, and relationships among constructs. The answers to these questions will provide more insight into the state of environmental awareness and behavior among the student population. These insights will be used to inform the Office of Sustainability's efforts on campus and will guide the implementation of measures that will more effectively assist students in addressing the psychological barriers that are most prominent at the college level.

Literature Review

Environmental attitudes are defined as the care or concern that one has for the environment. The concern for the environment is affected by factors such as: levels of environmental concern, personality and values, education and environmental knowledge, direct experience with nature, and demographic background. It is important to study the relationship between environmental values, attitudes, and behavior to understand how these dimensions affect people's willingness to engage in sustainable action (Gifford & Sussman, 2012). Several measurement scales have been developed to assess people's values and attitudes regarding the environment. The New Ecological Paradigm Scale (Dunlap et al. 2000) is used to gauge whether a respondent supports the ideas of the prevailing anthropocentric worldview (Dominant Social Paradigm), or alternatively the ideas of a pro-environmental worldview (New Ecological Paradigm).

The process of behavior change toward sustainability is complex and does not correspond to a linear model in which ecological knowledge would lead to awareness, then directly to action (Roizman, 2001; Blake, 1999). This discrepancy is described as the value-action gap in pro environmental behavior (Kollmuss & Agyeman, 2002). While authors discussed a variety of external and internal factors that contribute to the value-action gap, our research only focuses on the latter as we were exploring psychological barriers to environmental action. Structural barriers are important as well -- however, for "almost everyone who is not severely restricted by structural barriers, adopting more pro-

environmental choices is possible, but this is not occurring to the extent necessary" (Gifford, 2011, p.1). The purpose of our study was to investigate in our local setting why people expressing pro-environmental values and attitudes do not always engage in behaviors that match these values. People may care about the environment, but their lack of sustainable behaviors is due to other significant factors that must be considered. Lack of pro-environmental action is not necessarily due to a lack of awareness, or a lack of ability to change.

The piece of literature most central to our study is Dragons of Inactions: Psychological Barriers that Limit Climate Change Mitigation and Adaptation (Gifford, 2011), which categorizes, and labels psychological barriers faced by humans which limit their environmental behaviors, informally called 'dragons of inaction'. There are seven categories of barriers, 'dragon families', labeled as Limited Cognition, Ideologies, Comparisons with Others, Sunk Costs, Discredence, Perceived Risks, and Limited Behaviors. While in this foundational work there are a total of 29 dragons distributed throughout the seven families, later work in psychometrics (Lacroix et al, 2019) developed the Dragons of Inaction Psychological Barriers (DIPB) Scale, a measure to investigate psychological barriers to pro environmental behavior into five subscales: Change Unnecessary, Conflicting Goals and Aspirations, Interpersonal Relations, Lacking Knowledge, and Tokenism.

Methods

The study surveyed students at the Virginia Tech main campus (Blacksburg, Virginia, United States) in the Spring of 2022. A non-probabilistic sampling method was used, collecting 765 responses over the course of the three-week-long data collection period. 90% of respondents were undergraduate students, 40% lived on campus. The colleges with the greatest representations were Engineering (27%), Science (18%), and Liberal Arts and Human Sciences (15%); matching approximately the student population distribution. 55% students were in their first/second year and respondents' average age was 20.8 years old. 38% identified as male and 58% as female. 65% are White, 16% are Asian/Asian American, 7% Black/African American, 6% Hispanic/Latinx. 94% of students are from the US. When asked if they have ever participated in a sustainability-related class or project, 58% and 46% of respondents answered 'yes', respectively.

The research was designed as an exploratory, quantitative, cross-sectional study aimed to identify characteristics, patterns and correlations and test relationships between variables related to values and attitudes regarding environment and psychological barriers to pro environmental action. The primary data collection instrument was an online survey questionnaire investigating the following constructs and measures:

> *Values and Opinions Regarding the Environment.* Assessed using the New Ecological Paradigm, a scale with 15 items proposed by Dunlap et al. (2000), which is divided into two sub-scales: New Ecological Paradigm (NEP) and Dominant Social Paradigm (DSP).
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> *Psychological Barriers to Pro Environmental Behavior*. Assessed with the Dragons of Inaction Psychological Barriers (DIPB), a 22-item scale proposed by Lacroix et al. (2019) and composed by five subscales. The measurement strategy starts with a question prompting respondents to select one of the major types of pro-environmental behavior that they could perform more/better than they already do.

