Abstract: This paper is the outcome of a course project for Economics of Sustainability (Northeastern University, Boston, Massachusetts). Facilitated and under the direction of the instructor, course participants designed a survey instrument where questions and responses were developed to be indicators of behavioral bias related to the environment. The consumer good targeted in the survey was convenience-based coffee consumption, and convenience was defined by the use of single-use disposable coffee cups. The discussion highlights the survey development process including literature review-based expectations specific to each question. The paper concludes with next steps, which involve the administration of the instrument and evaluation of the survey results.

Keywords: economics; sustainability; survey design; pro-environmental behavior

1. Introduction

Cultural orientation toward consumption implicitly defines the human relationship with the environment as either one of symbiosis or dominion. In the case of the former, arguably stewardship would prevail. In the context of the latter, the economic system would likely fail to assess intrinsic value of resources, as resource value would be dictated based on the value of the natural resource to the human system. Furthermore and significant, time and assumptions related to resource regeneration determine if one period’s stewardship or dominion impact the future access, availability, and viability of a resource.

Our present global society builds on an institutionalized Western perspective of the environment as a resource for human use, which is implicit to global economic systems and their focus on Gross Domestic Product (GDP). GDP is embedded within our policy interest to ensure that we seek to maximize production, subject to resource constraints, at any given point in time. In the case of production, this conforms to policy, monetary and fiscal, that seeks to maintain or establish the economy at its peak in business cycle terms, which is equatable to the attainment of potential GDP.

The underlying assumption of production and consumption decisions is premised on neoclassical consumer theory, which defines individuals in an economy as having insatiable desires to consume. This assumption is reflected in the production possibilities frontier (PPF) where efficiency is defined as any production combination found on the PPF line (Figure 1). On this line, the economy is maximizing production relative to resource constraints. Combinations of output along this can only be attained by allocating the resources in a way that maximizes production relative to inputs (e.g., land, labor, and capital). Depending on whether the allocation of resources considers intergenerational equity and renewability of resources, these trade-off decisions may or may not be consistent with sustainable resource utilization.

The PPF provides a visual depiction of production; production levels on the line are referenced as “efficient” as they reference the maximum production that is available given the resource levels available. Points to the left of the line are referenced as inefficient...
and those to the right are considered unsustainable or unattainable. In order for the PPF to depict sustainable resource use, resources would have to be priced relative to their regeneration and externalities, which requires a more holistic ecological perspective.

![Production possibilities frontier (PPF)](image)

**Figure 1.** Production possibilities frontier (PPF).

To the extent that a society maintains the social norm of environmental stewardship and thus, the satiation of needs relative to wants, the efficient allocation of resources may not embody the maximum production. Instead, an economy may not fully use observable resources given consideration of their long-run availability. This makes clear the relationship between economics and the environment. The relationship was articulated in the 1987 report of the United Nations [1] World Commission on Environment and Development (referred to as the Brundtland Report): environmental stresses and patterns of economic development are linked one to another. Energy policies are associated with the global greenhouse effect, acidification resulting from SO$_2$ and NO$_x$, and deforestation resulting from monoculture in many developing nations. These stresses all threaten economic development. Thus, economics and ecology must be completely integrated in decision-making and lawmaking processes not just to protect the environment but also to protect and promote development. Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind (World Commission on Environment and Development, 1987, Paragraph 42) [1].

1.1. Culture and Individual Behavior

Culture is a significant contributor to what is perceived as valuable in a society, and it can determine how resources are allocated within that society [2] (Mokyr, 2017). Given that culture is a learned behavior, it can affect the relationship between individuals and the environment, thereby determining the extent of the anthropocentric perspective. The United Nations Educational, Scientific and Cultural Organization (UNESCO) [3] defines culture as a significant factor in attaining global sustainability.

Culture shapes the way we see the world. Therefore, it has the capacity to bring about the change of attitudes needed to ensure peace and sustainable development. “A global crisis faces humanity at the dawn of the 21st century marked by increasing poverty in our asymmetrical world, environmental degradation, and shortsightedness in policymaking. Culture is a crucial key to solving this crisis” [4] (UNESCO, 2000).

The inputs and outputs of economic systems are dependent on the value structures of a society. To the extent that economics explains observable phenomena and proposes optimal outcomes, the discipline can be both responsible for the maintenance of an economic...
framework and also the catalyst for a change. In essence, economic outcomes mimic the values of the participants in an economic system but can also affect them.

In the current period, the role of culture in economics has been significantly limited by the perception that the present neoclassical-based economic system is the outcome of natural evolution. As noted by Zein-Elabdin (2009) [5], “The assumption that modern European achievements represent a natural or historical norm—as in [Adam] Smith’s (1869, p. 405) [6] ‘natural course of things’—leads to disavowal of culture. As the cultural framework is taken for granted, the realm of economy... is disembodied from culture; in other words, the materiality of life, habits of provisioning or accumulation are seen as supracultural” [6] (p. 1156). At the time of Smith’s writing, Christian religion and its evolving Protestant forms implicitly embedded a common moral perspective related to a focus on virtue as defined by Christianity. Independent of the implicit morally-based cultural norms, an economic system developed. Arguably, the concept of separation between economic practice and culture legitimized the substitution of regulation for morality. Furthermore, the dominance of neoclassical economics and its quantitative measures of efficiency allowed for a uniform assumption of rational self-interest. Not accounting for the role of culture in promoting a commonality of societal values, neoclassical economics eliminated the explicit evaluation of moral and ethical parameters in decision-making. In doing so, it promoted a new cultural orientation consistent with its assumptions (Hardin, 2009) [7]. However, the reliance on market value in determining the optimal use of resources has created an environmental conundrum, as qualitative impacts are ignored in determining optimal production and consumption. To the extent that cultural attributions incorporate individual moral responsibility and community ethics, the focus on self-interest alone may have promoted economic outcomes devoid of moral orientation. As McCloskey [8] (1996) notes, “I believe now that neglecting the culture—for example, neglecting ethics—will make the economic analysis wrong. By this I mean “wrong” in terms that economists themselves would recognize as relevant. I believe now that an economics that wants to get the economy right has to know about ethics. And an economy that wants to get its business right has to practice ethics” [8] (p. 188). What McCloskey reaffirms is the significance of Smith’s “impartial spectator”, with an embedded assumption that the spectator is directed by innate conscience. “We can never survey our own sentiments and motives; we can never form any judgment concerning them unless we remove ourselves, as it were, from our own natural station, and endeavor to view them as at a certain distance from us” [6] (Smith, 1869, p. 99).

