

**Public Opinion on the Environment: The Role of Perceived Efficacy,
Environmental Concern, and Self-Interest in Environmentally-
Responsible Consumer Behavior**

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Since the birth of the environmental movement in the early 1970s, scholars have been interested in domestic environmental attitudes. In *The Grassroots of a Green Revolution*, a comprehensive survey of American public opinion on the environment, Deborah Guber (2003) argues that an overwhelming majority of citizens acknowledge environmental problems, and that a general consensus exists in support of environmental protection. The real tension, however, lies in how citizens respond to the problem (Guber 2003). Americans are divided when it comes to deciding who bears responsibility for managing environmental problems and how personal environmental opinions affect, or should affect individual behavior. Determining how environmental opinions affect behavior is a salient concern for analyzing individual decision-making in the market, and specifically, breaking down the motivations of the environmentally responsible consumer. As Table 1 demonstrates, close to a majority of Americans share pro-environmental consumer attitudes: 50% of those surveyed by the General Social Survey (GSS) are fairly or very willing to pay higher prices for environmental protection.

Table 1

Willingness to pay higher prices for environmental protection

	Freq.	Percent	Cum.
not at all willing	99	7.2	7.2
not very willing	247	17.8	25.0
neither willing nor unwilling	298	21.5	46.5
fairly willing	551	39.8	86.3
very willing	148	10.7	97.0
dk	42	3.0	100.0
Total	1,385	100	

Source: NORC GSS Module on the Environment (1993)

1 out of every 2 Americans thinks environmental problems are important enough to sacrifice personal utility, in the form of financial penalty, for. If consumers are willing to pay higher prices for environmental protection, it seems natural that, assuming they

understand the environmental benefits of buying organic, they would overlook the slightly higher prices and choose the green option. Consequently, one would expect the frequency of environmentally responsible consumer behaviors to be at least partially, if not greatly, determined by the strength of environmental attitudes, particularly the willingness of consumers to pay higher prices for environmental benefits. According to the GSS survey, however, this is not the case. Only 27% (see Table 2) of Americans sampled, far less than the majority, report buying pesticide free fruits and vegetables either often or always-- a behavior that would be consistent with strong environmental willingness to pay.

Table 2

Frequency of purchase of pesticide-free, organic fruits and vegetables

	Freq.	Percent	Cum.
never	471	34.0	34.0
sometimes	436	31.5	65.5
often	266	19.2	84.7
always	105	7.6	92.3
not available	107	7.7	100.0
Total	1,385	100	

Source: NORC GSS Module on the Environment (1993)

So while the bulk of Americans indicate a willingness to act on their pro-environmental beliefs, far fewer actually do, at least in regard to the choice of buying organic as opposed to traditional produce. Evidently, the attitude-behavior construct in green consumerism is tenuous. This paper explores some of the reasons why this might be so. Specifically, I will address how certain factors, like the level of self-interest and perceived efficacy, influence the impact of pro-environmental attitudes on environmentally responsible consumer behavior. Sociodemographic and economic variables like political philosophy, environmental memberships, income, gender, education and product availability will be taken into account as controls.

Theoretical Rationale for Efficacy, Self-Interest, and Attitudes as Predictors

James Buchanan's seminal article "Individual Choice in Voting and the Market" provides the basic rationale for assuming efficacy matters in individual market-oriented behavior (1954). Buchanan argues that individual decision-making in voting differs greatly from individual decision-making in the marketplace in terms of the degree of certainty involved. The individual in the market "can predict with absolute certainty the direct or immediate result" of his or her action; the individual in the voting booth cannot (p. 335). Because market actors are more confident their actions will lead to the desired outcome, the marketplace entices individuals to act by stimulating their sense of personal efficacy, efficacy defined as the extent to which an individual believes personal action can affect the desired outcomes.

For example, let us say a fictional character Sophia can express her concern over the environment in several ways, among them buying green and voting for candidates and policies supportive of her beliefs. When Sophia buys an all-purpose cleaner made from naturally occurring baking soda and vinegar instead of a potentially toxic mainstream product, she knows with certainty that by choosing this particular product she is reducing the amount of potentially harmful chemicals that she brings into the environment. She may buy this product without hesitation if her sense of efficacy is high because she believes that by doing so she is reducing environmental harm, whether that harm centers on herself, her family, or the environment in general, and regardless of others' choices. Sophia's sense of efficacy may change depending on how she conceives the problem. If she is only concerned about the impact of chemicals on the environment and not their affect on her own health or the health of those around her, she may be less inclined to buy

the product because she feels that her personal action will not make a difference—feeling instead that real impact requires collective action. Nonetheless, in the marketplace, Sophia makes the decision whether her choice matters; in the political sphere, efficacy is irrelevant.

Sophia's political choice will never directly lead to the hoped for outcome; many factors beyond her control intervene to complicate the outcome. Consequently, she may hesitate to cast a vote for the green party candidate because she cannot be certain that her personal action will lead to improvements in the state of the environment due to uncertainty with regard to a) who other individuals will vote for, and b) policy implementation, even if the green candidate wins. Personal efficacy then is highly relevant to market-based decisions, but matters much less for political ones--the latter being wrought with the requirement of collective action and the challenges of general politicking. Buchanan's observations help to explain why efficacy has been found as an important influence on pro-environmental consumer behavior as well as to why individuals like Sophia may be more apt to engage in pro-environmental behaviors in the marketplace before they vote green in the booth.

Exploring the factors involved in market-based decisions demands that one consider the role of self-interest. The literature on how incentives induce action, most of it firmly rooted in economic theory, is extensive. Self-interest supposedly determines all action (in economic theory)--we are rational and maximize our utility—but even economists would argue that self-interest does not always exclusively motivate behavior.

Amartya Sen in “Rational Fools: A Critique of the Behavioral Foundations of Economic Theory”, eloquently argues that action is not exclusively motivated by ego, or

self-interest, even though the two may coincide (1977). According to Sen, commitment and sympathy are also important aspects of choice; aspects that neoclassical economic theory ignores in its simplistic assumption that rational self-interest drives preferences and preferences determine action. Sen exalts action based on commitment, i.e. a case in which something doesn't necessarily make you personally worse off, but you think it is wrong and you are ready to do something to stop it" (1977, p. 326). Alternately, action based on sympathy is consistent with egoism, since sympathy represents a case in which concern for others directly affects one's own welfare (Sen uses the example of thoughts of torture making someone personally sick).

In this 1977 article, Sen suggests that commitment as an element of choice may not be relevant to certain types of economic choice, including the private purchase of consumer goods, as these types of situations "may show up rather rarely in such exotic acts as the boycotting of South African avocados or the eschewing of Spanish holidays. (1977, p. 330)." Sen concludes, in a sign of the times that "for many studies of consumer behavior and interpretations thereof, commitment may pose no great problem (ibid.)" Nearly thirty years have passed since Sen's article, and his aforementioned "exotic acts" now confront global consumers on a daily basis. Commitment, and the rules and norms of behavior often figure prominently in contemporary consumer decisions. Environmentally responsible consumer behavior is an illustrative example. People do not purchase environmentally conscious products solely because of price; in fact most enviro-products are more expensive. Commitment, to use Sen's terminology, represented by attitudes towards environmental issues or environmental concern, in addition to self-interest, should be considered as an important determinant of behavior.

Environmental Attitudes, Moderators, and Environmentally Responsible Consumer Behavior

Past Research

The push to identify the characteristics of and influences on socially responsible consumers began with the rise of the environmental movement. Among the first studies to formally explore the characteristics of socially responsible consumers was “The Socially Conscious Consumer” in 1972, by W. Thomas Anderson, Jr. and William H. Cunningham. The study employed linear discriminant analysis of six demographic and six sociopsychological factors to assess correlations between independent variables and scores on a social responsibility scale. The study’s primary objective was to determine the extent to which consumers with varied levels of social consciousness could be distinguished on certain demographic and sociopsychological factors, in order to provide the basis for market segmentation and set the criteria for effective marketing strategies going forward. The particular demographic independent variables were selected because they represented generally accepted marketing segmentation criteria; the sociopsychological variables were selected on the expectation they would be significantly related to social consciousness, on the basis of previous research using attitudinal measures for segmentation in other markets. Interestingly, the results showed strong and significant correlations between social consciousness and socioeconomic status, occupation, and age of the household head, but sociopsychological factors, like dogmatism, cosmopolitanism, status consciousness, and conservatism, were found to have more impact. Anderson and Cunningham’s conclusion that attitudes may be an important segmentation criterion (more important than demographic variables)

differentiating socially responsible consumers from the less conscious, provides the context for the examination of attitudes in green consumerism.

Research on the covariates of social consciousness, coupled with increased environmental awareness, led to efforts aimed at identifying characteristics associated specifically with environmental as opposed to general social concern (see Kinnear, Taylor, and Ahmed 1974). With environmental threats looming, research soon evolved beyond the exploration of the predictors of attitudes to an emphasis on outcomes. Hence, inquiry shifted to identifying traits associated with pro-environmental behavior and the relationship (or lack of relationship) of environmental attitudes therein.

The notion that attitudes are distinct from behavior is a twentieth century development. The first serious attention to ‘attitude’ was given by Darwin, who defined attitude as the physical expression of an emotion, in 1872. In Darwin’s interpretation, attitude was a motor concept; it implied behavior, and the two were indistinct. Subsequent theorists and researchers, some based on experimental findings, argued for a distinction between attitudes and behavior based on evidence that attitudes did not predict behavior (see LaPierre 1934; Wicker 1969). The prevailing view among cognitive social psychologists since the early 20th century has been that attitudes have both affective and belief components, and that attitudes and behaviors should correlate. In *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Fishbein and Ajzen presented their Theory of Reasoned Action (TRA), linking attitudes to behavioral intentions and then behaviors (1975). TRA posited that attitudes about behavior were determined by beliefs about the probability of certain consequences of the behavior and the affective evaluation of those consequences by the individual. A later model popular

in market research posited attitude as a learned association between a concept and an evaluation (Fazio, R.H. 1986). The strength of attitude, measured by the reaction time in how quickly it can be expressed, determined how it would affect behavior. The quicker an attitude is expressed, the stronger it is. Stronger attitudes are more accessible from memory and accessible attitudes are more likely to motivate behavior. The distinct but related conceptualizations of attitude and behavior from Fishbein and Ajzen's and Fazio's models are the jumping point for much of the inquiry examining the role of environmental beliefs in behavior.

In general, research indicates a positive correlation between environmental attitudes and behaviors. In a meta-analytic review of 187 studies, Hines, Hungerford, and Tomera examined a variety of variables presumed to affect environmental behaviors (1987). Their analysis, which covered 51 studies of the environmental attitude-behavior relationship revealed a corrected r of .374, thereby providing moderate support for the hypothesis that environmental concern correlates with environmentally responsible behavior. Extensive research on environmental behaviors related to energy use, however, has shown little evidence to support the notion that environmental concern unequivocally translates into pro-environmental behavior, in this case, reductions in energy use (see Webster 1975; Ritchie, McDougall, and Claxton 1981; Verhallen and Van Raaij 1981).