Respondents were then invited to respond why they did not adequately engage in that behavior by rating their agreement to 22 sentences. Example items for the DIPB scale would be:

- Change Unnecessary: “There's not much point in making this change because I feel confident that technological innovators will solve environmental problems”
- Conflicting Goals and Aspirations: “I can't change because I'm invested in my current lifestyle”
- Interpersonal Relations: “f I made the necessary change, I probably would be embarrassed when others noticed what I was doing”
- Lacking Knowledge: “There's so much information out there that I'm confused about how to make this change.”
- Tokenism: “The pro-environmental efforts that I currently engage in make further changes unnecessary”
- Industry Causing: “It’s not fair for me to change when really it’s industry that’s causing the majority of environmental problems”

Willingness to Engage in Sustainability-Related Campaigns. Assessed with a measurement scale proposed for this study, based on three priorities to promote change towards sustainable action on campus: reducing waste, saving energy in campus buildings, and changing to more sustainable modes of transportation.

Data analysis was conducted using quantitative methods and non-parametric statistical tests. Reliability analyses confirmed the internal consistency of all measurement scales and subscales for the data in the study. Descriptive statistics and internal consistency for all measures in the study are presented in Table 1.

Table 1

Descriptive Statistics and Internal Consistency for Study Measures

Scale	# Items	Mean	*SD*	Median	*IQR*	Internal Consistency
Values & Attitudes Regarding the Environment						
New Ecological Paradigm	8	4.10	0.52	4.13	0.71	.73
Dominant Social Paradigm	7	2.67	0.62	2.57	1.00	.71
Psychological Barriers to Pro Environmental Behavior						
Change Unnecessary	5	1.82	0.65	1.80	1.20	.82
Conflicting Goals and Aspirations	5	2.79	0.81	2.80	1.00	.73
Interpersonal Relations	4	1.76	0.73	1.75	1.67	.86
Lacking Knowledge	3	2.86	1.00	3.00	1.00	.79
Tokenism	4	2.03	0.68	2.00	2.00	.83
Industry Causing	1	3.00	1.01	3.00	2.00	one-item
Willingness to Engage in Sustainability Campaign [1]	3	3.44	1.08	3.67	0.66	.86

Note. All measures have responses choices ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), except when noted. [1] Response choices range from 1 (*not at all engaged*) to 5 (*extremely engaged*).

Results

1. What are Virginia Tech students’ values and opinions regarding the environment?

In general, respondents displayed pro-environmental values and opinions: high agreement with statements reflecting the New Ecological Paradigm (M = 4.10), and low agreement with the Dominant Social Paradigm (M = 2.67). 92% of respondents

agree/strongly agree that humans are seriously abusing the environment (M = 4.49), while 90% agree/strongly agree that humans are still subject to the laws of nature, despite special abilities (M = 4.32). “If things continue on their present course, we will soon experience a major ecological catastrophe” had 89% of agreement (M = 4.42), while 85% agree/strongly agree that plants and animals have as much right as humans to exist (M = 4.30).

Reflecting similar trends, several statements in the Dominant Social Paradigm subscale (DSP) had high levels of disagreement. When prompted with the statement “The so-called ecological crisis facing humankind has been greatly exaggerated”, 79% of respondents disagreed or strongly disagreed (M = 1.85). 72% of participants disagree that the balance of nature is strong enough to cope with industrial impact (M = 2.21). The domination of humans over nature is not a widely held belief among Virginia Tech students: 69% of respondents disagree or strongly disagree with the statement "Humans were meant to rule over the rest of nature” (M = 2.16). The higher levels of agreement with DSP items were 57% for “The Earth has plenty of natural resources if we just learn how to develop them” (M = 3.57) and 47% for “Human advancement and innovation will ensure that we do not make the Earth unlivable” (M = 3.32). Responses were widely balanced on the statement regarding human's right to modify the environment to suit their needs: 31% responded neutrally, while 34% agreed and 35% disagreed (M = 3.00). One of the strongest relationships found in this study reflects the contrast between the ideas of the New Ecological Paradigm and Dominant Social Paradigm. A Pearson correlation coefficient showed a negative relationship between students’ agreement with each paradigm (correlation of -.48, $p \leq .001$).