In reconciling the relationship between environmental education, the present economic framework, and cultural orientation with the environment, there is an opportunity to promote and institutionalize pro-environmental behavior. However, research has highlighted that awareness and knowledge of necessary change do not translate into action.

1.2. Cognitive Dissonance

Despite the rise of the ethical and environmental consumer movement, many consumers do not make consumption decisions in alignment with their beliefs [9,10] (Bodur et al., 2014; Carrington et al., 2014). Although in some cases, this may be attributable to lack of knowledge or opportunity as environmentally friendly products may not be available, for others, consumer behavior may be related to cognitive dissonance. Challenges in finding eco-friendly products along with perceived or real financial costs of environmentally friendly consumption can significantly limit pro-environmental consumption [11] (Barbarossa and De Pelsmacker, 2016), which can lead to an inconsistency between beliefs and behavior that may in turn be rationalized to yield cognitive dissonance. Based on her evaluation of American perceptions and pro-environmental behavior, Markle [12] (2014) highlights “the dissonance between... stated concern for the environment and the inefficacy of... action” and suggests that a culture of individualism has promoted limited collective action [12] (p. 260). In turn, this has promoted an exaggerated perception of individual action. For example, recycling behavior dominates the perception of environmental contribution,
even when ample evidence exists that recycling is not sufficient and larger behavioral change is necessary to mitigate environmental damage [12] (Markle, 2014, p. 260).

While consumers may self-identify as “ethical” or “environmentally conscious”, the prioritization of ethical concerns relative to factors such as habits, price, and convenience can change when they consume and therefore limit or prevent ethical consumption [10] (Carrington et al., 2014). Moreover, when questioned about the difference between beliefs and behavior, consumers do not experience it as cognitive dissonance but rather view it as the outcome of multiple factors simultaneously influencing their decision [10,13] (Carrington et al., 2014; Szmigin et al., 2009). Instead of cognitive dissonance, this value action gap can be explained as consumers adapting in response to changing consumption situations and varying preferences [13] (Szmigin et al., 2009). Carrington et al. (2014) [10] describe this as the influence of the prioritization process, which incorporates all factors that consumers care about.

Habit also plays a significant role in aligning consumer beliefs with behavior. As Carrington et al. (2014) [10] explain, “Whether founded upon implementation plans or shopping habits, the resulting behavior for [respondents] is identical—rapid and pre-mediated enactments of planned/habitual behavior in a state of automaticity” [10] (p. 2764). As such, changing shopping habits to prioritize ethical or environmental consumption requires frequent reminders of the environmental impact of consumption [14] (Thøgersen, 2004). As Thøgersen writes, “Cognitive dissonance may be unpleasant, but the unpleasantness of the sacrifices needed in order to behave in an environmentally responsible way may easily be worse, in which case most people adopt other than behavioral means to resolve the dissonance or simply choose to live with their perceived behavioral inconsistency” [14] (p. 101). In summary, making green consumption behavior more accessible can increase the incidence of environmentally friendly consumption [9] (Bodur et al., 2014).

This paper builds on the existing literature and evaluates individual environmental behavior relative to demographic attributes and knowledge transfer in an informal setting. The focus of the paper is on personal attributes that may signal pro-environmental behavior, in effect assessing awareness, knowledge, and pro-environmental behavior with respect to the self-reported potential for individual action. The discussion is the outcome of a course project for Economics of Sustainability at Northeastern University located in Boston, Massachusetts, U.S. As part of a semester-long project, course participants in the spring of 2020 designed and administered a survey instrument to assess the relationship between demographic characteristics and environmental awareness, knowledge, literacy, and behavior. Specifically, the survey provided an opportunity to determine the relationship between personal attributes and the potential for behavioral change as related to the consumption of single-use coffee cups.

The remainder of this paper consists of a methodology section providing detail on the survey design and administration process; a detailed discussion of the survey instrument and a literature-based interpretation of potential responses; and the next steps to accompany the survey, inclusive of administration and evaluation. Given the international mix at both Northeastern University and in the city of Boston, explanations are provided to highlight U.S. policy and cultural norms as well as expectations based on a broad global perspective as available.

2. Methodology

A survey was designed through a classroom collaboration process by the 19 Northeastern University undergraduate students enrolled in the spring 2020 course Economics of Sustainability taught by Madhavi Venkatesan. Initially, every student was tasked with generating three potential survey questions. The parameters for question development were that the question address factors that influence individual environmental sensitivity and behavior, as well as the connection between the two. The questions were designed to provide an understanding of individual awareness, knowledge, and pro-environmental behavior. This task was informed by the class content and students’ general knowledge
from other classes and experiences. Then, the class was split into two groups, and the suggested questions were discussed and assessed for relevance and modified as needed. The questions deemed most relevant were proposed to the entire class. Each question was evaluated through class discussion, as facilitated by the instructor. Following the first iteration of the process, 22 questions remained. These were shared with the class for an additional review, resulting in a 19-question survey.

