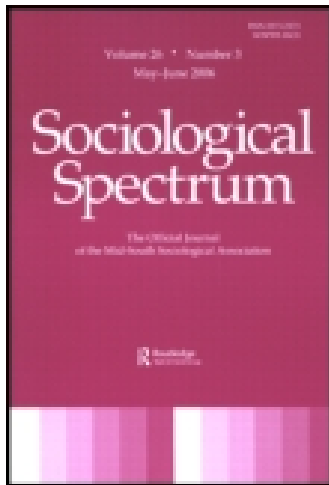


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# Barriers to Environmental Sacrifice: The Interaction of Free Rider Fears with Education, Income, and Ideology

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Sacrificing individual material interests for collective benefits involves trust that others will act in good faith. Inherent to situations concerning collective goods is the problem of the free rider that plagues collective action: the individual who maximizes their short-term interests at the cost of the greater good. Prior research in environmental sociology has identified various social structural factors predicting pro-environmental behavior and concern, while research on social dilemmas has explored the role of trust in determining cooperation in situations regarding collective goods. This research draws upon these areas of scholarship to examine the interaction between free rider fears with education, income, and ideology in determining the willingness of Americans to sacrifice individual interest for environmental protection through an analysis of 2010 General Social Survey data. Findings help differentiate the engagement of pro-environmental behavior from general environmental concern, with the fear of free riders particularly impacting the highly educated and ideological liberals.

Individuals willing to sacrifice for the environment are sociologically interesting because they provide insight into a link between the micro and the macro, foregoing quotidian comforts and security for the benefit of a collective good. Pursuing environmental protection as a public good presents a social dilemma—a situation where people must cooperate in order to secure a collective good even if such behavior contradicts individualist rationality. The vast spatial and temporal scales involved with environmental degradation make pro-environmental behavior difficult to monitor and enforce at the level of the individual. Likewise, it is not possible to generally exclude people from enjoying the benefits of environmental protection (whether they actively contribute towards it or not), making it an “inclusive collective good” (Olson 1965). This complicates cooperation as some individuals may suspect that others are “free riding”—enjoying the benefits of a collective good without contributing toward its continuation, potentially negating the sacrifices made by active participants over the long term. This presents the old problem of collective action, forcing us to ask a fundamental sociological question: “When will a collectivity act to maximize its *collective* interest even though such behavior conflicts with a course of action that would maximize the short-term interests of each individual separately?” (Marwell and Ames 1979; emphasis in the original).

Sociological research has examined the relationship between several factors with pro-environmental behavior and concern (Van Lieke and Dunlap 1980; Dietz, Stern, and Guagnano 1998; Engel and Pötschke 1998; Stern et al. 1999; Stern 2000; Poortinga, Steg, and Viek et al. 2004; Franzen and Meyer 2010; Pampel and Hunter 2012). Some of these include education, income, and ideology. Research on social dilemmas involving environmental public goods has identified trust as a key variable predicting the willingness to cooperate toward collective goals (Van Lange, Van Vugt, Meertens, and Ruiters 1998; Liebe, Preisendörfer, and Meyerhoff 2011; Irwin and Berigan 2013). The research presented here seeks to connect these two areas of research by exploring an individual's willingness to sacrifice for the environment as contingent upon the interaction of education, income, and ideology with free rider fears.

Rather than focusing on the impact of free riding behavior, this paper looks at how the suspicion of free riding affects the willingness to participate toward collective environmental benefits. Research on social dilemmas indicates that people with low levels of trust are less likely to cooperate toward collective goals because they suspect free riding behavior. While people may recognize the desirability of a collective goal, they may be less willing to contribute toward its realization if they believe it requires collective action to achieve *and* they suspect their individual contribution will be canceled by the free riding behavior of others acting in a self-interested manner. Thus, we can expect that individuals who (1) are not trusting of people in general and (2) do not see the point of contributing toward collective environmental goods unless everyone acts in concert are more likely to suspect free riding behavior in the context of collective environmental goods.