Uncertainties regarding the environmental attitude-behavior relationship have led researchers to employ a variety of methods in the effort to construct stronger and more informative models. Accordingly, subsequent researchers have either fleshed out the attitude-behavior construct by using more specific proxies for attitude and/or shown how different levels or characteristics of concern correlated with different types of behaviors

and intentions (see Ajzen and Fishbein 1980; Roberts and Bacon 1997; Minton and Rose 1997), explored the role of moderator variables using interaction terms in the attitude-behavior relationship aiming to uncover a more nuanced explanation (Berger and Corbin 1992), or abandoned the construct altogether in favor of modeling behavior with independent variables that capture related aspects of attitude like value orientations, self-interest and perceived efficacy, instead of direct assessments of individual beliefs on environmental issues or behavioral intentions (McCarty and Shrum 2001; Guber 2003; Ellen, Wiener, Cobb-Walgreen 1991).

Deborah Guber employs the latter approach—general environmental attitudes and behavioral intentions are not directly explored as influences in her analysis of market-based consumer behavior. Guber, trying to unpack the popularity of green consumerism, explores the role of a variety of factors, including self-interest and efficacy, in motivating environmentally responsible consumer behavior. Her results support a positive correlation between efficacy and environmentally responsible consumer behavior, but little, if any correlation between the latter and the level of self-interest. Guber's conclusions concerning efficacy echo earlier research by Pam Scholder Ellen, Joshua Lyle Wiener, and Cathy Cobb-Walgreen that demonstrate that PCE² (perceived consumer effectiveness), a variation of efficacy, motivates and contributes uniquely to pro-ecological behaviors (1991). Ellen, Wiener, and Cobb-Walgreen also eschew the direct use of attitude as an explanatory variable in favor of an approach that assumes efficacy is a related but distinct aspect of attitude.

² Perceived Consumer Effectiveness (PCE) was first conceptualized as a predictor of ecological concern (note: concern not behavior) in a 1974 article "Ecologically Concerned Consumers: Who Are They?" by Thomas C. Kinnear, James R. Taylor, and Sadrudin A. Ahmed. Kinnear et.al empirically explored the relationship between ecological concern and socioeconomic variable, personality characteristics, and PCE.

Ida Berger and Ruth Corbin take a different approach (1992). Using attitude as a distinct explanatory variable, Berger and Corbin isolate the impact of PCE as a moderator of the attitude-behavior construct in order to better define the relationship between environmental concern and consumer action. The authors find the PCE changes the form of the relationship between a composite of environmental attitudes and pro-environmental consumer behaviors. Justifying their use of efficacy as unique and separate from attitude, the authors assert: “though an attitude represents a summary evaluation of an individual’s beliefs or feelings about an issue, PCE represents an evaluation of the self in the context of the issue” (p. 80). Furthermore, if PCE is conceptualized distinctly from attitude and can be used a direct predictor of behavior, it may also moderate the influence of other variables (p. 80). A moderator variable is defined as any variable that systematically affects the association between an outcome and explanatory variable. In addition to their use of a moderator approach in market-based activities, the authors also analyze the role of moderator variables with regard to politically oriented activities, but for the purposes of this paper that analysis is not relevant.

Berger and Corbin, using correlation analysis and hierarchical linear regression with interaction terms, provide evidence that PCE indeed moderates the relationship between environmental attitudes and consumer behavior. More specifically, perceived consumer effectiveness is found to moderate both the strength and form of the attitude-personal consumer behavior relationship (p. 84). In other words, the researchers found that PCE alters the slope of the relationship between attitudes and consumer behaviors (p.

84). For persons who perceive themselves to be more efficacious, environmental attitudes more strongly affect their personal consumer behaviors (p. 84).

Objectives

This study will focus exclusively on environmentally responsible consumer behaviors like buying organic produce or purchasing an eco-friendly product when alternative products are readily available. Since the guiding hypothesis is that environmentally responsible consumer behavior is driven by a balance of inherent self-interest, altruistic intentions (Sen's "commitment"), and a personal evaluation of one's ability to affect change (efficacy, or PCE), the focus on market-based behaviors is intentional and necessary. Note however, that this study's objectives are predicated on the assumption that self-interest and efficacy are distinct from environmental concern. Given the expectation that green consumerism is both private- and public-regarding, the primary objective is to explore how self-interest and efficacy moderate the relationship between environmental attitudes and typically incentive-driven behaviors. The joint analysis of the role of self-interest and efficacy, to the best of my knowledge, has not yet been explored. While Guber analyzes the impact of self-interest and efficacy on behavior independently, and Berger and Corbin analyze interactions between efficacy and attitude in the attitude-behavior construct, neither explores how self-interest interacts with efficacy to moderate behavior or the possibility of self-interest moderating the influence of attitude on action. By specifying the model to include interaction terms, I hope to better specify the role of environmental concern, self-interest, and efficacy in green consumption.

A second purpose of this study will be to examine how the impact of self-interest changes as its conceptualization changes. Working from Deborah Guber's observation of the need to explore the impact of self-interest measured in new ways (p. 165), this study will use two different conceptualizations of self-interest. Following the lead of Baldassare and Katz (1992), self-interest will be conceived narrowly as a measure of the self-perceived personal threat of environmental problems, and broadly as a measure of self-reported general worry about a composite of environmental problems, which is more consistent with Kinder and Kiewiet's (1979)³ and Rohrschneider's (1988)⁴ sociotropic conception of influence.

I expect the analysis to show that environmentally responsible consumer behavior depends largely on personal beliefs about the importance of environmental issues (attitudes), the extent to which one believes their action is important in the aggregate (efficacy), and how specific consumer behavior brings personal tangible or intangible benefits or avoidance of harm (self-interest). Recall Sophia from earlier in the paper. Sophia feels strongly about the need for environmental protection. She grew up in the Pacific Northwest, surrounded by beautiful thick evergreens and abundant wildlife. She respects and deeply appreciates nature. At home she recycles, makes an effort to reduce her personal energy use, and avoids using disposable products. She lives close to where she works and often uses her bicycle or walks. When Sophia wanders the aisle of her local grocery store, she often thinks about how her purchases reflect, or fail to reflect her beliefs. In the produce section, choosing between traditional and organic tomatoes,

³ Kinder and Kiewiet (1979) found that perceptions of national economic well-being were more important to voting decisions than perceptions of personal financial well-being.

⁴ Rohrschneider presents evidence that perceived national pollution problems figure more prominently into attitudes towards environmental protection than local environmental pollution.

Sophia makes a decision based on a combination of assessments. While Sophia understands the supposed environmental benefits of buying organic and she is convinced that her purchase of organic tomatoes helps protect the environment, she also knows that avoiding pesticide-laden fruits and vegetables is probably better for her own health. So she buys the organic tomatoes, but not only because it is the environmentally responsible thing to do. She buys the tomatoes because doing so is in her self-interest; she avoids personal harm by foregoing pesticide treated produce. In addition, she firmly believes that her individual organic purchase makes a difference, just as she believes all the daily choices she makes to save energy, and reduce pollution and waste, make a difference. Sophia's best friend Genevieve, on the other hand, thinks that the amount of pesticides on traditional produce is quite harmless. She does, however, believe that the mass spraying of pesticides in the growing process is harmful to the environment. Genevieve, like Sophia, believes strongly that her personal actions can improve the environment, but when faced with the choice of traditional versus organic produce, she often choose the traditional fare. Despite her environmentalism and sense of efficacy, for Genevieve, self-interest takes precedence (traditional fare is cheaper). Sophia and Genevieve are but two examples of how environmental attitudes, efficacy, and self-interest jointly influence the decision to engage in green consumerism; there are many more. This goal of this study is to deepen the understanding of how these influences interplay.

Method

This analysis builds upon the work of Berger and Corbin, who analyzed the attitude-behavior relationship in market-based decisions using a moderator approach. The approach requires that the theorist specify a focal independent variable whose effect

on the dependent variable is said to be moderated by another variable (Jaccard and Turrissi 2003). My design assesses the main claim of Berger and Corbin, that efficacy moderates the attitude-behavior relationship, but also explores how self-interest moderates the influence of efficacy on behavior and of attitude on behavior. Using OLS linear and logistic regression with interaction terms on two different datasets, I explore how efficacy, self-interest, and pro-environmental attitudes interact to explain incentive-driven behaviors.

The Data

Data were drawn from two public opinion surveys from widely respected sources. The first dataset was compiled from the *1993 NORC General Social Survey (GSS)*, which included a lengthy set of environmental items. The dataset was used to extract self-reported frequencies of organic produce purchase, a proxy for self-interest, a measure to assess self-perceived efficacy, and a series of demographic variables for controls. Please see the Appendix for details on variable creation and question wording. Data were collected from face-to-face interviews with respondents targeted from a national probability sample.

From the second dataset, an *April 2000 Gallup Poll* from the Social Series on the Environment, data was gathered on respondents' tendency to purchase environmentally-friendly products, a proxy for self-interest, a measure of efficacy, and demographic control variables. The Appendix contains details on question wording. The poll covered a nationally representative randomly drawn survey of 1000 adults and was conducted via the telephone. Table 3 lists the survey measures used for the main variables in both models.

Variable	Survey Measures
<i>GSS Version</i>	
Green consumer behavior	Frequency of purchase of organic fruits and vegetables
Attitude	Willingness-to-pay higher prices for environmental protection
Self-Interest (Narrow)	Self-perceived threat of pesticides to personal and family health
Efficacy	something about the environment"
<i>Gallup Version</i>	
Green consumer behavior	because they thought is was better for the environment than another product
Attitude	Level of sympathy for the environmental movement
Self-Interest (Broad)	Extent of personal worry over 13 different environmental problems
Efficacy	environmental problems

Demographic controls were selected on the basis of theoretical justification and precedents set by earlier research. The controls, included in both models, are income, gender, environmentalist status, education, and political views (ranging from conservative to liberal). First, I assume that income is positively correlated with the frequency of organic purchases, particularly since organic produce generally costs more than generic produce. Income is a popular theme in the literature on environmental attitudes; some scholars argue that the entire environmental movement is bridled with elitism—for example, why would someone struggling just to feed his family on a daily basis care about environmental protection. When survival is a challenge, concern for the environment is a luxury (see Loth 1991). I also expect education to positively correlate with the frequency of organic purchases. As schooling years increase, awareness of the harmful impacts of environmental problems to oneself and to the environment in general should increase as cognitive skills sharpen (see Munton and Brady 1970; Van Liere and Dunlap 1980). Additionally, individuals with more education are also likely to have better access to resources that increase the chance of them making environmentally responsible consumer choices. The inclusion of gender is based on the observation that women are more likely to buy green than men (see Guber 2003 for an overview). Some

researchers suggest that women, as opposed to men, are more environmentally concerned due to their maternal socialization as nurturers and care givers (see Mohai 1992; Blocker and Eckberg 1997). Others have suggested that women might also be more sensitive to environmental threats (Bord and O'Connor 1997). Finally, liberal political views and self-association as an 'environmentalist' are expected to positively correlate with green consumerism as both liberals and environmentalists are likely be more supportive of social and environmental goals than non-liberals and non-environmentalists. Critics and even insiders frequently cite the environmental movement for its deep ideological split, and its failure to promote environmentalism as a goal that each human being is invested in, rather than solely a partisan issue of liberal Democrats (see Shellenberger and Nordhaus 2005).

Identical controls were included for the second model with the exception of one additional control for the type of community the respondent lives in. In the Gallup data, since the question probing the frequency of purchase of environmentally safe products does not include the option for the respondent to note that the products were not available in his or her area, I have attempted to control for location-based differences by including dummy variables for urban and suburban areas. The underlying assumption is that organic produce is more widely available in urban and suburban areas than in rural areas. The issue of availability was dealt with in the first model by restricting analysis to respondents who live in areas where organic produce is available to them.