Differences across demographic groups. A Wilcoxon Rank Sum test showed a statistically significant difference ($W = 29059$, $p \leq .05$) between undergraduate and graduate students in their responses to questions regarding the Dominant Social Paradigm: undergraduate students align slightly more with the Dominant Social Paradigm. A Kruskal-Wallis test showed a significant difference was found in the level of agreement with the Dominant Social Paradigm across the nine different colleges ($H = 30.671$, $p \leq .001$). Members of some colleges align more closely with the Dominant Social Paradigm than others: a Pairwise Wilcoxon rank sum comparison revealed that students in Agriculture and Life Sciences and Architecture and Urban Studies were less likely to follow the Dominant Social Paradigm than were students in Engineering. Significant difference between gender groups regarding environmental values and attitudes was found for both subscales. For support to the New Ecological Paradigm, females ranked higher than males (Mdn = 4.25 over 4.00, $p \leq .001$), while for support to the Dominant Social Paradigm, males ranked higher than females (Mdn = 2.86 over 2.43, $p \leq .001$).

Influence of participation in sustainability classes or projects. Participation in sustainability classes granted less support for the Dominant Social Paradigm. A Wilcoxon Rank Sum test showed that there was a statistically significant ($W = 63454$, $p \leq .001$) between the participants who had taken a sustainability class before (Mdn = 2.57) compared to participants who have not taken a sustainability class before (Mdn = 2.71) regarding agreement with the Dominant Social Paradigm. Previous participation on a sustainability-related project affected students’ values and attitudes regarding the environment. Students who participated in projects supported statistically significantly more the New Ecological Paradigm than students who did not participate in these projects (Mdn = 4.12 over 4.12, $W = 85043$, $p \leq .001$). Conversely, students who did not

participate on a project supported more the Dominant Social Paradigm than those who participated on a project (Mdn = 2.71 over 2.57, W=58280, p ≤.001).

2. What are the most prominent psychological barriers to pro environmental behavior among Virginia Tech students?

Data analysis showed that the three most prominent psychological barriers were Conflicting Goals & Aspirations (M = 2.79), Lacking Knowledge (M = 2.86), and Industry Causing (M = 3.0). There was no significant difference among these three barriers. There was a clear contrast between responses to these scales and the responses to the least prominent psychological barriers: Change Unnecessary (M = 1.825), Interpersonal Relations (M = 1.76), and Tokenism (M = 2.03). Overall, the individual items with the highest rate of agreement were "These issues are important to me but it's too hard to change my habits" and "I'd like to change but I'm not sure where to start" with 55% and 50% of respondents who agree, respectively. On the other side, several items in the three least prominent barriers had exceptionally high levels of disagreement, ranging from 73% to 89%. In addition to the prevalence of the three main psychological barriers, there are a number of significant positive correlations among the subscales: positive correlations between Conflicting Goals & Aspirations and Industry Causing ($r = .36$, $p \leq .001$), Conflicting Goals & Aspirations and Lacking Knowledge ($r = .23$, $p \leq .001$), Change Unnecessary and Tokenism ($r = .62$, $p \leq .001$, Change Unnecessary and Interpersonal Relations ($r = .53$, $p \leq .001$), and Interpersonal Relations and Tokenism ($r = .47$, $p \leq .001$).