This argument concerns a factor that helps explain gaps between attitudes and behavior. Many policy approaches to environmental behavior implicitly rely on information-based strategies, assuming that better knowledge of the environmental impacts of behavior will encourage individuals to make behavioral or lifestyle changes. McKenzie-Mohr (2000) and McKenzie-Mohr, Lee, Schultz, and Kotler (2012) argued that a key component of altering pro-environmental behavior is to first identify specific barriers, which could be either internal (e.g., lack of knowledge) or external (e.g., lack of structural access) to the individual. These barriers will differ across types of individuals and specific behaviors. Whether individuals fear that collective efficacy is threatened by free riders may constitute an internal barrier preventing participation in some pro-environmental behaviors.

While past research has analyzed the relationship between education, income, and ideology with an individual's willingness to engage in pro-environmental behavior, we do not know how the suspicion of free riders moderates these factors. Can higher levels of formal education, greater amounts of disposable income, or more liberal worldviews overcome cynical attitudes about the viability and rationality of contributing individual actions toward collective environmental goals? I argue that they do not. Rather, individuals suspicious that free riders may cancel out their contribution are much less likely than their counterparts to express a willingness to engage in pro-environmental behavior, particularly among those with liberal ideology or many years of formal education.

This paper focuses on one narrow aspect of environmentally significant behavior: an individual's willingness to sacrifice material resources in order to protect the environment. As such, this research falls under an "intent-oriented" (as opposed to "impact-oriented") aspect of the literature, concerned with what leads individuals to engage in environmentally significant behavior rather than the environmental impacts of behavior itself (Stern 2000). Relying on data from the 2010 General Social Survey, this paper argues that an individual's willingness to sacrifice in

order to protect the environment is depressed by their likelihood to recognize environmental free riders. This contribution will help us better understand the potential barriers to environmental sacrifice.

## ENVIRONMENTAL SOCIAL DILEMMAS, CONCERN, AND BEHAVIOR

Decades of research within environmental sociology has identified pro-environmental concern as a coherent worldview distinct from perspectives that exempt the evaluation of human relationships from consideration of natural environments (Catton and Dunlap 1978; Van Liere and Dunlap 1980; Dunlap and Van Liere 1978; Dunlap et al. 2000). However, high levels of environmental concern do not guarantee that an individual will engage in pro-environmental behavior. This may be attributed to gaps between the indirect experience of environmental education and direct experience of environmental degradation, access to environmental services, or role strain preventing pro-environmental behavior where intent is present (Kollmuss and Agyeman 2002; Carolan 2010; Walton and Austin 2011).

Research regarding collective action can help further explain the gap between environmental attitudes and behavior. Making individual sacrifice for collective environmental goods presents a particular problem within collective action—the “social dilemma.” Scholars define social dilemmas as situations where individuals have incentive to not contribute to a collective good, creating a tension between individual and collective rationality (Olson 1965; Kollock 1998). Hardin’s (1968) “tragedy of the commons” offers a classic example, where the aggregation of self-interested acts brings ruin to the resources (public goods) enjoyed by the collective. Free riders—individuals pursuing their own interests to the detriment of collective interests—are inherent to social dilemmas (Ostrom 2000a), and people are less willing to cooperate toward a public good once they recognize free riders (Yamagishi and Cook 1993).

However, if all people act according to their individual interests, collective interests suffer over the long-term, negating any future benefits individuals may seek. Experiments demonstrate that most people are “conditional cooperators” willing to participate in action for a public good if they believe their efforts will not be exploited by free riders (Ostrom 2000b; Shinada and Yamagishi 2007). General levels of trust play a significant role in social dilemmas, positively predicting cooperation toward a public good. For example, in their research on environmental social dilemmas, Irwin and Berigan (2013) found that people with low levels of generalized trust were less willing to make sacrifices for environmental protection, particularly in individualist cultures. Likewise, trust was a statistically significant predictor in Liebe et al.’s (2011) study of the willingness to pay for forest biodiversity in Germany.

Just as pro-environmental attitudes do not necessarily translate to pro-environmental behavior, we should not expect that suspicion of free riders automatically causes individuals to withdraw from collective action. In a study of community activism, Oliver (1984) found that active members in neighborhood associations were more pessimistic than token members about the possibility of collective efficacy. This research showed that under certain conditions, individuals suspicious that no one else will contribute key resources to a collective good are more likely to volunteer their time and effort.