As a general note concerning both models, I have excluded "don't know" and "not available" responses using listwise deletion. The restriction does not seem to hinder

analysis by materially impacting the size or bias of the sample. The final sample size used for the two analyses is 1187 and 925 for the GSS and Gallup surveys respectively⁵.

Operationalizing Variables in GSS

The equation used in the GSS multiple regression analysis was:

*Frequency of organic purchase = b1 (Environmental attitudes-WTP) + b2 (Perceived efficacy) + b3 (Narrow self-interest) + b4 (Perceived efficacy*Narrow self-interest) + b5 (Environmental attitudes*Narrow self-interest) + b6 (Income) + b7 (Female) + b8 (Education) + b9 (Political views) + b10 (Environmentalism) + constant + error*

Please refer to the appendix for additional coding information.

The outcome variable representing environmentally responsible consumer behavior in the GSS poll concerns the frequency of purchase of organic produce, excluding responses from areas where organic produce is not available. Since the dependent variable is an ordinal measure (coded 1-4 with meaning ranging from “1” representing “never” to “4” representing “always”), linear regression was used for analysis.

Environmental concern was derived from a question probing respondents’ willingness to pay (WTP) higher prices for environmental protection. WTP, a similarly coded ordinal variable ranking the degree of willingness, was chosen in lieu of a composite of more general questions on the level of environmental support on the grounds that WTP implies commitment and in some senses also evaluates the respondent’s willingness to act on behalf of his or her beliefs. It is important to note, however, that WTP does not measure action, only an inclination towards action. A possible downside to using WTP is that because it measures the extent to which consumers are willing to incur a reduction in welfare (via higher prices) in support of

⁵ Before “don’t know” and “not available” responses were removed, samples sizes for the GSS and Gallup surveys were 1385 and 1000, respectively.

their principles, respondents with high willingness-to-pay may be predisposed to discount the involvement of self-interest in market-decisions. Consumers with high WTP have already indicated their irrationality, in the sense they do not welfare maximize at least with regard to price, and this may bias the analysis.

Self-interest in the GSS portion of analysis is conceived narrowly (see discussion in “Objectives” section above) based on the respondent’s evaluation of the threat pesticides used in farming pose to themselves and their families. This conceptualization is consistent with an egocentric perspective of self-interest, echoing the respondent’s acknowledgement of the personal threat that pesticides pose to one’s health. The variable used is also an ordinal variable coded 1-5 with the degree of self-interest increasing in ascending fashion.

Efficacy is based on the extent of respondents’ agreement with the following assertion: “It is just too difficult for someone like me to do much about the environment”. This measure is distinct from the concept “perceived consumer effectiveness” (PCE). Efficacy in the GSS model refers to one’s sense of personal impact over outcomes specifically related to the environment and not necessarily restricted to the realm of consumer decisions, unlike PCE. This measure of efficacy might be more appropriately referred to as “perceived effectiveness in environmental progress”(PEEP) since the emphasis is on one’s ability affect environmental change in general.

Operationalizing Variables in Gallup

The logistic regression on the Gallup data was modeled as follows:

Green purchase = $b1$ (Environmental attitudes-level of support in movement) + $b2$ (Perceived efficacy) + $b3$ (Broad self-interest) + $b4$ (Environmental attitudes*Broad self-interest) + $b5$ (Income) + $b6$ (Female) + $b7$ (Education) + $b8$ (Liberal political views) + $b9$ (Environmentalist) + $b10$ (Urban) + $b11$ (Suburban) + constant + error

The appendix contains details on specific question wording and coding information.

In the second model, using the Gallup Environment dataset, the outcome variable is a dichotomous measure representing whether or not respondents have bought some product specifically because they thought it was better for the environment than competing products. Because the dependent variable is dichotomous, logistic regression was used for analysis.

The variable used to capture environmental attitudes was chosen for reasons similar to the use of willingness to pay in the former model. In this model, the attitude variable, an ordinal measure, gauges respondents' assessment of their level of involvement in the environmental movement, and thereby implies action. Theoretically there should be a natural correlation between those who perceive themselves as active participants in the movement and the frequency of their environmental action.

Self-interest is broader in this model than in the GSS model, partially due to the lack of other options (none of the questions asked were sufficient to gauge narrow self-interest), and partially due to theoretical justification for exploring the impact of both. The resulting self-interest variable was constructed as an index from questions that assess the respondent's level of personal worry about a composite of environmental problems⁶. Using the questions in this way assumes that a high level of general worry about environmental problems indicates a high level of self-interest. This particular conceptualization is consistent with a sociotropic perspective of self-interest in which an

⁶ The environmental problems covered by the survey questions include: ocean and beach pollution, pollution of rivers, lakes and reservoirs, air pollution, damage to the earth's ozone layer, loss of tropical rain forests, loss of natural habitat for wildlife, the greenhouse effect or global warming, contamination of soil and water by toxic waste, contamination of soil and water by radioactivity from nuclear facilities, acid rain, pollution of drinking water, extinction of plant and animal species, and finally, urban sprawl and loss of open spaces.

individual feels personally affected by problems and conditions that ordinarily would not be expected to directly affect them in the short-term. Sociotropic influence implies that individuals may be impacted by environmental problems less directly, either psychologically via reductions in mental well being, or through expectations of long-term consequences that may affect the livelihoods of offspring.

Efficacy, like self-interest, will be used in a slightly different, and broader sense than in the GSS analysis. The measure in the Gallup analysis gauges respondents' perception of the extent to which citizens or citizens' groups can positively affect environmental problems and contribute to solutions. Since the question prompts respondents to think specifically about the impact of "citizens' groups," in addition to citizens in general, the resulting variable goes beyond measuring only the individual's sense of personal efficacy to also include their thoughts on how collective action might contribute to environmental progress. Furthermore, the term "citizen" connotes an individual as a political being and hence may lead the respondent to think about the efficacy of political groups or campaigns in addition to the efficacy of consumers and consumer groups. Appropriately, the term may be referred to as "perceived citizen effectiveness on environmental progress" (PCEEP). The distinct conceptualizations of both efficacy and self-interest should be kept in mind when interpreting results.

Method of Analysis

A series of variable creation, recoding, and cleaning procedures were implemented to prepare the data for the hypotheses to be examined.

In addition to dummy creation for the outcome variable in the Gallup data and most of the control variables in both models, an index was created as a proxy for broad

self-interest in the Gallup model. The measure was constructed from ordinal rankings, coded 1-4, assessing the respondent's level of personal worry about a composite of thirteen environmental problems. Scores were added across the thirteen environmental problems resulting in one "personal worry score" for each respondent based on the sum of their individual assessment scores of personal worry over a range of environmental threats. The resulting index ranges from 13-52 with a mean of 42 and a standard deviation of 8.5⁷. All variables were recoded, when necessary, so that an increase in the code was consistent with a conceptual increase in the variable, i.e., an increase in self-interest is coded as an increase from say 1 to 2. Recoding the variables in this way facilitates the interpretation of coefficient signs.

Multiplicative interaction terms were generated for combinations of efficacy, self-interest, and attitude in each of the two models. Hence each model originally (before non-significant interactions were eliminated) contained three interaction terms: self-interest*efficacy, self-interest*attitude, and efficacy*attitude.

A caveat should be mentioned concerning the use of self-reported behavior instead of actual observed behavior in both the GSS and Gallup model. Though self-reports tend to represent actual behaviors quite well (see Ajzen and Fishbein 1980), they do have limitations. Self-reported behavior may be affected by social desirability, or the tendency of individuals to inflate or deflate their responses to be more consistent with what they deem as the more socially desirable answer. This concern should not greatly affect analysis, however, since predicting the magnitude or frequency of green consumerism is not the primary goal. The primary goal is to identify interactions among

⁷ Cronbach's alpha test for internal consistency indicates the index satisfies the requirement of internal consistency, with a high score of .92. Please see the Question Wording and Frequency Distribution for the Gallup poll section of the Appendix for details.

independent variables that alter the form of the relationship between attitude, efficacy, and self-interest and green consumerism, in important and significant ways. Therefore, even if frequency or magnitude is overstated by social desirability, this should not affect the analysis of relationships between outcome and predictor variables.

Two analytical procedures were employed using STATA to examine the interactions between self-interest, attitude, and efficacy in predicting pro-environmental consumer behavior. Since the outcome variable in the GSS data was scaled as an ordinal variable (bounded 1-4), OLS multiple regression with interaction terms was employed to model the frequency of organic purchase as a function of general attitudes (WTP), self-interest (narrow), efficacy (PEEP), and interaction terms between attitude/self-interest, self-interest/efficacy, and attitude/efficacy. For the dichotomous outcome variable in the Gallup data, logistic regression with interactions was used to model the odds ratios of buying green as a function of attitudes, self-interest, efficacy (PCEEP) and the relevant interaction terms.

Results

Model 1: GSS

In the model without interactions terms, efficacy is not a significant predictor of organic produce purchase; self-interest, however, is highly significant. Table 4 presents the results of the model before interaction terms were included.

Table 4

GSS Multiple regression model without interaction terms*Outcome variable: Frequency of organic produce purchase*

	Coefficient	Robust s.e.	P>t	95% Confidence Interval	
Attitudes (WTP)*	0.045	0.027	0.093	-0.007	0.097
Efficacy (PEEP)	-0.023	0.028	0.413	-0.079	0.032
Self-Interest (narrow)***	0.276	0.031	0.000	0.216	0.336
Income**	0.004	0.002	0.035	0.000	0.007
Female***	0.189	0.052	0.000	0.086	0.291
Education	0.002	0.005	0.709	-0.008	0.012
Political views**	0.052	0.020	0.010	0.013	0.091
Environmentalist***	0.448	0.084	0.000	0.283	0.613
Constant	0.564	0.172	0.001	0.226	0.902
R-squared	0.1388				
Adjusted R-squared	0.1330				
N	1187				

***p-value<.01

**p-value<.05

*p-value<.10

In fact, the model without interaction terms seems to fit the data well with an R-squared of 13.8% and all the variables, with the exception of efficacy and the control variable for education, turning out to be significant or even highly significant. At this point a researcher might be tempted to drop the efficacy variable due to its' lack of explanatory power, salvage the remaining model, and call it a day. However, given theoretical speculation that self-interest moderates the influence of efficacy on behavior, it makes sense to explore potential interactions before discarding efficacy. The impact of efficacy on behavior may not be direct-- it might depend on the level of self-interest. The case may indeed be, and it turns out this is so, that efficacy does influence behavior, but the relationship is moderated by self-interest. In this case, the model must be specified to account for self-interest as a moderator of efficacy. The inclusion of an interaction term between self-interest and efficacy serves to better model the relationship between efficacy, self-interest, and behavior.

Interaction between self-interest and efficacy

Table 5 presents the final model results with interaction terms and robust standard errors⁸.