In the final form of the survey, the first questions focus on demographic factors, which were followed by a section that assesses whether prior environmental engagement or knowledge influence environmental sensitivity. The last section examines environmental knowledge, environmental sensitivity, and respondents’ willingness to change behavior when informed about the environmental impact of their consumption choices.

3. Survey

The final survey instrument is provided in Appendix A and discussed in this section. Each survey question is accompanied by a brief literature review that frames the relevance and expectation from respondents.

Question 1: "How old are you? ___ (value)"

The relationship between age and environmental sensitivity is fairly ambiguous. Although there could be potential bias toward greater understanding of environmental issues among younger cohorts due in large part to widely publicized climate change actions, such as the Paris Agreement and global climate strikes, proximity to and interaction with the environment are not uniform across youth. Children who reside in urban environments, have compromised living conditions, or have minimal exposure to outdoor activities may be limited in their perception of the environment [15,16] (Chawla, 1992; Strife and Downey, 2009). Furthermore, other characteristics such as gender, income, and parents’ political values may have more significance than age with respect to environmental sensitivity.

According to a Pew Center Research Survey focusing on environmental perceptions, a significant majority of Americans support protecting the environment; however, there are deep partisan divides on the issue [17] (Anderson, 2017). Among the 74% that noted concern for the environment, only 20% were able to state that they made an active effort to live in ways that help protect the environment “all the time” [17] (Anderson, 2017, Section 4). Active participation does appear to have an age bias, as those aged 65 and older are three times as likely (36% versus 12%) as those aged 18 to 29 to employ environmental protection in their decision making all the time [17] (Anderson, 2017). The results of the national survey are in agreement with a similar 2016 survey conducted in Bridgewater, Massachusetts.

The results of the Bridgewater survey noted that “in assessing self-perception of environmental consciousness, across all age and educational categories, 95% of the surveyed participants considered themselves to be environmentally conscious” [18] (Venkatesan et al., 2017, p. 254). However, as in the findings of the national survey, the Bridgewater survey found that less than 20% of survey participants made an active effort to implement environmental protection all the time; in this survey, active participation was based on the use of reusable shopping bags. In parallel with the national study, the Bridgewater results also found that age was positively correlated to both environmental sensitivity and direct action to protect the environment. There was no relationship between gender and environmental consciousness, but there was a negative correlation between willingness to pay to protect the environment and age. The latter attribution is largely correlated to age and fixed income [18] (Venkatesan et al., 2017).

Question 2: “What is your gender? ___ (classification)"

Literature surrounding the connection between gender and the environment justifies the inclusion of this question. However, gender sensitivities may vary due to occupation and country. Studies related to the global south reveal a gender-based sensitivity toward environmental protection as a result of gendered labor roles [19,20] (Agarwal, 2007; Elias et al.
These findings support that women are more likely than men to be concerned about the environment, to take personal environmentally friendly actions, and to be knowledgeable about climate change. One possible explanation is that social norms maintain the caregiver and nurturer role designated to women, and these household expectations affect women’s interaction with and sensitivity toward the environment [19,21] (Agarwal, 2007; Mohai, 1997). However, with opportunities for paid employment, the relationship between gender and environmental sensitivities are somewhat ambiguous.

Question 3: “Where have you lived that has had the most significance on your life? _____ (city) _____ (state) _____ (country); State an attribute that made it significant _____”

The literature concerning the relationship between place of origin (or another location that has had a comparable impact on the respondent) and environmental attitudes justifies the inclusion of this question, which suggests that prior residence may have a significant effect on an individual’s beliefs and values. These beliefs and values, if instilled at a young age, can influence an individual throughout their life [15,16] (Chawla, 1992; Strife and Downey, 2009). Morrissey and Manning (2000) [22] note that while urban residents are generally thought to be more concerned about the environment than rural residents, this correlation is complex and unclear. These results and those of others [23,24] (Kriese and Scholz, 2011; Vallance et al., 2012), which address the dynamic between residential interest in sustainability and subsequent residential transformation, highlight the ambiguity of physical location as an indicator of environmental sensitivity. Although physical location may be significant, education and family values also influence an individual’s environmental sensitivity and cannot be factored out of analysis.

Question 4: “Have you ever experienced an environmental catastrophe such as a drought, flood, tornado, hurricane, or another severe weather-related event? If so, what? How old were you?”

The literature provides some evidence that experiencing a natural disaster influences attitudes and behaviors toward the environment. One study found that children became more altruistic for approximately three years following an earthquake [25] (Li et al., 2013). However, altruism levels “returned to pre-earthquake levels” soon afterward, indicating that this change in behavior is short-lived [25] (Li et al., 2013, p. 1686). This suggests that having recently experienced a natural disaster will lead to a greater concern for the environment as a result of increased concern for others but only if the disaster was relatively recent. Another study found that experiencing environmental harm increased pro-environmental behavior but it did not examine how recently the environmental harm had occurred (Chen et al., 2013).