Research in environmental sociology has looked at the effects of education, income, and ideology in predicting environmental concern and pro-environmental behavior. Formal

education has been positively associated with general environmental concern and the willingness to sacrifice for environmental protection (Johnson, Bowker, and Cordell 2004; Irwin and Berigan 2013). However, this is not always the case with pro-environmental behavior (Olli, Grendstad, and Wollebaek 2001; Kollmuss and Agyeman 2002), which may depend on structural opportunities to participate in such behavior (Walton and Austin 2011), such as whether people have easy access to recycling services. Increased education is often associated with greater awareness of environmental issues. Dietz and colleagues (1998) demonstrated that awareness to environmental consequences positively predicted an individual's willingness to sacrifice for the environment.

We might expect that more disposable income offers more opportunities to participate in environmentally significant action, but only if we can assume that environmental concern and behavior are viewed by individuals as a luxury. Most research indicates that income serves as a poor predictor of environmental concern (Jones and Dunlap 1992; Mohai and Bryant 1998). Wiidegren (1998) found no significant relationship between income and the willingness to pay for environmental protection or behavior in environmentally friendly manners. Liebe and colleagues (2011) found that while income did not predict whether or not an individual was willing to pay for environmental public goods, it did predict the amount of money people were willing to contribute. Some inconsistent results have been found, however. Franzen and Meyer (2010) and Pampel (2013) found a positive association between affluence and environmental concern in developed economies. Similarly, Dietz, Dan, and Shwom (2007) found higher levels of income associated with greater support for climate change policies.

Ideological and partisan cleavages have not always determined environmental concern in the past, though today environmentalism is typically associated with the political left.<sup>1</sup> Austin (2002) documented the emergence of anti-environmental organizations and their ideologically conservative underpinnings in response to pro-environmental mobilization. Meyer (2010) argued that the libertarian philosophy associated with Ayn Rand is inherently hostile toward environmental concern, as environmentalism directly contradicts the value it places on egoism and its disdain for sacrificing self-interest for a collective good. This is supported empirically by McCright and Dunlap (2011a, 2011b), who analyzed survey data to demonstrate that conservative ideology significantly predicts the likelihood of denying the reality of climate change among American adults.

As already mentioned, pro-environmental concern does not necessarily predict pro-environmental behavior. Thus, factors predicting environmental concern may differ from those predicting the willingness to sacrifice for the environment. Of particular interest for this research are how free rider fears interact with education, income, and ideology in determining the willingness to engage pro-environmental behavior versus pro-environmental concern.

## DATA AND MEASUREMENTS

This article draws upon the 2010 General Social Survey (GSS;  $N = 2,044$ ), which had a 70% response rate. Data was collected on a variety of relevant attitudes and behaviors as part of

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<sup>1</sup>Before ideology and party identification were as strongly correlated as they are today in the U.S., Buttel and Flinn (1978) found a strong correlation between ideology and environmental attitudes, but that party identification did not predict environmental concern.

the International Social Survey Programme environment module. The GSS is an in-person survey administered by the National Opinion Research Center, and is representative of the non-institutionalized U.S. population aged 18 and older.

Two indices provided the dependent variables, analyzed with a common set of models. Cronbach's alpha was used to measure their reliability. The first dependent variable measures an individual's willingness to sacrifice material interests for the benefit of the environment. I constructed a three-item index consisting of items asking respondents how willing they are to (1) accept cuts in their standard of living, (2) pay much higher prices, or (3) pay much higher taxes in order to protect the environment. These items were added to create an Environmental Sacrifice Willingness Index (ESWI;  $\alpha = .836$ ), with higher values reflecting the respondent's greater willingness to make individual sacrifices for environmental ends. Inglehart (1995), Dietz et al. (1998) and Stern et al. (1999) have all relied on this scale.

The second dependent variable, the Environmental Concern Index (ECI;  $\alpha = .725$ ), consists of five questions measuring the respondent's environmental orientation. This index measures an individual's pro-environmental attitudes in general, independent of their willingness to make individual sacrifices. "Green concern" asked how concerned the respondent is about environmental issues in general (1 = not very concerned to 5 = very concerned), "green economy" asked how they respond to whether "we worry too much about the future of the environment, and not enough about prices and jobs today" (1 = strongly agree to 5 = strongly disagree), "green progress" asked whether "people worry too much about human progress harming the environment" (1 = strongly agree to 5 = strongly disagree), "green exaggeration" asked for a response to the statement that "many of the claims about environmental threats are exaggerated" (1 = strongly agree to 5 = strongly disagree), and "green importance" asked whether "there are more important things to do in life than protect the environment" (1 = strongly agree to 5 = strongly disagree). These variables were used in models predicting the ESWI.