Table 5

Final GSS multiple regression model with robust standard errors

Outcome variable: Frequency of organic produce purchase

	Coefficient	Robust s.e.	P>t	95% Confidence Interval	
Attitudes (WTP)*	-0.153	0.091	0.092	-0.331	0.025
Efficacy (PEEP)**	-0.254	0.101	0.012	-0.452	-0.056
Self-Interest (narrow)	-0.144	0.128	0.262	-0.396	0.108
Efficacy*Self-Interest**	0.068	0.029	0.018	0.012	0.125
Attitudes*Self-Interest**	0.059	0.027	0.028	0.006	0.111
Income*	0.003	0.002	0.066	0.000	0.007
Female***	0.188	0.052	0.000	0.086	0.290
Education	0.001	0.005	0.844	-0.009	0.011
Political views**	0.050	0.020	0.013	0.011	0.089
Environmentalist***	0.441	0.083	0.000	0.278	0.605
Constant	2.008	0.463	0.000	1.100	2.917
Adj. R-squared	0.1427				
R-squared	0.1499				
N	1187				

***p-value<.01

**p-value<.05

*p-value<.10

Given my primary hypothesis that self-interest, attitude, and efficacy interact to influence green consumer behavior, I expected to find a significant interaction between self-interest and efficacy in addition to the previously documented interaction between efficacy and attitude. Confirming my hypothesis the data indeed revealed a significant bilinear interaction between self-interest and efficacy, but surprisingly, no evidence of a bilinear interaction effect between efficacy and attitude, as in previous research by Berger and Corbin (1992). Instead of confirming that efficacy moderates the relationship between attitude and behavior, I found that self-interest is the moderator. The model results

⁸ Though at first the coefficient signs on efficacy, self-interest, and attitudes may seem opposite of what should be expected (as efficacy increases, behavior should increase, and so on), they are nothing to be concerned about. The signs have very little explanatory power because they are components of an interaction term (and the significant interactions have the expected sign).

indicated significant interactions between self-interest (narrow) and efficacy (PEEP) as well as between self-interest (narrow) and attitude (willingness to pay for environmental protection). Consequently, the model implies that self-interest moderates both the relationship between efficacy and green consumerism and attitude and green consumerism⁹.

After controlling for the level of environmental concern, income, gender, education, political views, and environmentalist status, once the level of self-interest reaches a certain threshold, the higher it rises, the greater the impact of perceived effectiveness on environmental progress (PEEP) on the frequency of buying organic. Put more succinctly, at moderate-high and high levels of self-interest, as self-interest increases so does the slope of PEEP on behavior. At moderate or lower levels of self-interest, as self-interest rises, the slope of PEEP on behavior actually falls. The dynamics of these relationships are clearly demonstrated in the slope coefficients for efficacy's impact on behavior across increasing levels of self-interest (see Table 6).

Table 6
Slope of Efficacy on Behavior at Varying Levels of Self-Interest

Level of Self-Interest (Narrow)	Effect of efficacy on organic purchase
<i>Low</i>	-0.19
<i>Low-Moderate</i>	-0.12
<i>Moderate</i>	-0.05
<i>Moderate-High</i>	0.02
<i>High</i>	0.09

For respondents with reported moderate-high levels of self-interest, i.e. those who perceive pesticides used in farming as very dangerous to themselves and their families,

⁹ These results were confirmed using ordered probit analysis since the outcome variable is an interval ranging from 1-4. The interaction between self-interest and efficacy, and self-interest and attitudes remained significant at p-value .012 and .050, respectively. Please refer to the appendix for detailed results of the probit model.

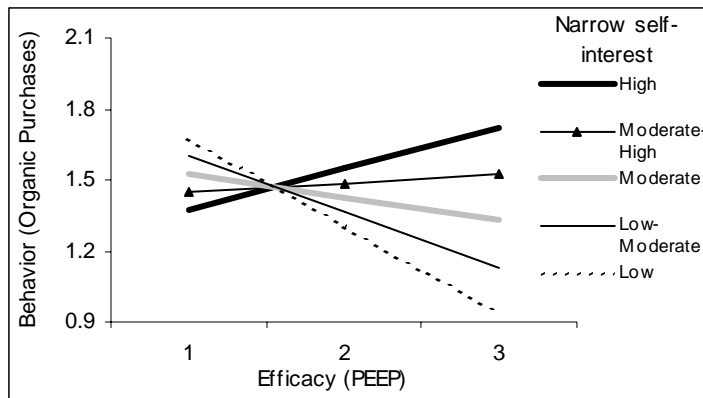
the slope of PEEP on the frequency of organic purchase is .02. For those with reported high levels of self-interest, i.e. those who perceived pesticides to be extremely dangerous, the slope coefficient jumps to .09. So a one-interval unit increase in the respondent's PEEP has more than quadruple the impact on the frequency of buying green at high levels of self-interest than at moderate-high levels. In other words, the green buying habits of persons with high narrow self-interest with regard to buying organic are much more sensitive to changes in perceived efficacy than those with even moderate-high self-interest. The moderator really enhances the effect of perceived efficacy on behavior.

The explanation for greater sensitivity is intuitive. People with high levels of narrow self-interest feel personally extremely threatened by pesticides used in farming. The main allure of organic produce is its pesticide-free status. People who feel personally very threatened by pesticides used in farming are also highly likely to feel that pesticides are also a serious threat to the environment in general. In fact, the correlation between the perceived threat of pesticides to oneself and one's family and to the environment in general is high at .81. Therefore, as PEEP increases for this type of individual, meaning the person feels more strongly that they individually can be effective in empowering changes in the environment, the frequency of their green buying habits should increase accordingly. Extending the argument a step further, high PEEP will have a bigger impact on green purchases for people who perceive pesticides to be extremely dangerous than those who feel the threat less strongly because a) the magnitude of the problem is much larger in their eyes, b) their incentive is bigger, i.e. those who feel most threatened have the most to lose from not buying organic if they believe that buying organic positively contributes to environmental progress, and c) there is a clear

connection between personal action (buying organic) and what the individual considers environmental progress since that individual views pesticides as threatening personally and to the environment in general.

The results from the model become more interesting as the level of self-interest falls to moderate and below. The initially counterintuitive pattern is distinct from that at moderate-high and high levels. Graph 1 demonstrates the impact of PEEP on behavior at low, low-moderate, moderate, moderate-high, and high levels of self-interest.

Graph 1: Linear relationship between efficacy and behavior at varying levels of narrow self-interest



At low, low-moderate, and moderate levels of self-interest, the impact of efficacy on behavior is actually negative with a slope of -0.19 , -0.12 , and -0.05 , respectively. This means that for respondents whose beliefs range from thinking that pesticides used in farming present no danger to somewhat of a danger to themselves or to their families, higher levels of perceived effectiveness on environmental progress actually lead to reductions in the frequency of green consumerism. This relationship is less intuitive than the scenario at high levels of self-interest. It is possible that for the moderate self-interest case, where the slope is so slight (-0.05), moderate levels of narrow self-interest actually leave PEEP

with very little explanatory power. No matter how great the extent to which an individual believes he or she can impact environmental change through his or her decisions, if that person does not feel very or extremely threatened by pesticides used in farming (or is ambiguous about that threat), he or she has very little incentive to buy organic at all. A simple cross-tabulation of self-interest and frequency of organic purchase supports this explanation. As displayed in Table 7, the bulk of respondents (63%) with low self-interest have never even bought pesticide free fruits and vegetables.

Table 7
Crosstabulation of organic produce purchase and self-interest (narrow)

<i>I buy pesticide-free fruits and vegetables:</i>	<i>Pesticides danger to me and my family:</i>						Total
	not dangerous	not very dangerous	somewhat dangerous	very dangerous	don't know		
never	10	111	231	78	29	12	471
%	62.5	63.4	34.1	26.0	16.3	31.6	34.0
sometimes	1	34	251	90	52	8	436
%	6.3	19.4	37.0	30.0	29.2	21.1	31.5
often	3	15	119	79	43	7	266
%	18.8	8.6	17.6	26.3	24.2	18.4	19.2
always	1	7	31	28	35	3	105
%	6.3	4.0	4.6	9.3	19.7	7.9	7.6
not available	1	8	46	25	19	8	107
%	6.3	4.6	6.8	8.3	10.7	21.1	7.7
Total	16	175	678	300	178	38	1,385
%	100	100	100	100	100	100	100

Similarly, 63% of respondents who claim pesticides used in farming pose very little threat to themselves and their families have also never purchased organic fruits and vegetables. Interestingly, the share falls to 34% for individuals who believe pesticides pose somewhat of a threat (or moderate self-interest). The correlation between the level of perceived threat (self-interest) and frequency of organic purchase is relatively low at .23.

Many other factors could be involved. One possibility is that respondents with low levels of self-interest do not associate buying organic with contributing to environmental progress. If buying organic is not consistent with one's personal philosophy about what constitutes environmental progress, as efficacy increases,

frequency of purchase could easily remain stable, or decline due to factors like a preference to affect change through political, as opposed to consumer means, which attack the problems they perceive as most threatening (which evidently do not involve pesticides). Furthermore, some individuals may resent market-based solutions to social and environmental problems, and thus as their sense of personal control over outcomes increases, they may specifically avoid purchasing organic because they perceive it as a completely futile, and possibly loathe act. These people may be inclined to intentionally avoid purchasing organic (whereas before they may have purchased organic for other reasons—possibly convenience, or even ignorance) because they feel that buying organic is both a waste of money and effort.

Interaction between self-interest and attitude

If self-interest is a predominant influence on consumer behavior, then it makes sense to explore how it moderates the relationship between other important predictors and behavior. Specifically, if self-interest modifies the impact of efficacy, an individual belief, on consumer behavior, it might also moderate the impact of attitudes, a related concept, on such action. Hence the model includes an interaction term between self-interest and environmental concern, which alongside the moderator between self-interest and efficacy, is significant. Recall that environmental concern in the GSS model is represented by the respondent's willingness to pay higher prices for environmental protection. Embedded in WTP is also a measure of the respondent's willingness to act in order to contribute to environmental progress. In line with rational choice theory, the higher the level of self-interest the higher the incentive to act. For people who feel most threatened by pesticides used in farming, personal environmental concern has a greater

impact on the frequency of organic purchases than for someone who feels the threat of pesticides less strongly. The greater incentive created by heightened personal threat impels the individual to act more strongly on their environmental attitudes, or commitment to solving environmental problems. Although self-interest is not the only factor influencing green consumerism, as the model indicates, it plays a large role in moderating the impact of other variables on behavior. Self-interest moderates the relationship between environmental concern and environmental behavior, and makes the impact of concern on behavior more salient. The relationship echoes the moderator approach described by Berger and Corbin (1992) but in their analysis, efficacy was the moderator variable, not self-interest.

Although the GSS model provides no evidence for efficacy as a moderator of the attitude-behavior relationship, it does support the hypothesis that self-interest is the moderator. Specifically, as self-interest increases so does the slope of attitude on behavior. Table 8 displays the slope differentials by level of self-interest.

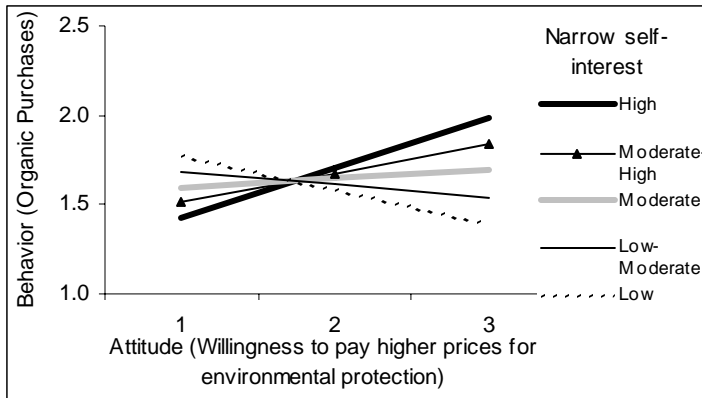
Table 8
Slope of Attitude on Behavior at Varying Levels of Self-Interest

Level of Self-Interest (Narrow)	Effect of attitude on organic purchase (slope)
<i>Low</i>	-0.09
<i>Low-Moderate</i>	-0.04
<i>Moderate</i>	0.02
<i>Moderate-High</i>	0.08
<i>High</i>	0.14

After controlling for the level of efficacy, income, gender, education, political views, and environmentalist status, for levels of self-interest moderate and higher, the higher the level of self-interest, the greater the impact of environmental commitment (or WTP) on the frequency of buying organic. This relationship is clearly demonstrated in the slope

coefficients for moderate to high levels of self-interest, but reverses for low levels of self-interest (see Graph 2).