Question 5: “How would you identify yourself from a religious or spiritual perspective? ___(religious)___(spiritual). If religious, what denomination? _________________________”

The literature generally indicates that religious identification is correlated with lower levels of environmental concern. [26] Clements et al. (2013) examined nationally representative data from the 2010 General Social Survey to determine how self-identified Christians reported environmental behaviors, attitudes, and beliefs. They found that “self-identified Christians report lower levels of environmental concern than do non-Christian and nonreligious respondents” [26] (Clements et al., 2013, p. 85). They also found that within the group identifying as Christian, more religious individuals disclose greater private environmental behavior than less religious individuals but note that there are no differences in perceived environmental concern or willingness to “pay or sacrifice for the environment” [26] (Clements et al., 2013, p. 94). Sherkat and Ellison (2007) [27] drew similar conclusions based on their evaluation of the 1993 General Social Survey. Although they reported that church attendance was correlated with nonpolitical pro-environmental behavior, they also found that church attendance impacts political conservatism, negatively affecting political environmental activism. Gottlieb (2008) [28] noted that the issue may be related to the perspective of moral obligation incorporated in the practice of religion that limits the practitioner’s perspective in favor of the present. Ives and Kidwell’s (2019) [29]
analysis of the literature found that political ideology and economic status are better indicators of environmental sensitivity. They state that the effect appears to vary across cultures, and values across individuals within a specific religious community may vary widely as well. Kanagy and Nelsen (1995) [30] assessed the relationship between religion and environmentalism and found no meaningful support for religion as a predictor of a pro-environmental attitude. However, context-driven assessment of the relationship between religion and environmental concern and protection has noted the significance of theocentric movements in raising awareness of environmental issues. Groups such as Creation Care and Christians for the Mountains have gained national attention for their efforts to limit environmental degradation in Appalachia (Witt, 2016) [31]. However, again, the role of religion remains disputed, as religion in the context of an environmental issue may be reflective of community perspective rather than the cause of a community’s environmental stance (Chuvieco et al., 2016) [32].

With respect to spirituality, Garfield et al. (2014) [33] demonstrate a positive relationship between spirituality and pro-environmental attitudes and note that spirituality is a better indicator of pro-environmental attitudes than religiousness. Moreover, their findings highlight that spirituality is positively associated with donating to pro-environmental causes [33] (Garfield et al., 2014). There is a gap in the literature with regard to the relationship between environmental concern and religions outside of the Jewish and Christian traditions in America.

**Question 6: “Do you participate in routine recycling of trash?”**

The rationale behind the addition of this question to the survey is that routine recycling of trash tends to be correlated with higher levels of environmental concern. Viscusi et al. (2016) [34] find that the private value of recycling, determined by participants’ self-reporting as an environmentalist, is pivotal in encouraging recycling, while being influenced by an external norm is not. They further explain that this is likely due to the behavioral link that exists for the private value, where an individual would be exercising hypocrisy if they were upset by the lack of recycling by neighbors when they themselves do not recycle (Viscusi et al., 2016) [34].

Schultz and Oskamp (2016) [35] reinforce the idea that environmental beliefs and attitudes influence the level of recycling participation through their analysis of three different studies. The goal of the three studies was to understand the degree to which effort was an obstacle in recycling participation. The results from the first study determined that environmental concern was positively correlated with participation in the recycling program considered “high effort” (Schultz and Oskamp, 2016, p. 375) [35]. In the second study, they discovered that environmental concern was positively correlated with a willingness to spend money to facilitate recycling. The third study involved an analysis of the empirical research literature on the relationship between environmental position and recycling. Their finding corroborated the results of their first study—specifically, that only individuals with strong pro-environmental beliefs are likely to participate in recycling programs requiring considerable effort (Schultz and Oskamp, 1996) [35].

Yeboah and Kaplowitz (2016) [36] highlight that variation in the degree to which certain types of pro-environmental behaviors are engaged in can be partially explained by variations in an individual’s value–belief–norm system. Particularly, environmental concern does not appear to be a key factor in influencing energy conservation behavior, whereas the opposite is the case for environmental citizenship behavior. The authors find that environmental citizenship behavior is greatly influenced by participants’ environmental considerations (Yeboah and Kaplowitz, 2016) [36].

**Question 7: “Would you describe your parents as being influential in your perception of social responsibility? ___ (yes) ___ (no) Reason_________________________”**

The connection between social responsibility perception and environmental concern is justified by the fact that the wellbeing of society is linked to the wellbeing of the environment. In line with previous studies, Whitbeck and Gecas (1988) [37] found that parents’
and children’s values are weakly correlated. However, they contribute to previous research by highlighting that children credit their values to their parents and parents are actively engaged in the transfer of norms and beliefs to their children.

Albanese et al. (2015) [38] evaluate the relationship between values and attitudes and socio-economic outcomes in Italy. They find that individuals brought up in homes prioritizing work and horizontal values, or those relating to generalized morality acquired within and between groups, have more trust in strangers, whereas people raised in homes that underscored obedience to authority figures and the law are found to be more risk averse. Additionally, the findings emphasize that parental socialization is an important factor in educating children. The level of trust can be associated with social responsibility, as feeling a sense of social responsibility requires a level of trust within a society (Albanese et al., 2015) [38].

Barni et al. (2011) [39] examine “intergenerational differences between perceived parental socialization values and adolescent’s personal values,” finding differences in one’s “openness to change (hedonism and stimulation) vs. conservation (tradition, conformity and security)” (p. 115). For example, adolescents were likely to be looking for new experiences and perceived their parents as limiting this experience in an attempt to have them accept and support conservative values. However, agreement of values between fathers and mothers was found to be significant in increasing the likelihood of children accepting their parent’s value priorities (Barni et al., 2011) [39]. These observations, in combination with the finding that the quality of parent–child relationship can serve as a relevant predictor of acceptance of values, indicate that tight-knit and more value-aligned families can play a role in value transmission.

**Question 8.** “Would you describe your parents as being influential in your perception of environmental responsibility? ___ (yes) ___ (no) Reason_________________________

Research by Grønhøj and Thøgersen (2009; 2012) [40,41] explores the link between parental values and their children’s values (ages 16–18). Study results suggest that family socialization is a significant influence on young consumers’ pro-environmental orientation, corroborating the findings of Barni et al. (2011) [39]. Grønhøj and Thøgersen (2012) [40] concluded that pro-environmental behavior in adolescents is heavily influenced by familial norms, especially through parental behavior that reflects these norms. However, the initial research also found that the “young generation is, on average, significantly less environmentally concerned than their parents’ generation” (Grønhøj and Thøgersen, 2009, p. 414) [41], providing evidence that the relation may not be as derivative.