The main variables of interest include education, income, ideology, and free rider fears. Education was coded in terms of years completed (maximum value of 20 years, equivalent to working toward or completing a graduate or professional degree). Income was measured in terms of total family income for the previous year, and coded in terms of quintiles (1 = bottom quintile to 5 = top quintile). For ideology, respondents were asked to rank themselves along a seven-point scale, with higher scores representing more conservative ideology (1 = extremely liberal to 7 = extremely conservative).

A single dichotomous variable was created to account for free rider fears. This was calculated from two measures: general levels of trust and the belief that others must act concordantly for environmentally significant behavior. The GSS asks respondents whether, in general, "would you say that most people can be trusted, or that you can't be too careful in dealing with people" (1 = you can't be too careful to 5 = most people can be trusted). In a more direct question, the GSS also asks respondents how much they agree with the statement that "there is no point in doing what I can for the environment unless others do the same" (1 = strongly agree to 5 = strongly disagree). Individuals responding with *both* low levels of trust (1-2) *and* who strongly agreed or agreed that there is no point in pro-environmental behavior unless others do the same were coded = 1. These individuals are identified as the most likely to be influenced by suspicion of free riding when it comes to cooperating on environmental public goods, capturing about 14% of the sample.

In keeping with many other studies in the field concerning environmental attitudes and behavior, this analysis controls for a variety of social structural variables: gender (1 = Female), race (1 = Black), age (18 to  $\geq 89$ ), religious affiliation (1 = Evangelical Protestant), religious attendance (1 = attend religious service once per week or more), residence (Population under 10,000 = 1), and awareness to environmental consequences. Women may express higher levels of environmental concern because they more commonly view the world as inherently interconnected rather than a set of separate subjects and objects (Stern, Dietz, and Kalof 1993), and display greater levels of risk perception on issues ranging from nuclear energy to climate change (Flynn, Slovic, and Mertz 1994; McCright 2010). Although many studies find no significant racial differences predicting environmental concern, some have found blacks expressing greater levels of concern and risk perception than whites (Adeola 2004), particularly over local environmental problems (Mohai and Bryant 1998). Younger individuals tend to be more environmentally concerned than older individuals (Jones and Dunlap 1992; Dunlap, Van Liere, Mertig, and Jones 2000; Givens and Jorgenson 2013).

Many scholars have examined the relationship between religion and environmental concern. White (1967) suggested a contradiction between Judeo-Christian belief and environmental concern. However, other researchers have not found support for this claim across all denominations (Hand and Van Liere 1984; Kanagy and Nelson 1995), but have found a negative correlation between conservative Protestant affiliation and the willingness to engage in pro-environmental behavior (Sherkat and Ellison 2007). Yet frequent church attendance increases the likelihood that an individual will have participated in pro-environmental behavior, possibly through increased exposure to things like recycling drives and carpooling programs conducted by religious organizations (Shibley and Wiggins 1997; Sherkat and Ellison 2007).

Rural and urban residents sometimes display different orientations toward environmental concern and behavior. Since urban residents typically live in more restrictive environmental conditions and face the impacts of pollution more directly compared with rural residents, they sometimes report higher levels of environmental concern. Rural economies often depend more heavily on industries extracting natural resources, making rural residents less concerned about environmental protection (Tremblay and Dunlap 1978), while agricultural economic structures restrict the ability of individuals to see the long-term benefits of pro-environmental behavior (Carolan 2006). However, Sharp and Adua (2009) argued that over time rural communities have become much more heterogeneous, diminishing the ability to use rural residence as a predictor of anti-environmental attitudes derived from economic interest. In order to control for the possibility that rural residents develop utilitarian relationships with their natural environments and are thus less willing to make individual sacrifices for environmental protection, a dichotomous variable was created to measure the effect of living in an area with a population of 10,000 or less.