Graph 2: Linear relationship between attitude and behavior at varying levels of narrow self-interest



For respondents with reported moderate levels of self-interest, i.e. those who perceive pesticides used in farming as somewhat dangerous to themselves and their families, the slope of WTP on the frequency of organic purchase is .02. For those with reported high levels of self-interest, i.e. those who perceived pesticides to be extremely dangerous, the slope coefficient jumps to .14. So a one-interval unit increase in the respondent's WTP has seven times the impact on the frequency of buying green at high levels of self-interest than at moderate levels. In other words, the green buying habits of persons with high narrow self-interest with regard to buying organic, are much more sensitive to changes in environmental commitment than those with even moderate self-interest.

The results reverse for respondents with low levels of narrow self-interest. Given low levels of self-interest, the impact of efficacy on behavior is actually negative with a slope of -.09. So for respondents who believe that pesticides used in farming present no danger to themselves or to their families, higher levels of commitment (or willingness to

pay for environmental protection) actually lead to reductions in the frequency of green consumerism. As with the interaction between self-interest and efficacy, this relationship, although at first counterintuitive, can be explained. No matter how great the extent to which an individual believes he or she can impact environmental change through his or her decisions, if that person does not feel threatened by pesticides used in farming, he or she has very little incentive to buy organic at all because they either a) do not believe that buying organic contributes to environmental progress, or b) only care about contributing to the environment inasmuch as it personally affects their lives and the lives of their families. So as commitment increases, frequency of purchase could easily remain stable, or even decline due to other preferences, like an inclination to act through political, instead of consumer means, or even hesitancy towards market-based solutions to social and environmental problems. As I mentioned previously with regard to the interaction between self-interest and efficacy, those who feel immune to the threats of pesticides may even perceive buying organic as a completely futile act, and hence as their sense of commitment increases they may be inclined to intentionally avoid purchasing organic because they understand their efforts are better directed elsewhere.

Model 2: Gallup

The results of Gallup analysis ameliorate some of the issues present, particularly the threat of multicollinearity disturbing inferences, in the GSS model (Please see the Appendix for a discussion of Heteroskedasticity and Multicollinearity in the GSS Multiple Regression Model). Table 9 presents the final model results of the logistic regression with significant interaction terms.

Table 9

Final Gallup logistic regression model*Dichotomous outcome variable: Green purchase*

	Odds Ratio	Std. Error	P>z	95% Confidence Interval	
Attitudes(perception of environment movement support)***	4.591	2.251	0.002	1.756	12.002
Efficacy	1.001	0.109	0.996	0.809	1.238
Self-interest (Broad)***	1.138	0.037	0.000	1.068	1.213
Attitudes*Self-interest**	0.976	0.012	0.042	0.953	0.999
Income*	1.113	0.062	0.054	0.998	1.241
Female	1.136	0.200	0.468	0.805	1.604
Environmentalist	1.019	0.301	0.948	0.572	1.817
Education***	1.185	0.067	0.003	1.060	1.325
Liberal	0.959	0.219	0.856	0.613	1.501
Urban	1.273	0.304	0.312	0.798	2.033
Suburban	1.368	0.300	0.152	0.891	2.102
Log likelihood	-434.35				
LR chi2(11)	129.57				
Prob>chi2	0.00				
Pseudo R-squared	0.13				
N	925				

***p-value<.01

**p-value<.05

*p-value<.10

While the GSS model confirmed my suspicion that self-interest was highly important in moderating some of the relationships determining green consumer behavior, the Gallup model only partially confirms these results. Consistent with the GSS model, the Gallup model provides no evidence of a bilinear interaction effect between efficacy and attitude, as in previous research by Berger and Corbin (1992). Also consistent with GSS results, the Gallup model indicates significant interactions between self-interest (broad in this model) and attitude (self-perception of level of involvement in environmental movement), somewhat ameliorating concerns over whether this particular interaction should have been included in the GSS model (see discussion on Heteroskedasticity and Multicollinearity in Appendix). The Gallup model did not, however, reveal a significant interaction between self-interest and efficacy ($z = .72$ and $p\text{-value} = .472$) as in the GSS model. So while the Gallup model confirmed the role of self-interest as a moderator in lieu of efficacy, the interaction was contained to attitude's impact on green consumerism (measured as a dichotomous variable indicating whether or not respondents have

purchased a particular product in the past year because they thought it was better for the environment than a competing product).

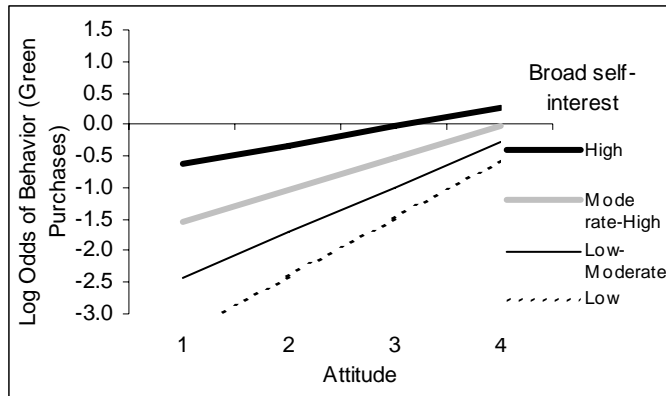
Interaction between self-interest and attitude

Although the Gallup model provides no evidence for efficacy as a moderator of the attitude-behavior relationship, it does reveal evidence to support the hypothesis that instead, self-interest moderates this relationship. After controlling for the level of efficacy, income, gender, education, political views, environmentalist status, and availability via community type, the model indicates there is a significant interaction between self-interest and environmental commitment (represented by the respondent’s self-perceived level of environmental involvement). With a p-value of .042 the interaction term is significant at the .05 level. Table 10 displays the slope of the logits, as well as odds ratios, by level of self-interest. Graph 3 provides a visual interpretation.

Table 10

Level of Self-Interest (Broad)	Effect of attitude on green consumerism	
	Log of odds	Odds ratio
<i>Low (-2 s.d.)</i>	0.92	2.50
<i>Low-Moderate (-1 s.d.)</i>	0.71	2.04
<i>Moderate-High (mean)</i>	0.51	1.66
<i>High (+1 s.d.)</i>	0.30	1.35
<i>Mean</i>	42.0	
<i>Range</i>	(13,52)	
<i>Standard deviation (s.d.)</i>	8.5	

Graph 3: Relationship between attitude and behavior at varying levels of broad self-interest



In this model, self-interest has a dampening effect on the influence of attitude on the likelihood of buying green. To interpret the table, the exponent of the logistic coefficient represents the multiplicative factor by which the odds of the predictor variable change, in this case, the increase in odds of someone having bought green in the past year, given a one-unit increase in the attitude variable. Since all the multiplicative factors, also known as odds ratios, are greater than 1.0, an increase in the predictor (attitude) yields an increase in the predicted odds of buying green. Interestingly, in the Gallup model, the multiplicative factor decreases (rather than increases) as the level of self-interest increases (recall the Gallup model uses a broad measure of self-interest that gauges the respondent's level of personal worry over a composite of environmental problems). The decrease in the odds ratio as self-interest increases means that the size of the impact of attitude on green consumerism actually falls as levels of broad self-interest rise. This does not mean that increasing self-interest is consistent with decreases in environmental purchases. It simply means that as self-interest increases, the predicted odds of buying green, although still increasing, increase at a slower rate.

Explaining this result ultimately comes down to breaking down the nuances of the proxies used to conceptualize attitude and self-interest. To start, remember that an

increase in self-interest in the Gallup model refers to an increasing sense of personal worry over a broad array of environmental problems. An increase in environmental commitment refers to higher personal involvement (or reported personal involvement) in the environmental movement. The model indicates that as personal worry increases, environmental commitment has a positive, but decreasing impact on the predicted odds of buying green. In the former GSS model, an increase in narrow self-interest greatly increased the sensitivity of green buying habits to changes in environmental commitment, at least moving from moderate to high levels of self-interest. This is not the case in the Gallup model¹⁰. For example, for an individual with low self-interest (-2 s.d. from the mean), meaning they worry very little about environmental problems, the expected increase in the predicted odds of buying green from a one-unit increase in environmental commitment is 2.5. For an individual with high broad self-interest (+1 s.d. from the mean), meaning they worry to a high degree about environmental problems, the increase in the predicted odds of buying green resulting from a one-unit increase in environmental concern drops to 1.4. The odds ratio at the mean, or at moderate-high levels of self-interest, is 1.7. In sum, at high levels of broad self-interest, environmental concern matters less; at low levels, it matters more.

Since the logistic model with an interaction term confirms the existence of a significant interaction between self-interest and attitudes, a simpler way to present the effect is to compare the odds ratio of environmental attitudes on the likelihood of green purchase between models estimated at different levels of self-interest. The resulting equation, estimated at various levels of broad self-interest is:

¹⁰ Note that because an index was used for self-interest, I have distinguished between low, low-moderate, moderate-high and high self-interest by creating a range around the mean from -2 standard deviations to +1 standard deviation.

$Green\ purchase = b1\ (Environmental\ attitudes - level\ of\ support\ in\ movement) + b2\ (Perceived\ efficacy) + b3\ (Income) + b4\ (Female) + b5\ (Education) + b6\ (Liberal\ political\ views) + b7\ (Environmentalist) + b8\ (Urban) + b9\ (Suburban) + constant + error^{11}$

Note that the model excludes the interaction term and the independent variable self-interest. The idea is to compare the effect of environmental attitudes on the likelihood of green purchase by estimating regressions on different segments of the data, separated by the level of reported self-interest. At low levels of self-interest, a one-unit increase in environmental attitudes, for example, moving from being unsympathetic to the environmental movement to being neutral, increases the odds of having purchased a “green” product in the past year by 3.97. However at high levels of self-interest, the same one-unit increase only increases the odds by 1.50. Estimating the same regression on the sample of respondents with low, low-moderate, and moderate-high (all levels *except* high) self-interest results in a better fitting model and an odds ratio of 2.71. Even more interesting, the increase in likelihood of buying green from more supportive environmental attitudes drops drastically from moderate-high to high levels of self-interest (2.58 to 1.50).¹² Evidently, the sensitivity of green consumerism to environmental attitudes weakens considerably at high levels of self-interest, but changes only negligibly at lower levels.

¹¹ Due to a relatively small sample size for the regression at low levels of self-interest (N=37, versus N=449 for the model at high levels of self-interest), STATA drops the independent variable “environmentalist” due to high collinearity. The exclusion does not affect the odds ratio of environmental attitudes on the likelihood of green purchases. The models on segments with low and high self-interest produce similar results when the independent variable “environmentalist” is excluded from both models. To cross check these results, a third regression was estimated on low and low-moderate levels of self-interest (N=126). Overall significance improves and collinearity does not appear to be an issue. The odds ratio predictably stands at 2.35, meaning that when the sample is expanded to include those with low-moderate levels of self-interest, stronger environmental attitudes increase the odds of buying green by 2.35, or less than the impact at high levels of self-interest, but higher than the impact at low levels of self-interest. Please see the Appendix section Supporting Logistic Regressions for Gallup Model for additional model results.