Differences across demographic groups. After analyzing the data on how the psychological barriers were distributed across demographic groups, a few significant differences have been found. For instance, Lacking Knowledge as a psychological barrier to pro-environmental behavior was different when comparing first-year and fourth-year students ($H = 16.466$, $p \leq .001$): first-years were more likely to consider the lack of knowledge as a barrier (Mdn = 3.00) than fourth years (Mdn = 2.67). This key piece of data can help to guide the Office of Sustainability in their efforts of assisting younger students in knowing more about sustainable efforts. A significant difference in psychological barriers across the colleges was found only for the Change Unnecessary subscale ($H = 28.729$, $p \leq .001$). Students in Architecture and Urban Studies (Mdn =1.40) were less likely to agree that pro environmental change is not necessary than students in three other colleges: Engineering (Mdn = 1.80), Science (Mdn = 1.80), Business (Mdn = 2.00).

Males had higher agreement with the Change Unnecessary barrier than females. Females were also less likely to agree with the Interpersonal Relations. For Tokenism, tests also indicated a statistically significant difference between males and females. Lastly, for Industry Causing, differences were found between males and females and between respondents who prefer to self-identify and those who prefer not to disclose their gender.

Influence of participation in sustainability classes or projects. There was no statistically significant difference in any of the 6 psychological barriers found between respondents who had previously taken a sustainability-related class as opposed to those who hadn't, as shown by a Wilcoxon Rank Sum test conducted. On the other hand, the test showed that previous participation in a sustainability-related project can generate differences in score for two barriers: Change Unnecessary and Interpersonal Relations: those who had

previously worked on a sustainability-related project (n = 353) were more likely to disagree with items in the Change Unnecessary subscale (W = 60,302, p < .001) than those who did not previously participate in a project (n = 412). Student who participated in projects were also less likely to agree with interpersonal relations items as barriers than those who did not participate before (W =64,696, p < .001).

3. How much are students willing to engage in sustainability-related campaigns?

Participants demonstrated high levels of willingness to engage in case the Virginia Tech Office of Sustainability proposes a sustainability-related campaign (M = 3.44). 51% of respondents would be very or extremely engaged on a campaign aimed at diminishing waste on campus (M = 3.41), while 51% would be very/extremely engaged on efforts to save energy on campus buildings (M = 3.37). Changing to more sustainable modes of transportation was the topic that would have the highest level of engagement: 57% of respondents would be very or extremely engaged (M = 3.52).

Differences across demographic groups. Comparison tests were completed to find statistical significance between respondents' willingness to engage in sustainability-related campaigns and their demographic information. We found a difference across colleges (H = 35.303, p ≤ .001). Students in Architecture and Urban Studies (Mdn = 4.00) were more likely to engage than students in Agriculture and Life Sciences (Mdn = 3.67), Engineering (Mdn = 3.33), Liberal Arts and Human Sciences (Mdn = 3.33), Business (Mdn = 3.00).

Differences in gender groups regarding willingness to engage in a sustainability campaign were statistically significant (W= 15.264, p ≤ .001). Females (Mdn = 3.67) were more likely to engage than males (Mdn = 3.33),; and those who preferred to self-identify (Mdn = 4.00) were also more engaged than males.

Influence of participation in sustainability classes or projects. Students who previously attended a sustainability class are more willing to engage in a sustainability campaign at the university than students who did not attend a class before. Comparison tests show a significant difference (W = 80917, p ≤ .001). Similarly, students who participated in a sustainability project before expressed higher levels of willingness to engage than those who had not participated in a project (Mdn = 3.67 over 3.33).

4. How are the main constructs in the study correlated?

Correlation tests were conducted to identify relationships among the main constructs in the study. A moderate negative correlation was found between the New Ecological Paradigm and the Change Unnecessary Subscale (r = -.44, p ≤.001). Along the same lines, a moderate positive correlation between the Dominant Social Paradigm subscale and the Change Unnecessary subscale was identified as well (r = 0.50, p ≤.001). This set of results indicate that participants who responded pro-environmentally did not think their decisions and actions were related to a lack of need for change, while respondents with more support for the dominant social paradigm are more likely to think that change is not necessary. Another relationship was identified between students' agreement with the New Ecological Paradigm and their willingness to engage in a sustainability campaign – a weak positive correlation (r = .29, p ≤.001). Correlation between items in the same constructs were reported in the corresponding sections.