In addition to measuring education, an index of environmental unawareness ( $\alpha = .801$ ) was created to measure how cognizant respondents were to environmental consequences. This was constructed from four questions asking respondents whether pesticide use in farming, water pollution, air pollution from industry, and air pollution from cars present dangers to the environment in general (1 = extremely dangerous for the environment to 5 = not at all dangerous). Higher scores for this index represent less awareness to the environmental consequences of pesticide use, water pollution, air pollution from cars, and air pollution from industry.

## METHODS

Ordinary least squares regression was used to estimate the effect of each predictor on each dependent variable. Missing data was handled using listwise deletion in all models. Two models were created to analyze both the ESWI and the ECI. None of the variables used in the models had variance inflation factors greater than 1.8, indicating that multicollinearity is not a problem.

The bulk of the analysis concerns the interaction of free rider fears with education, income, and ideology. Interaction terms were created between the dichotomous free rider fear measurement moderated by values of years of completed education, family income quintiles, and ideological scales. The variables constituting the interaction terms were included in all models.

Multiplicative interaction regression models require a different type of interpretation than additive regression models (see Brambor, Clark, and Golder 2006). The coefficients of the constituent variables do not represent average main effects as they would in a linear additive model, but rather the effect of X on Y when Z is equal to zero. As the observed range of values for the moderating variables do not include zero, the coefficients of constitutive terms must be interpreted with caution. The significance of the interaction term is not of primary interest, but rather the conditional effects of one variable on the outcome given the value of another variable. That is, the analytical concern regards the conditional effects of X on Y given a value of Z. Many scholars choose to center variables in interaction models, subtracting the mean from each observed value in order to reduce multicollinearity. However, this does not add anything substantive to the results, and collinearity between the interaction term and its constituent variables does not impair an exploration of conditional effects (Friedrich 1982; Brambor et al. 2006).

In order to probe the interaction between free rider fears with education, income, and ideology, I computed “simple slopes” (Preacher, Curran, and Bauer 2006) of the free rider fear measurement along selected observed values of moderating variables using the MODPROBE macro for SPSS statistical software (Hayes and Matthes 2009). This technique has also been referred as the “pick-a-point” approach to probing interactions (Rogosa 1980). Probing these interactions along observed values allows us to understand how free rider fears affect the dependent variables according to different levels of education, income, and ideology.

## RESULTS

Descriptive statistics for the variables used in analysis are presented in Table 1 (see Appendix A for a correlation matrix). Results from the additive linear regression models are presented in Table 2. Only two predictors are significant across both environmental sacrifice and environmental concern. These included positive relationships with liberal ideology and environmental awareness when controlling for other variables.

The effects of being female, increased education, higher levels of family income, and evangelical Protestant affiliation were all statistically significant in predicting environmental concern, but have no statistically significant impact on the willingness to sacrifice for the environment. There is mixed evidence regarding extractive commodities theory. Residence in an area of less than 10,000 people is correlated with less willingness to sacrifice for the environment, yet is not statistically significant in predicting environmental concern. At least in terms of environmental



TABLE 1  
Descriptive Data of Variables Used in Analysis

Variable	Range	<i>M</i>	<i>SD</i>
Dependent Variables			
ESWI	3–15	8.534	3.249
ECI	5–25	16.479	3.761
Female	0–1	0.564	0.496
Black	0–1	0.152	0.359
Age	18–89	47.970	17.678
Education	0–20	13.460	3.149
Income	1–5	2.997	1.374
Ideology	1–7	4.080	1.457
Evangelical Protestant	0–1	0.237	0.426
Religious Attendance	0–1	0.255	0.436
Pop under 10k	0–1	0.312	0.463
Environmental Unawareness	4–18	8.924	2.771
Green Concern	1–5	3.860	1.105
Green Economy	1–5	2.960	1.187
Green Progress	1–5	3.040	1.050
Green Exaggeration	1–5	3.120	1.119
Green Importance	1–5	3.370	1.101
Free Rider Fear	0–1	0.141	0.348

TABLE 2  
Unstandardized Coefficients and Standard Errors (in parentheses) from Linear Regressions  
Predicting Environmental Sacrifice Willingness Index (*N*= 1,043) and Environmental  
Concern Index (*N*= 1,087)