**Question 9:** “Do you engage in outdoor activities? ___ (yes) ___ (no) If yes, ___once a week ___two to three times ___four to five times ___daily”

Larson et al. (2011) [42] notes that individuals who participate in more outdoor recreational activities are more likely to have pro-environmental behavior. Powell (2009) [43] studied the effects of a tour centered around the sustainability of natural ecosystems on peoples’ perceptions of environmental issues, and they found that individuals who attended the tours retained increased awareness of issues facing ecosystems a year after the tour, demonstrating that knowledge of ecosystems developed through direct involvement can have lasting effects on people’s perceptions toward the environment. Similarly, Brownlee (2013) [44] found that frequent engagement with the environment can increase awareness and concern regarding climate change and its impacts on the environment.

**Question 10:** “Have you ever taken a class on the environment? ___ (yes) ___ (no) What was it? _____Department_____”

Adding to the relationship between knowledge and action, Coyle [45] (2005) provides insight into environmental literacy in the U.S. and defines three channels of environmental education: awareness, knowledge, and literacy. He notes that environmental literacy is the goal of education but that education for awareness and knowledge are not sufficient conditions for developing literacy. With respect to awareness, the study reports that the
media has not been a sufficient channel for education. Rather, the media has chosen to report on select events, providing incomplete information. However, environmental education with respect to the development of knowledge that affects personal action, referenced as “personal conduct knowledge”, is associated with positive outcomes [45] (Coyle, 2005, p. 54).

Personal conduct knowledge does not require detailed knowledge of causal sequences because most of the connections are fairly simple and usually require just one step. We refer to this level as “personal conduct” knowledge because, unlike general environmental awareness, people willingly go a step farther to take personal action and make the connection between an environmental issue and their own individual conduct [45] (Coyle, 2005, p. 55).

Coyle [45] highlights that the most significant component of behavioral change is environmental literacy, which is consistent with the Environmental Protection Agency [46] (EPA)’s continuum provided in Figure 2. In his assessment of environmental literacy, Coyle [45] includes standard demographic variables (i.e., age, education, and gender) to evaluate differences in knowledge but does not provide demographic details that could offer insight into the characteristics and experiences that may align with degrees of pro-environmental behavior. This is not unique in the literature; in a qualitative review of 72 papers, Ernst [47] (2019) finds that knowledge transfer is not a sufficient indicator of behavioral change and recommends a greater assessment of factors that may align with individual-level behavioral change.

![Environmental Education Continuum](figure2.png)

**Figure 2.** Environmental Education Continuum. Source: Environmental Protection Agency, 2019, p. 5 [46].

**Question 10: “Have you ever taken a class on the environment? ___ (yes) ___ (no) What was it? ___**

There is generally a substantial correlation between environmental conscientiousness and education. However, these correlations can be rather complex and dependent on other factors. For example, a survey conducted by the Economic and Social Research Council (2011) [48] found that people with a college degree were 25% more likely to adopt environmentally friendly purchasing decisions. However, they were also found to engage in less environmentally friendly behavior such as leaving the television on at night or forgoing public transportation. Nawrotzki and Pampel (2013) [49] also find a relationship between education and environmental sensitivity, noting specifically that to the extent that education is a proxy for income, environmental sensitivities spread from higher socio-economically classified groups both within and across countries to be eventually adopted across all groups.

Studies also find that education in America is more likely to reinforce existing scientific beliefs, regardless of their accuracy. For example, Drummond and Fischhoff (2017) [50] found that political conservatives in America who were highly educated were actually more likely to reject the scientific consensus on the anthropogenic basis of climate change. However, political liberals relative to educational attainment level were more likely to accept the scientific consensus. These findings held for people with greater scientific literacy; conservatives were less likely to believe, and liberals were more likely to do so. As a result of this, more education does not necessarily increase people’s awareness of environmental and sustainability issues. Instead, it may be more likely to reinforce one’s preexisting beliefs.
Interestingly, America may be an outlier in the correlation between environmental beliefs and education. Lee et al. (2015) [51] find that in an assessment of 119 countries, overall, educational attainment is one of the most reliable predictors of awareness of anthropogenic climate change. Additionally, they note that people who live in countries that are experiencing the effects of climate change also strongly believe that humans are contributing to climate change.

**Question 12:** “To what extent do you believe the present speed of climate change is an issue. ___not an issue ___insignificant ___unsure ___somewhat ___significant”

This question is useful in mapping the relationship between environmentally related choices and an individual’s perception of the speed of climate change. In their 2019 report, Leiserowitz et al. [52] find that 69% of Americans believe global warming is happening, while 59% of Americans believe that people in the US will be harmed by global warming. Similarly, surveys from the Pew Research Center [53] note that about 59% of Americans believe global climate change was affecting their local community a great deal or some in 2018 (Funk, 2019) [54]. These reports highlight the current polling data on global warming and the importance of this issue to the American population. However, the 2019 report also includes that only 44% of Americans believe they will be personally affected by global warming, despite 59% believing that it will affect people in their own communities. This indicates a potential dissociation from the problem, where people are able to recognize the issue as one of importance but are unable to picture its direct impact on their own lives.

**Question 13:** How many community service activities do you participate in annually? ___0 ___1 to 2 ___3 to 5 ___5 to 10 ___10 to 15 ___more than 15

Community service is extremely common among college students. In their 2000 study, Astin et al. [55] found that 76% of the students in their sample group participated in some form of community service during their undergraduate years. While few studies have directly examined the connection between participation in community service and environmental attitudes, the well-studied effects of community service on participants can be used to draw an indirect connection to the environment. For example, one study found that community service increases “moral sensitivity [and] moral motivation” in participants (Boss, 1994, n.p.) [56]. Other studies have found that community service increases “awareness of the world” (Astin et al., 2000, p. iv) and “civic responsibility” [57] (Vogelgesang and Astin, 2000, p. 29).