Discussion

Strong support for pro-environmental values. Results showed wide support for pro-environmental values across respondents and suggest that students at Virginia Tech do recognize the danger of climate change and do think change is necessary. Students, from undergraduate to graduate from different demographics all expressed concern about current environmental actions.

Translating values into action. Our survey aimed to understand the potential barriers as to why individuals do not take environmental action. The common assumption for this phenomenon is that people are not aware of the climate issue, do not care about it, or are perhaps unaware of the severity of it. However, our data did not confirm this assumption: on the contrary, students showed a high level of awareness and concern for the environment. However, concrete engagement with significant sustainable behaviors is not at the same level. That indicates that, if pro-environmental behaviors are not occurring, it is likely due to psychological barriers as opposed to a lack of pro-environmental values, confirming that values do not always manifest into.

Psychological barriers to pro environmental action. The most prominent barriers students at Virginia Tech face were that they lack knowledge about pro-environmental behavior, have conflicting goals and aspirations regarding their behavior, and believe that industry was at fault for propagating issues caused by climate change. Although the need is recognized, change might seem difficult. Several participants were hesitant to change their habits because they are confused about where to begin making changes in their lives. It might seem too hard to change their habits because committing to a more sustainable lifestyle would interfere with other goals or because they were too invested in their current lifestyle. Several students viewed it as unfair that they would have to take the initiative towards sustainability when they believe industry to be the major cause of climate change. Social pressures are not affecting people's environmental attitudes and again that there is something else affecting the behavior. Most participants were showed barriers related to limited cognition in different ways.

Differences across groups. The demographic group that had the most differences in their responses was gender. Women expressed higher support for the New Ecological Paradigm than men, while men supported more the Dominant Social Paradigm than women. Men were more likely to agree with statements reflecting psychological barriers as Change Unnecessary, Interpersonal Relations, Tokenism, and Industry Causing), while women were more likely to engage in a sustainability campaign. Engineering students were more in agreement with the Dominant Social Paradigm, while students in Architecture and Urban Studies were more likely to agree that pro environmental change is necessary. First-year students agreed more with the "lacking knowledge" barrier.

Engaging in a Sustainability Campaign. Between the initiatives suggested (diminishing waste, saving energy, adopting more sustainable modes of transportation), students showed almost equal willingness to engage, with 50% or more participants stating that they would be very/extremely engaged. The demographic factors that increased the likelihood of students engaging in a sustainability campaign were being female and having previously participated in a sustainability-related project. Students in Architecture and Urban Studies were more likely to engage.

Influence of previous participation in class and projects. Previous participation in sustainability classes and projects granted more support for environmental attitudes and more willingness to engage in a sustainability campaign. These findings might illuminate the importance of engaging students through class and projects. Key factors would be

increased environmental knowledge, lived experience and practical involvement with community organizing and alternative lifestyles, peer support for change, among others.

Conclusion

Students at Virginia Tech widely express environmental values and concern about climate change. Sustainability efforts at the university should operate from the understanding that students have concerns about the state of human activity affecting the environment, agree that action should be taken to promote sustainability, and might want to have more pro-environmental lifestyles; but they might need help translating those beliefs into action. Future sustainability campaigns should acknowledge the barriers students face: lack of knowledge about how to change, difficulty to transform habits/lifestyles, and a feeling of unfairness in face of industry-caused environmental degradation. Based on our findings, we recommend that the university implements campaigns on campus that are easy to understand and adopt and build upon with students' pre-existing habits. We also suggest that sustainability-related content and projects be integrated into a greater number of courses. The university could encourage students to take such classes and engage in these projects as part of general education classes. Hands-on experience in a sustainability project could help students get involved with the local community and would help them develop sustainable habits. We recommend that Virginia Tech try to integrate more sustainability content into classes and encourage students to enroll in environmental courses which include engagement in projects.

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