¹² See Appendix for all model results.

The conceptualization of broad self-interest as personal worry over environmental problems and environmental concern as the level of sympathy one has towards the environmental movement are key to understanding the implications of the Gallup model. High levels of worry over environmental problems do not necessarily translate into action. Some people are inclined to worry, and even worry a great deal about things they think are beyond their control; these people may never do anything to help ameliorate their woes. Problems may seem so large and threatening that even millions strong organized efforts, like the environmental movement, let alone one's personal actions to aid environmental progress, may seem futile. If high worry translates into a sense of futility, environmental attitudes, namely the degree of sympathy one holds towards the environmental movement, may very well have a smaller impact on the likelihood of buying green. One may worry excessively and even regard themselves as active in the movement (high environmental concern) but feel that personal, or consumer action, is not worthwhile due to either the magnitude or scope of the problem. On the contrary, a person who worries less about environmental problems may view them as a decidedly more manageable, and hence, will be more inclined to contribute through environmentally responsible purchases—because they understand that their consumer decisions can make a difference. Being sympathetic to the environmental movement, to them, may mean more than what it means to someone who thinks the magnitude of problem is unapproachably large—to them, it means action. Consequently, as the model indicates, environmental concern for a person with lower levels of broad self-interest will increase the odds of buying green by a greater amount than the increase of a person with higher levels.

Discussion and Implications

In the GSS model, self-interest plays a similar role as moderator of both the attitude-behavior relationship and the efficacy-behavior relationship. In both cases, people with moderate to high levels of narrow self-interest allow other beliefs, like efficacy and commitment to have a greater impact on their purchase decisions. Also in both cases, respondents with low levels of self-interest indicate a reverse in the trend. People who do not feel personally threatened by pesticides actually decrease their organic purchases as beliefs like efficacy and environmental commitment become stronger.

In the Gallup model, self-interest is shown to moderate the attitude-behavior relationship, but not the efficacy-behavior relationship. The form the moderator takes is distinct from the GSS model. While at all levels of self-interest, from low to high, increasing environmental concern leads to an increase in the odds of buying green, the increase decreases as self-interest grows.

The conflicting results of the Gallup and GSS models concerning the interaction between self-interest and attitude most likely result from the different conceptualizations of self-interest and attitude used in the two models. Recall that environmental concern in the GSS model is a measure of the willingness-to-pay higher prices for environmental protection. Self-interest in the GSS model is conceived as the level of threat one feels pesticides pose to themselves and to their families. The self-interest variable in the GSS model directly relates to the outcome variable, the frequency of purchasing organic. It makes intuitive sense that if one feels highly personally threatened by pesticides, that person will be more likely to dodge that threat by buying organic precisely because the threat of direct personal harm gives them a greater incentive to do so. Because self-

interest is high, the individual has an added incentive to buy green on top of environmental concern. Therefore the willingness-to-pay higher prices for environmental protection of that same person will have a larger impact on the frequency of buying organic than for a person with lower self-interest. In this sense, incentives bridge the gap between environmental concern and behavior. Attitudes lead to greater action because the incentive to avoid harm is stronger and because market action will clearly ameliorate the threats to personal welfare.

This relationship does not hold in the Gallup model, where self-interest is operationalized as the level of personal worry the respondent indicates over a range of environmental problems. Attitude is represented by the person's self-characterization as being unsympathetic, sympathetic, or active in the environmental movement. Environmental concern in the Gallup model, while still implying action, is not confined to market-based options. This is in contrast to the definition in the GSS model where environmental concern, or willingness-to-pay higher prices specifically refers to attitudes about the potential of individuals to induce change through market-based solutions. While the GSS definition for self-interest is narrow and specifically related to the outcome variable, the connection is much less strong in the broader Gallup definition. The Gallup conception of self-interest gauges the respondent's perception of the magnitude of the environmental problem in general, as opposed to their specific views on pesticides. In the Gallup model, the relationship between self-interest, the outcome variable, and attitudes is much less direct. Self-interest indicates general worry, but unless we assume that worry induces personal harm, that buying green (note: not necessarily buying organic) helps us avoid harm, and that our level of sympathy towards

the environmental movement correlates with our belief in the efficacy of market-based action, then it makes sense that the Gallup model does not replicate the results from the GSS model. Here are some more realistic assumptions. Assume that for some people, the larger the problem, the greater the sociotropic influence. But sociotropic influence does not directly affect one's life—it lingers in the distance, long-term, outside of short-term daily individual action. We might also assume that if environmental problems are perceived as large yet distant threats, people might be less optimistic about the efficacy of market-based action as a solution, if they even consider it a possibility. Because the problem seems so massive, the individual may not even grasp how to impact a solution through the market. Alternatives, like voting green, joining environmental organizations, or even dedicating oneself to a career in the environmental field may present themselves as much more effective means of ameliorating the issues in the long-term. Therefore, the impact of an individual's support of the environmental movement on personal market behavior may become smaller as broad self-interest, or the level of personal worry over environmental problems reaches a fulcrum. This may be because as self-interest rises, the problems becomes less manageable, and the call to action, represented by attitudes, leads to a preference for non-market-based, collective efforts that might better attack such a daunting threats.

So why are these conclusions important? The results of my research show that self-interest matters, even in the arena of supposedly altruistic environmentally friendly market purchases. In fact, it matters a lot. Self-interest moderates the relationship between efficacy and action, as well as between environmental concern and action. Echoing the thoughts of Sen in "Rational Fools" (1972), self-interest is not the whole

story, both commitment and efficacy matter. However, incentives are powerful—and they become more powerful the closer they come to appealing to things an individual cares a great deal about and has a vested interest in—namely, their health, and the health of family members.

From a marketing perspective, calling attention to self-interest can help—but there is a limit to its effectiveness. The GSS model suggests that if consumers make the connection between their personal welfare and buying green, their pro-environmental inclinations and heightened sense of efficacy will be that much more effective in inducing action. On the other hand, the Gallup model suggests the limited efficacy of appealing to broad self-interest, like using scare tactics to induce general worry, in an effort to promote green consumerism. Self-interest is most effective when it directly appeals to personal well-being, and when the connection between consumer action and improvements in well-being is clearly illustrated. Invoking self-interest by shocking people with the magnanimity of environmental problems might actually reduce the effect of pro-environmental attitudes on pro-environmental consumer action. Overall, both models provide compelling justification for a marketing emphasis on the tangible personal benefits of environmentally responsible products in addition to their altruistic appeal. Incentives are indeed powerful, but not all-powerful.

Directions for Future Research

Since this analysis only investigated possible bilinear interactions among self-interest, efficacy, and attitude, exploring other, nonlinear interactions would be a good next step. Another direction that could yield interesting results would be to consider flipping the conceptualization of which variable serves as the moderator in the interaction

term. For example, while this analysis on the basis of theoretical speculation, assumed self-interest moderated the relationship between attitude and behavior and between efficacy and behavior, it is statistically possible that attitude or efficacy actually moderates the relationship between self-interest and behavior. Finally, consumer focus groups, or surveys designed specifically to evaluate the roles of self-interest, environmental concern, and efficacy in the consumer decision-making process, would greatly enhance interpretation and help to better explain the motivations driving environmentally responsible consumer behavior.

Appendix

Ordered Probit Model Results using GSS Data

Table 11

GSS model using probit analysis

Outcome variable: Frequency of organic produce purchase

	Coefficient	S.E.	P>t	95% Confidence Interval	
Attitudes (WTP)	-0.159	0.115	0.168	-0.385	0.067
Efficacy (PEEP)***	-0.316	0.119	0.008	-0.550	-0.082
Self-Interest (narrow)	-0.139	0.142	0.328	-0.418	0.140
Efficacy*Self-Interest**	0.084	0.033	0.012	0.019	0.149
Attitudes*Self-Interest*	0.064	0.032	0.050	0.000	0.127
Income*	0.004	0.002	0.072	0.000	0.008
Female***	0.235	0.066	0.000	0.105	0.364
Education	0.002	0.009	0.852	-0.015	0.018
Political views***	0.069	0.025	0.006	0.020	0.117
Environmentalists***	0.527	0.102	0.000	0.327	0.726
_cut1	-0.229	0.521			
_cut2	0.749	0.522			
_cut3	1.683	0.522			
Log likelihood	-1401.842				
LR chi2(10)	190.49				
Prob>chi2	0.000				
Pseudo R-squared	0.064				
N	1187				

***p-value<.01

**p-value<.05

*p-value<.10

Heteroskedasticity and Multicollinearity in the GSS Multiple Regression Model

Tests on the final GSS model including two interaction terms indicate the presence of heteroskedasticity, or unequal variance of error terms. Specifically, heteroskedasticity implies that the variance of the errors terms differs for different values of the explanatory variables. Although estimates of beta coefficients are unaffected, heteroskedasticity poses a problem because it can bias the beta standard errors and compromise statistical inference by consequently affecting t-statistics. In the presence of heteroskedasticity, a relationship that ordinarily would be statistically significant may appear insignificant because nonconstant variance in error terms has inflated the standard errors to a point where the null hypothesis that the beta coefficient is equal to zero cannot be rejected. Despite testing positive for heteroskedasticity, the interaction terms remain within the threshold of significance and thus unequal variances pose little threat. To be conservative, however, I have used robust standard errors in the final model. If heteroskedasticity is indeed a problem, robust standard errors should account for it.

A second concern of any model with interaction terms is possible multicollinearity. Multicollinearity is a problem inasmuch as it makes it more difficult to achieve significance of the collinear parameters. However, if estimates are already statistically significant, collinearity poses less of a threat. Because independent variables may be highly correlated, the variance, standard errors, and parameter estimates may be inflated. Variance inflation factors can help to detect this, since variance inflation is the consequence of multicollinearity. An examination of the variance inflation factors of the model with both moderators indicates the presence of multicollinearity. As Table 12

clearly shows, several of the variables, including the interaction terms, have VIF's greater than 10.

Table 12
Variable Inflation Factors for GSS Model

<i>Variable</i>	<i>VIF</i>	<i>1/VIF</i>
Attitude*Self-interest	24.43	0.04
Efficacy*Self-interest	22.71	0.04
Self-interest	15.38	0.07
Attitude	14.23	0.07
Efficacy	13.71	0.07
Education	1.09	0.91
Environmentalism	1.08	0.92
Political views	1.06	0.94
Female	1.03	0.97
Income	1.03	0.97
Mean VIF		9.58

Analyzing the auxiliary regression of attitude on the two moderators, self-interest, efficacy, education, environmentalism, political views, female, and income confirms the indications from VIF analysis. Interestingly, multicollinearity becomes a non-issue when only the moderator “self-interest*efficacy” is kept in the model. The reverse is not true—multicollinearity persists when only the second moderator “self-interest*attitude” is kept in the model. Comparing the R-squared from the auxiliary regression with the R-squared from the original model when only “self-interest*efficacy” is included yields no evidence of multicollinearity (the R-squared of the auxiliary at 10.0% is lower than the original R-squared at 14.6%). The opposite situation arises when the analysis is replicated on the model with both moderators. The R-squared of the auxiliary regression skyrockets to 93% from the original 15.0%. R-squared comparison of the original and auxiliary regression with only the moderator “self-interest*attitude” included mirrors the results of analysis with both moderators (R-squared jumps from 14.5% to 92.7%). These

results suggest that the addition of the second moderator between self-interest and attitude may induce multicollinearity.