Given that community service has been shown to increase feelings of morality, awareness, and responsibility in participants, it follows that participation in community service would likely result in an increased concern for the environment.

**Question 14:** What percent of materials placed in recycling bins is actually recycled? ___less than 20% ___25% to 50% ___50% to 75% ___all

This question serves as a proxy to assess the level of environmental awareness, under the assumption that recycling knowledge is consistent with this awareness. The exact percentage of material intended for recycling that is actually recycled is difficult to measure, partly due to variations across systems and communities. In 2015, of the 8.3 billion metric tons of plastic that was produced, 6.3 billion metric tons became plastic waste. Of that, only 9% was recycled, 12% was incinerated, and 79% accumulated in landfills or the natural environment. The United Nations [58] estimates that 80% comes from the land—either from storm drains, wastewater treatment plants, and trash (United Nations, 2017) [59]. The Berkeley Ecology Center emphasizes the notion that all “[p]lastics that go into a curbside recycling bin get recycled” is a myth, and that “many plastics are nonrecyclable” [60] (1996, p. 26).

**Question 15:** Should there be a charge on single-use bags at check-out (grocery/convenience stores)? ___(yes) ___(no) Is 5 cents ___too little ___enough ___unsure

This question provides an indication of sentiment toward environmental protection. Schwepker and Cornwell (1991) [61] found that there are several factors that contribute
to a person’s tendencies to limit purchases with excess packaging. The study reveals that individuals who feel that they have potential to make a difference, “who are concerned about litter, who believe there is a pollution problem, and who have a favorable attitude toward ecologically conscious living” are most likely to purchase products with eco-friendly design (Schwepker and Cornwell, 1991, p. 95) [61]. These indicators are likely affected by how much knowledge about environmental impact the consumer has been exposed to. This is relevant to contextualizing a person’s response to a tax on plastic bags. It also provides validation to the assumption of an implicit scale reflecting a person’s propensity to consider ecological impacts of purchases, which furthers an inquiry into whether a given plastic bag tax is too little or enough. Fromer (2010) [62] discusses the introduction of bans and taxes on single-use bags in legislation across the United States. In some cases, as a counter argument to the environmental impact of plastic, representatives of the plastic bag industries cite the disproportionate impact on low-income communities as a reason to condemn plastic bag bans.

**Question 16:** How much of the price of coffee is the disposable cup? Scale___less than 2% ___2% to 5% ___5% to 10% ___Other

The primary purpose of this question is to collect baseline information on the perceived value of a disposable cup, prior to providing the survey participants with more information on the environmental implications of convenience-based consumption. Thus, this survey question provides an indication of consumer understanding of the cost of convenience consumption.

Specific to the literature, Holcombe and Sobel (2000) [63] found that a lack of understanding of externalities may result in lower estimates of cost. Earlier research also noted that consumers may have difficulty referencing the “true” price of a product due to bundling and other competitive market elements [64,65] (Brown, 1969; Urbany and Dickson, 1991).

**Question 17:** On an average week, how often do you consume meat? ___once ___two to three times ___4 times ___daily Why? ___Vegan ___Vegetarian ___Pescatarian ___No reason ___Environment ___Other

The rationale for the inclusion of this question in the survey is to better understand the relationship between meat consumption and environmental concern, as meat consumption contributes to the increasing speed of climate change. Moreover, this question provides a means of assessing survey participants’ consistency by indicating whether everyday choices to be more environmentally friendly are congruous with reported levels of environmental concern. Sanchez-Sabate and Sabate (2019) [66] performed a systematic review of 34 papers related to meat consumption behavior and consumer views within the context of environmental concern. They find that in developed nations, the group of people informed on the impact of meat on the planet and willing to change their consumption patterns is small. Interestingly, they do note a gender bias in that the majority of those willing to modify consumption behavior are women. Ruby (2012) [67] highlights health benefits or concern for the ethical treatment of animals are key drivers to vegetarianism. Furthermore, he indicates that little research has been done on individuals who become vegetarian because of environmental reasons as well as those persuaded by multiple factors. When examining the relationship between people’s diets and pro-environmental attitudes and behaviors, Asvatourian et al. (2018) [68] found that only about one-third of respondents believed that reducing meat consumption would assist in slowing the speed of climate change. However, most respondents did mention minimizing food waste and packaging and consuming more locally and seasonally as being beneficial for the environment. The authors found that individuals following a health-conscious diet, the lowest meat consumption and higher vegetable consumption, reported higher levels of pro-environmental behavior than those partaking in the traditional or mainstream diet. There were no discernible differences in attitudes and knowledge surrounding environmental issues by dietary pattern. Similar to Sanchez-Sabate and Sabate (2019) [66], Asvatourian et al. (2018) [68] also find that women
make up a larger share of the sample following a health-conscious or more environmentally friendly diet.

Question 18: After reading this passage, how likely are you to change your use of single-use coffee cups? If you’re likely to change your usage, what changes would you make and how would you make them? If you’re unlikely to change your usage, what is stopping you?

This question was incorporated into the survey to determine the effect of reading a short informational passage on influencing behavior change. The passage read to respondents was as follows:

According to the Environmental Protection Agency [69], 58 billion paper cups are thrown away each year in the United States; 400 million cups being thrown away every day. 58 billion cups roughly translate into 20 million trees and 12 billion gallons of water. A person using just one cup per day generates almost 23 pounds of waste by the end of the year [70] (Weber, 2016).

The rationale for the question stems from the literature, which indicates correction of informational asymmetries may influence behavioral change and that individuals are more likely to modify their behavior when they are aware of global impacts. Wooltorton et al. (2011) [71] examine the outcomes of the implementation of a sustainability initiative on an Australian university campus and find that an important first step is for individuals to be aware of and understand both their own environmental impact and options for changing their behavior. Steg and Vlek (2009) [72] explain that while informational campaigns are unlikely to cause behavior changes, prompts or reminders are more effective in changing behavior. Additionally, the authors note that behavior change is more likely if individuals do not face external barriers.

Specific to the channel of communication, Gleim et al. (2013) [73] analyze the barriers to environmentally friendly consumption of apparel. The authors find that while increasing information and detailed cues on products can increase the likelihood of consumption of sustainable apparel, increasing the number of cues and using verbal cues, such as encouraging customers to browse the green apparel section, have a greater impact on consumption. Moreover, greater employee expertise in sustainable fashion also positively impacted environmentally friendly consumption, which is likely because the employees were able to clearly communicate the environmental benefits of sustainable fashion (Gleim et al., 2013) [73]. This suggests that providing information about the environmental impacts of consumption choices in an oral manner will be more effective than written cues.

In a study by Bak (2018) [74] of individual response to local or global environmental issues, an individual’s response was found to be more reactive to global issues aligning to the adage “think global act local”. The suggested course of action based on the results is to “highlight global environmental issues, such as global climate change and the Great Pacific Garbage Patch, rather than emphasize local environmental degradation to encourage public participation in pro-environment behavior” (p. 605).

Question 19: How much extra would you be willing to pay to eliminate the impact of your single-use cup? _____5% _____10% _____20% _____50% _____other

Willingness-to-pay models are used to provide insight with respect to an individual’s perception of the value of a particular good or service. For this survey, participants were asked to provide a quantitative value of how much they would be willing to pay to eliminate the environmental impact stemming from the use of a single-use disposable coffee cup.

Based on previous studies related to environmental valuation, willingness to pay has been noted to be correlated with demographic variables; however, consistency in attribution has been missing across studies [75] (Royné et al., 2011). Furthermore, the relationship between consumer action and its impact on the environment reveals that the longer the time horizon, the lower the perceived impact and the greater the trade-off in favor of present action (Kees, 2011) [76]. Furthermore, perceptions of the limited impact of individual behavior can be a factor in promoting behavioral change [77,78] (Boström et al.,
2015; Ellen et al., 1991). However, evidence also suggests that consumers will be less apt to purchase products even at favorable prices if they know the producer to have a negative environmental impact (Choi and Ng, 2011) [79]. Given the complexity and informational asymmetries related to the perception of prices and environmental costs, the willingness-to-pay question in the present survey provides additional insight on the relationship between age, gender, perception, and individual action, as proxied by the amount of payment.

The survey as designed provides both the justification and expectation for each question and allows for segmenting between awareness, knowledge, and pro-environmental action. The last question particularly provides the survey participant insight with respect to the life cycle impact (Figure 3) of convenience-based coffee consumption. Indirectly, the survey is also a learning instrument in that the questions asked provide the respondent with a connection between their awareness, knowledge, and action, which may not have entered their conscious thought otherwise.

![Figure 3. Lifecycle of a consumption product.](image-url)

Informal channels of learning about sustainability can work effectively to change attitudes, beliefs, and behaviors. For example, Ballantyne and Packer [80] (2006) describe how encounters with nature and school field trips both impact an individual’s knowledge and behavior toward the environment. The key factors that are conducive to the adoption of pro-environmental attitudes and behaviors are “those that arouse learners’ emotions, challenge their beliefs and enhance their environmental conceptions” [80] (Ballantyne and Packer, 2006, p. 286). Other literature demonstrates similar results, with positive impacts from both a one-day engagement with the environment and a non-formal environmental education program. According to a 2012 study, a one-time guided botanical garden visit increased high school students’ knowledge of the environment, which persisted 4–6 weeks after the visit [81] (Sellman and Bogner). A separate study showed that a non-formal education program had similar effects, but most importantly, it altered the participants’ own view of their role in the environment. Prior to the program, most students perceived the environment as an object rather than a place humans are a part of [82,83] (Loughland et al., 2002; as cited by Goldman et al., 2013). However, after the program, the students showed a “dramatic increase in... awareness of human–nature interrelationships, a more realistic view of man’s dominant role in the environment and heightened sensitivity to human interference. Perception of the environment as manmade or damaged by human activity
increased from being least frequent before the program to being most frequent after the program [83] (Goldman et al., 2013, p. 540). This shift from an anthropocentric to an ecocentric orientation is key to promoting sustainable practices and behaviors, as many assert that the values arising from the former orientation are “one of the barriers to promoting responsible environmental behaviour” [83–85] (Dunlap, 2008; White, 1967, as cited by Goldman et. al, 2012, p. 540).

Informal learning can also positively impact adults’ perceptions of the environment. Digby’s prediction model demonstrates that when including non-formal environmental learning, environmental behavior can significantly improve the prediction of environmental behavior scores. Specifically, when controlling for age, education, income, and gender, both non-formal education and informal learning participation can significantly impact environmental behavior [86] (Digby, 2012).

While more research on the efficacy of informal learning channels is needed, the literature so far has indicated that these channels can be just as effective as formal education channels. Most importantly, informal learning often presents an opportunity for participants to directly engage with the environment and incorporate it into their local framework, enabling them to see themselves as part of the environment rather than an observer.