Reviewing the correlations among independent variables and between interaction terms and independent variables yields few clues. Bivariate correlations between the product terms and their component parts are high, ranging from .61 to .79, but not alarmingly so. As Jaccard and Turrisi note in their overview of “Interaction Terms in Multiple Regression,” high bivariate correlations between product terms and component parts is quite common and generally will not be problematic for interaction analysis unless the collinearity is so high that it disrupts the computer algorithm--and in this example it does not (p. 28, 2003). While high collinearity between the component parts of the product term could lead to serious complications, this also does not appear to be a problem in the GSS model (*ibid.*). The bivariate correlation between self-interest and efficacy is negligible at -.02 while the correlation between self-interest and attitude is not much to balk at either at .09. After reviewing the relevant correlations, it seems clear that the problem of collinearity may be induced by the introduction of the second interaction term. Checking the correlation between the two interaction terms provides some evidence. At .53, the bivariate correlation is high, but not shocking. Whether the second moderator should or should not be kept in the model is unclear and probably depends on how large a threat multicollinearity poses.

A possible solution aside from removing the moderator from the model involves mean centering the variables. For models with interaction terms, mean-centering the component variables X and Z prior to creating the product term XZ will result in a product term that is uncorrelated with both X and Z. Unfortunately, this will not change

the results of the significance test for the moderator variable and is generally only useful if the collinearity is so high it disrupts the computer algorithm (Jaccard and Turrisi 2003). Since both interaction terms are statistically significant to begin with, collinearity is not so high that it prevents analysis, and the inclusion of the second moderator adds explanatory power, I have decided to keep it in the model.

Supporting Logistic Regressions for the Gallup Model

Table 13

Gallup logistic regression model restricted to respondents with LOW levels of broad self-interest

Dichotomous outcome variable: Green purchase

	Odds Ratio	Std. Error	P>z	95% Confidence Interval
Attitudes(perception of environment movement support)**	3.978	2.551	0.031	1.132 13.979
Efficacy	0.588	0.249	0.210	0.257 1.349
Income	1.041	0.251	0.867	0.650 1.669
Female	1.450	1.257	0.668	0.265 7.926
Education	1.150	0.270	0.552	0.726 1.822
Liberal	1.534	2.111	0.756	0.103 22.773
Urban	7.007	10.308	0.186	0.392 125.223
Suburban	4.280	6.137	0.311	0.258 71.101
Log likelihood	-434.35			
LR chi2(8)	10.56			
Prob>chi2	0.23			
Pseudo R-squared	0.21			
N	37			

***p-value<.01

**p-value<.05

*p-value<.10

Table 14

Gallup logistic regression model restricted to respondents with HIGH levels of broad self-interest

Dichotomous outcome variable: Green purchase

	Odds Ratio	Std. Error	P>z	95% Confidence Interval
Attitudes(perception of environment movement support)**	1.503	0.282	0.030	1.040 2.172
Efficacy	1.228	0.222	0.256	0.861 1.751
Income	1.119	0.100	0.206	0.940 1.332
Female*	0.610	0.173	0.081	0.350 1.063
Environmentalist	1.183	0.527	0.706	0.494 2.834
Education***	1.306	0.119	0.003	1.092 1.562
Liberal	0.767	0.258	0.431	0.397 1.483
Urban	0.622	0.250	0.237	0.283 1.366
Suburban	0.709	0.267	0.362	0.338 1.485
Log likelihood	-179.73			
LR chi2(9)	29.21			
Prob>chi2	0.00			
Pseudo R-squared	0.08			
N	449			

***p-value<.01

**p-value<.05

*p-value<.10

Table 15

Gallup logistic regression model restricted to respondents with LOW and LOW-MODERATE levels of broad self-interest

Dichotomous outcome variable: Green purchase

	Odds Ratio	Std. Error	P>z	95% Confidence Interval
Attitudes(perception of environment movement support)***	2.346	0.622	0.001	1.395 3.944
Efficacy	1.022	0.235	0.925	0.651 1.603
Income	1.087	0.138	0.511	0.847 1.395
Female*	1.717	0.787	0.238	0.700 4.215
Environmentalist	2.230	2.774	0.519	0.195 25.540
Education***	1.166	0.156	0.253	0.896 1.516
Liberal	1.045	0.672	0.946	0.296 3.684
Urban	1.712	1.079	0.393	0.498 5.888
Suburban*	2.724	1.606	0.089	0.858 8.650
Log likelihood	-75.56			
LR chi2(9)	23.52			
Prob>chi2	0.01			
Pseudo R-squared	0.13			
N	126			

***p-value<.01

**p-value<.05

*p-value<.10

Table 16

Gallup logistic regression model restricted to respondents with LOW, LOW-MODERATE, and MODERATE-HIGH levels of broad self-interest

Dichotomous outcome variable: Green purchase

	Odds Ratio	Std. Error	P>z	95% Confidence Interval	
Attitudes(perception of environment movement support)***	2.712	0.451	0.000	1.958	3.757
Efficacy	0.922	0.129	0.560	0.701	1.212
Income*	1.145	0.087	0.075	0.986	1.329
Female*	1.547	0.381	0.076	0.955	2.507
Environmentalism	0.735	0.342	0.508	0.295	1.829
Education	1.109	0.087	0.187	0.951	1.292
Liberal	1.170	0.393	0.641	0.605	2.261
Urban	1.570	0.526	0.178	0.814	3.029
Suburban**	2.182	0.668	0.011	1.197	3.975
Log likelihood	-218.09				
LR chi2(9)	66.32				
Prob>chi2	0.00				
Pseudo R-squared	0.13				
N	394				

***p-value<.01

**p-value<.05

*p-value<.10

Table 17

Gallup logistic regression model restricted to respondents with MODERATE-HIGH levels of broad self-interest

Dichotomous outcome variable: Green purchase

	Odds Ratio	Std. Error	P>z	95% Confidence Interval	
Attitudes(perception of environment movement support)***	2.587	0.636	0.000	1.598	4.188
Efficacy	0.826	0.154	0.305	0.573	1.190
Income	1.110	0.114	0.309	0.908	1.357
Female	1.414	0.443	0.269	0.765	2.613
Environmentalism	0.502	0.260	0.183	0.182	1.383
Education	1.154	0.120	0.168	0.941	1.415
Liberal	1.045	0.426	0.914	0.470	2.322
Urban	1.822	0.788	0.165	0.781	4.252
Suburban*	2.117	0.808	0.050	1.001	4.474
Log likelihood	-130.20				
LR chi2(9)	33.48				
Prob>chi2	0.00				
Pseudo R-squared	0.11				
N	252				

***p-value<.01

**p-value<.05

*p-value<.10

Question Wording and Frequency Distributions for Main Independent and Dependent Variables:

General Social Survey Module on the Environment

Recode note: For the variables 1, 3, and 4, below, responses were recoded so that rankings progressed from low to high in terms of attitudes, self-interest, and frequency of purchase of organic produce, i.e., in the WTP variable, 1= very unwilling and 5= very willing. The variable for efficacy, number 2 below, did not need to be recoded as higher numbers indicated a higher sense of efficacy.

1. Survey question for environmental attitudes (WTP):

How willing would you be to pay much higher prices in order to protect the environment?

- 1 Very willing
- 2 Fairly willing
- 3 Neither willing nor unwilling
- 4 Fairly unwilling
- 5 Very unwilling
- 8 Can't choose, don't know
- 9 NA, refused

	Frequency	Percent	Cum.
not at all willing	99	7.2	7.2
not very willing	247	17.8	25.0
neither willing nor unwill	298	21.5	46.5
fairly willing	551	39.8	86.3
very willing	148	10.7	97.0
dk	42	3.0	100.0
Total	1,385	100	

2. Survey question for efficacy (PEEP):

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

It is just too difficult for someone like me to do much about the environment.

- 1 Strongly agree
- 2 Agree
- 3 Neither agree nor disagree
- 4 Disagree
- 5 Strongly disagree
- 8 Can't choose, don't know
- 9 NA, refused

	Frequency	Percent	Cum.
strongly agree	65	4.7	4.7
agree	284	20.5	25.2
neither agree nor disagree	194	14.0	39.2
disagree	698	50.4	89.6
strongly disagree	123	8.9	98.5
dk	21	1.5	100.0
Total	1,385	100	

3. Survey question for self-interest (narrow):

And do you think that pesticides and chemicals used in farming are...

- 1 extremely dangerous to you and your family,
- 2 very dangerous
- 3 somewhat dangerous
- 4 not very dangerous
- 5 not dangerous at all for you and your family?
- 8 can't choose
- 9 NA, refused

	Frequency	Percent	Cum.
not dangerous	16	1.2	1.2
not very dangerous	175	12.6	13.8
somewhat dangerous	678	49.0	62.7
very dangerous	300	21.7	84.4
extremely dangerous	178	12.9	97.3
dk	38	2.7	100.0
Total	1,385	100	

4. Survey question for outcome variable, organic produce purchase:

And how often do you make a special effort to buy fruits and vegetables grown without pesticides or chemicals?

- 1 Always
- 2 Often
- 3 Sometimes
- 4 Never
- 5 Not available where I live
- 8 Can't choose, don't know
- 9 NA, refused

	Frequency	Percent	Cum.
never	471	34.0	34.0
sometimes	436	31.5	65.5
often	266	19.2	84.7
always	105	7.6	92.3
not available	107	7.7	100.0
Total	1,385	100	

5. Survey question for control variable income:

Total family income from all sources in 1992 (before tax and other deductions)?

1	lt \$1000
2	\$1000-2999
3	\$3000-3999
4	\$4000-4999
5	\$5000-5999
6	\$6000-6999
7	\$7000-7999
8	\$8000-9999
9	\$10000-12499
10	\$12500-14999
11	\$15000-17499
12	\$17500-19999
13	\$20000-22499
14	\$22500-24999
15	\$25000-29999
16	\$30000-34999
17	\$35000-39999
18	\$40000-49999
19	\$50000-59999
20	\$60000-74999
21	\$75000+
22	refused
98	dk
99	na

Recode note: The income variable used in analysis excluded responses coded above 21.

	Frequency	Percent	Cum.
lt \$1000	15	1.1	1.1
\$1000-2999	16	1.2	2.3
\$3000-3999	21	1.6	3.9
\$4000-4999	26	1.9	5.8
\$5000-5999	31	2.3	8.1
\$6000-6999	21	1.6	9.7
\$7000-7999	23	1.7	11.4
\$8000-9999	36	2.7	14.1
\$10000-12499	52	3.9	17.9
\$12500-14999	62	4.6	22.6
\$15000-17499	55	4.1	26.7
\$17500-19999	47	3.5	30.2
\$20000-22499	52	3.9	34.0
\$22500-24999	63	4.7	38.7
\$25000-29999	84	6.3	45.0
\$30000-34999	108	8.0	53.0
\$35000-39999	92	6.9	59.9
\$40000-49999	119	8.9	68.7
\$50000-59999	100	7.5	76.2
\$60000-74999	96	7.2	83.3
\$75000+	134	10.0	93.3
refused	49	3.7	97.0
dk	41	3.1	100.0
Total	1,343	100	

6. Survey question for control variable gender (female):
Sex of respondent

- 1 Male
- 2 Female

Recode note: Gender was recoded as a dummy variable, female, where female=1 if woman, and female=0 if man.