4. Next Steps

The next steps related to the survey discussed in this paper will be to administer and evaluate results and assess both how outcomes align to expectations and the relationship between survey responses and pro-environmental behavior. We plan to administer the survey in an in-person format where the surveyor asks and records responses. The initial survey will be targeted to coffee shop locations within the Northeastern University campus and extend in a one-mile radius to include off-campus venues. Data will be compiled with the assistance of electronic tablets and organized in an Excel workbook. We plan to use R as the statistical evaluation platform.

We anticipate grouping question responses to create variables to specifically address the relationship between environmental awareness, knowledge, and behavior. As a result, we have simplified questions so that responses can be coded in binary form: 0 or 1. The questions are provided in Table 1. Table 2 categorizes the questions and classifies them as either “awareness” or “knowledge” variables.

Table 1. Simplified questions.

1. To what extent do you believe the present speed of climate change is an issue?
2. Should there be a charge on single-use bags at check-out (grocery/convenience stores)?
3. Is the current 5 cent charge too little or enough?
4. After reading this passage, how likely are you to change your use of single-use coffee cups?
5. Have you ever experienced an environmental catastrophe such as a drought, flood, tornado, or hurricane or another severe weather-related event?
6. Have you ever taken a class on the environment?
7. Would you describe your parents as being influential in your perception of social responsibility?
8. Would you describe your parents as being influential in your perception of environmental responsibility?
9. Do you engage in outdoor activities? (Pass if No)
10. How would you identify yourself from a religious or spiritual perspective?

Awareness and knowledge variables are composite variables and equate to the simple sum of the dummy values that comprise them. For example, if the responses for a single row of the knowledge variables are as follows: 1,0,1, and 0, then the composite knowledge variable value for this row will be 1+0+1+0, which equals 2.
Table 2. Classification and determination of awareness and knowledge composite variables.

| Awareness Variable                                                                 | Knowledge Variable                                                                 |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Have you ever experienced an environmental catastrophe such as a drought, flood, tornado, or hurricane or another severe weather-related event? | To what extent do you believe the present speed of climate change is an issue? |
| Have you ever taken a class on the environment?                                     | Should there be a charge on single-use bags at check-out (grocery/convenience stores)? |
| Would you describe your parents as being influential in your perception of social responsibility? | Is the current 5 cent charge too little or enough? |
| Would you describe your parents as being influential in your perception of environmental responsibility? | After reading this passage, how likely are you to change your use of single-use coffee cups? |
| Do you engage in outdoor activities? (Pass if No)                                    |                                                                                     |
| How would you identify yourself from a religious or spiritual perspective?           |                                                                                     |

We will use logistic regression to measure the effect of the awareness and knowledge variables on our dependent variable: How much extra would you be willing to pay to eliminate the impact of your single-use cup?

Our dependent variable has four levels of responses: 5%, 10%, 20%, and 50%. If it was a dichotomous variable, having only two levels of responses such as “Yes” and “No”, we could have used a binary logistic regression. Furthermore, these levels are ordered (5% is greater than 10%, and 10% greater than 20%, and so on), so we will use a proportional odds logistic regression as opposed to a multinomial logistic regression so as to not lose the information that this ordering can provide.

We anticipate finding that both awareness and knowledge contribute to pro-environmental behavior, as supported by the literature, but we hope to find that knowledge is a stronger predictor. This latter outcome is consistent with the literature as well. From assessing the demographic variables collected, we hope that our assessment will provide meaningful insight to targeting pro-environmental behavior and increasing understanding of the conditions that may facilitate it.

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Appendix A Survey

Question 1: “How old are you? ___ (value)”

Question 2: “What is your gender? ___ (classification)”

Question 3: “Where have you lived that has had the most significance on your life? _____ (city) _____ (state) _____ (country); State an attribute that made it significant ___”

Question 4: “Have you ever experienced an environmental catastrophe such as a drought, flood, tornado, hurricane, or another severe weather-related event? If so, what? How old were you?”

Question 5: “How would you identify yourself from a religious or spiritual perspective? ___(religious)___(spiritual). If religious, what denomination?_________________________”

Question 6: “Do you participate in routine recycling of trash?”

Question 7: “Would you describe your parents as being influential in your perception of social responsibility? ___ (yes) ___ (no) Reason_________________________”

Question 8. “Would you describe your parents as being influential in your perception of environmental responsibility? ___ (yes) ___ (no) Reason_________________________”

Question 9: “Do you engage in outdoor activities? ___ (yes) ___ (no) If yes,___once a week ___two to three times ___four to five times ___daily”

Question 10: “Have you ever taken a class on the environment? ___ (yes) ___ (no) What was it? ____Department____”

Question 11: What is your highest level of education? ___ less than high school ___ high school ___ some college ___ undergraduate ___ graduate”

Question 12: “To what extent do you believe the present speed of climate change is an issue. ___not an issue ___insignificant ___unsure ___somewhat ___significant”

Question 13: How many community service activities do you participate in annually? ___0 ___1 to 2 ___3 to 5 ___5 to 10 ___10 to 15 ___more than 15

Question 14: What percent of materials placed in recycling bins is actually recycled? ___less than 20% ___25% to 50% ___50% to 75% ___all

Question 15: Should there be a charge on single-use bags at check-out (grocery/convenience stores)? ___ (yes) ___ (no) Is 5 cents ___ too little ___ enough ___ unsure

Question 16: How much of the price of coffee is the disposable cup? Scale ___less than 2% ___2% to 5% ___5% to 10% ___10% ___Other

Question 17: On an average week, how often do you consume meat? ___ once ___ two to three times ___ 4 times ___ daily Why? ___Vegan ___ Vegetarian ___ Pescatarian ___ No reason ___ Environment ___ Other

Question 18: After reading this passage, how likely are you to change your use of single-use coffee cups? If you’re likely to change your usage, what changes would you make and how would you make them? If you’re unlikely to change your usage, what is stopping you?

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