	Frequency	Percent	Cum.
Male	596	43.0	43.0
Female	789	57.0	100.0
Total	1,385	100	

7. Survey question for control variable education:
Highest year of school completed

- 0 zero years
- 2 two years
- 3 three years
- 4 four years
- 5 five years
- 6 six years
- 7 seven years
- 8 eight years
- 9 nine years
- 10 ten years
- 11 eleven years
- 12 twelve years
- 13 thirteen years
- 14 fourteen years
- 15 fifteen years
- 16 sixteen years
- 17 seventeen years
- 18 eighteen years
- 19 nineteen years
- 20 twenty years
- 97-99 don't know, not applicable, not available

Recode note: 97-99 were excluded from analysis

	Frequency	Percent	Cum.
0	2	0.1	0.1
2	4	0.3	0.4
4	6	0.4	0.9
5	5	0.4	1.2
6	16	1.2	2.4
7	21	1.5	3.9
8	52	3.8	7.7
9	40	2.9	10.5
10	50	3.6	14.2
11	74	5.3	19.5
12	414	29.9	49.4
13	137	9.9	59.3
14	143	10.3	69.6
15	65	4.7	74.3
16	198	14.3	88.6
17	43	3.1	91.7
18	67	4.8	96.5
19	23	1.7	98.2
20	24	1.7	99.9
dk	1	0.1	100.0
Total	1,385	100	

8. Survey question for control variable political views:
Do you think of yourself as liberal or conservative?

- 1 extremely conservative
- 2 conservative
- 3 slightly conservative
- 4 moderate
- 5 slightly liberal
- 6 liberal
- 7 extremely liberal
- 8 dk

Recode note: Political views were coded as a continuous variable, where increasing values indicate an increasing tendency towards liberal political views, excluding don't know responses.

	Frequency	Percent	Cum.
extremely conservative	34	2.5	2.5
conservative	220	15.9	18.4
slightly conservative	225	16.3	34.7
moderate	509	36.8	71.5
slightly liberal	173	12.5	84.0
liberal	155	11.2	95.2
extremely liberal	27	2.0	97.2
dk	39	2.8	100.0
Total	1,382	100	

9. Survey question for control variable environmentalist status:
Are you a member of an environmental group?

- 1 yes
- 2 no
- 8 dk
- 9 na

Recode note: Environmentalist status was recoded as a dummy variable, enviro, where 1= yes, and 0=no, excluding don't know and not available responses.

	Frequency	Percent	Cum.
Not environmentalist	1,236	89.4	89.4
Environmentalist	146	10.6	100.0
Total	1,382	100	

Gallup Poll on the Environment

Recode note: For the variables 1, 2, and 3, below, responses were recoded so that rankings progressed from low to high (excluding don't know and refused responses) in terms of attitudes, efficacy, and self-interest, i.e., in the attitude variable below (#1), 1= unsympathetic and 5= active participant.

1. Survey question for environmental attitudes:

Thinking specifically about the environmental movement, do you think of yourself as...

- 1 An active participant in the environmental movement,
- 2 Sympathetic towards the movement, but not active,
- 3 Neutral, or
- 4 Unsympathetic towards the environmental movement
- 5 DON'T KNOW
- 6 REFUSED

	Frequency	Percent	Cum.
unsympathetic	46	4.94	4.94
neutral	190	20.39	25.32
sympathetic, but not active	532	57.08	82.4
active participant	157	16.85	99.25
dk	7	0.75	100
Total	932	100.0	

2. Survey question for efficacy (PCEEP):

In your opinion, how much of an effect can citizens and citizens' groups have on solving our environmental problems – a great deal, a fair amount, not very much, or almost none at all?

- 1 A great deal
- 2 A fair amount
- 3 Not very much
- 4 Almost none at all
- 5 DON'T KNOW
- 6 REFUSED

	Frequency	Percent	Cum.
almost none at all	35	3.76	3.76
not very much	87	9.33	13.09
a fair amount	385	41.31	54.4
a great deal	421	45.17	99.57
dk	4	0.43	100
Total	932	100.0	

3. Survey question for self-interest (broad):

I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this problem a great deal, a fair amount, only a little, or not at all. First, how much do you personally worry about...

- 1 A great deal
- 2 A fair amount
- 3 Only a little
- 4 Not at all
- 5 DON'T KNOW
- 6 REFUSED

- A. Ocean and beach pollution
- B. Pollution of rivers, lakes, and reservoirs
- C. Air pollution
- D. Damage to the earth's ozone layer
- E. The loss of tropical rain forests
- F. The loss of natural habitat for wildlife
- G. The "greenhouse effect" or global warming
- H. Contamination of soil and water by toxic waste
- I. Contamination of soil and water by radioactivity from nuclear facilities
- J. Acid rain
- K. Pollution of drinking water
- L. Extinction of plant and animal species
- M. Urban sprawl and loss of open spaces

Recode note: Extent of broad self-interest was measured by creating a continuous index summing up each respondent's level of worry over the array of problems (A-M), excluding don't know and refused responses. Details of the index and tests for consistency are below:

Variable	Obs	Mean	Std. Dev.	Min	Max
sindex	932	42	9	13	52

Item	mean(unstandardized items)					alpha
	Obs	Sign	item-test Correlation	item-rest correlation	average inter-item covariance	
Ocean and beach pollution	932	+	0.75	0.70	0.40	0.91
Pollution of rivers, lakes, and reservoirs	932	+	0.74	0.70	0.41	0.91
Air pollution	932	+	0.73	0.68	0.40	0.91
Damage to the earth's ozone layer	932	+	0.76	0.70	0.39	0.91
The loss of tropical rain forests	932	+	0.73	0.66	0.39	0.91
The loss of natural habitat for wildlife	932	+	0.73	0.68	0.40	0.91
The "greenhouse effect" or global warming	932	+	0.74	0.68	0.38	0.91
Contamination of soil and water by toxic waste	932	+	0.71	0.66	0.41	0.91
Contamination of soil and water by radioactivity from nuclear facilities	932	+	0.70	0.63	0.39	0.92
Acid rain	932	+	0.74	0.67	0.38	0.91
Pollution of drinking water	932	+	0.64	0.58	0.42	0.92
Extinction of plant and animal species	932	+	0.75	0.69	0.39	0.91
Urban sprawl and loss of open spaces	932	+	0.63	0.55	0.40	0.92
Test scale:					0.40	0.92

	Frequency	Percent	Cum.
Less than 23	37	3.97	3.97
between 23 and 33	89	9.55	13.52
between 33 and 43	268	28.76	42.27
between 43 and 52	538	57.73	100
Total	932	100	

4. Survey question for outcome variable, green consumerism (Item J):
Which of these, if any, have you, yourself, done in the past year?

- 1 Yes, have done
- 2 No, have not done
- 3 DON'T KNOW
- 4 REFUSED

- A. Avoided using certain products that harm the environment
- B. Been active in a group or organization that works to protect the environment
- C. Voted for or worked for candidates because of their position on environmental issues
- D. Contributed money to an environmental, conservation or wildlife preservation group
- E. Contacted a public official about an environmental issue
- F. Contacted a business to complain about its products or policies because they harm the environment
- G. Signed a petition supporting an environmental group or some environmental protection effort
- H. Attended a meeting concerning the environment
- I. Tried to use less water in your household
- J. Bought some product specifically because you thought it was better for the environment than competing products

- K. Voluntarily recycled newspapers, glass, aluminum, motor oil or other items
- L. Reduced your household's use of energy
- M. Bought or sold stocks based on the environmental record of the companies

Recode note: Responses to item J above were recoded as a dummy variable, bought, where 1=yes, have done and 0=no, have not done. Don't know and refused responses were excluded in order to create a dichotomous dummy variable for the outcome variable of the logistic regression.

	Frequency	Percent	Cum.
Have not bought	214	23.01	23.01
Have bought	716	76.99	100
Total	930	100.0	

5. Survey question for control variable income:
Total family income (before tax and other deductions)?

- 1 less than \$10000
- 2 \$10000 to 14000
- 3 \$15000 to 20000
- 4 \$20000 to 30000
- 5 \$30000 to 50000
- 6 \$50000 to 75000
- 7 greater than \$75000
- 8 dk, refused

Recode note: The income variable used in analysis excluded responses coded above 7.

	Frequency	Percent	Cum.
<10k	46	4.94	4.94
10-14k	37	3.97	8.91
15-20k	80	8.58	17.49
20-30k	120	12.88	30.36
30-50k	205	22.0	52.4
50-75k	203	21.8	74.1
>75k	241	25.9	100.0
Total	932	100.0	

6. Survey question for control variable gender (female):
Respondent's sex

- 1 Male

2 Female

Recode note: Gender was recoded as a dummy variable, female, where female=1 if woman, and female=0 if man.

	Frequency	Percent	Cum.
Male	454	48.7	48.7
Female	478	51.3	100.0
Total	932	100.0	

7. Survey question for control variable education:

What is the last grade or class that you completed in school?

- 1 None, or grade 1 - 4
- 2 Grades 5, 6 or 7
- 3 Grade 8
- 4 High school incomplete (Grades 9 - 11)
- 5 High school graduate, Grade 12
- 6 Technical, trade, or business after high school
- 7 College/university incomplete
- 8 College/university graduate or more
- 9 DON'T KNOW
- 0 REFUSED

Recode note:9 and 0 were excluded from analysis

	Frequency	Percent	Cum.
1-4	1	0.11	0.11
5-7	8	0.86	0.97
8th	7	0.8	1.7
9-11	63	6.8	8.5
hs grad	224	24.03	32.51
tech	28	3	35.52
some coll	253	27.15	62.66
grad coll	188	20.17	82.83
postgrad	160	17.17	100
Total	932	100.0	

8. Survey question for control variable political views (liberal):

How would you describe your political views?

- 1 Conservative

- 2 Moderate
- 3 Liberal

Recode note: The variable for political views was first recoded by Gallup, distributing don't know's into the moderate section. I have again recoded the variable as a dummy variable, liberal, where 1= liberal and 0=otherwise.

	Frequency	Percent	Cum.
Not liberal	761	81.65	81.65
Liberal	171	18.35	100
Total	932	100	

9. Survey question for control variable environmentalist status:

There are many different kinds of environmental organizations, including large national and international organizations like the Sierra Club and Greenpeace, as well as smaller, local organizations. First, do you, yourself, belong to any large national or international environmental organizations?

- 1 Yes
- 2 No
- 3 DON'T KNOW
- 4 REFUSED

Recode note: Environmentalist status was recoded as a dummy variable, enviro, where 1= yes, and 0=no, excluding don't know and refused responses.

	Frequency	Percent	Cum.
Not environmentalist	806	86.6	86.6
Environmentalist	125	13.4	100.0
Total	931	100.0	

10. Survey question for community type (urban, suburban variables):

Which of the following best describes the area you live in?

- 2 Urban
- 5 Suburban
- 7 Rural

Recode note: Community type was recoded as two dummy variables, urban and suburban. For urban, 1=urban, 0=otherwise, and for suburban, 1=suburban, 0=otherwise.

Urban:

	Frequency	Percent	Cum.
Suburban or rural	660	70.82	70.82
Urban	272	29.18	100
Total	932	100	

Suburban:

	Frequency	Percent	Cum.
Rural or urban	463	49.68	49.68
Suburban	469	50.32	100
Total	932	100	

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