	ESWI		ECI	
Female	-0.02 (0.17)	-0.02 (0.17)	0.43* (0.20)	0.42* (0.20)
Black	-0.18 (0.25)	-0.14 (0.26)	-0.36 (0.30)	-0.22 (0.30)
Age	0.00 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Education	0.04 (0.03)	0.03 (0.03)	0.14*** (0.04)	0.11** (0.04)
Income	0.02 (0.07)	0.02 (0.07)	0.26** (0.08)	0.23** (0.08)
Ideology	-0.14* (0.06)	-0.14* (0.06)	-0.57*** (0.07)	-0.57*** (0.07)
Evangelical Protestant	-0.39 (0.21)	-0.39 (0.21)	-0.55* (0.25)	-0.52* (0.24)
Religious Attendance	0.34 (0.20)	0.34 (0.20)	-0.09 (0.23)	-0.07 (0.23)
Pop. Under 10k	-0.37* (0.18)	-0.39* (0.18)	0.03 (0.22)	-0.02 (0.21)
Env. Unawareness	-0.13*** (0.04)	-0.14*** (0.04)	-0.50*** (0.04)	-0.49*** (0.04)
Green Concern	0.80*** (0.09)	0.79*** (0.09)	-	-
Green Economy	0.38*** (0.09)	0.38*** (0.09)	-	-
Green Progress	0.24** (0.09)	0.24** (0.09)	-	-
Green Exaggeration	0.31*** (0.10)	0.30** (0.10)	-	-
Green Importance	0.11 (0.10)	0.09 (0.09)	-	-
Free Rider Fear	-	-0.48 (0.27)	-	-1.69*** (0.31)
Constant	3.68***	4.03***	20.88***	21.45***
<i>R</i> <sup>2</sup>	0.32	0.32	0.28	0.30

\**p* ≤ .05; \*\**p* ≤ .01; \*\*\**p* ≤ .001.

concern, these results may reinforce Sharp and Adua's (2009) argument that rural residence no longer serves as a proxy for utilitarian attitudes toward nature resulting from relationships to extractive industry. Most measures of environmental concern predicted environmental sacrifice with statistical significance, including green concern, green economy, green progress, and green exaggeration. However, the priority an individual placed on the environment relative to other issues did not significantly predict the willingness to engage in environmental sacrifice.

The main effects of the dichotomous measure of environmental free rider fears negatively predict an individual's environmental concern with statistical significance but not the willingness to engage in environmental sacrifice. However, the primary interest of this research concerns how free rider fears interact with factors conventionally used to study environmental behavior and concern. In particular, this research is concerned with the influence of education, income, and ideology on an individual's willingness to contribute toward environmental public goods as conditional upon their likelihood to suspect free riding behavior. Whether these interactions operate differently in contexts of cooperation versus attitudes will speak to observed gaps between pro-environmental behavior and concern.

The results from the models including interaction terms are shown in Tables 3 and 4. These models show that including the interactions do not add much in explaining overall variance of ESWI and ECI. Aside from explaining additional overall variance, however, we can seek to gain a deeper understanding of how the effect of social structural variables (education, income, ideology) on environmental behavior and concern are conditional upon free rider fears.

As mentioned earlier, the interpretation of linear-multiplicative models differs from linear-additive models. The fact that only the interaction term including ideology predicts ECI (but not ESWI) at a statistically significant level does not indicate that free rider fears only have a substantial interaction with ideology. Likewise, we should not yet conclude that income has no significant interaction with free rider fears in predicting an individual's willingness to sacrifice for the environment or their environmental concern. Instead, we can discover greater insight into the relationship between these variables by probing the interaction of free rider fears with education, income, and ideology in determining environmental sacrifice as distinct from environmental concern.

TABLE 3  
Unstandardized Coefficients and Standard Errors (in parentheses) from  
Linear-Multiplicative Regression on Environmental Sacrifice Willingness Index

Independent Variables	Model 1	Model 2	Model 3
Education	0.05 (0.03)	0.03 (0.03)	0.03 (0.03)
Income	0.02 (0.07)	0.02 (0.07)	0.02 (0.07)
Ideology	-0.14* (0.06)	-0.14* (0.06)	-0.19** (0.07)
Free Rider Fear	1.72 (1.16)	-0.40 (0.63)	-1.77* (0.75)
Free Rider Fear × Education	-0.18 (0.09)	-	-
Free Rider Fear × Income	-	-0.03 (0.22)	-
Free Rider Fear × Ideology	-	-	0.31 (0.17)
Constant	3.83***	4.02***	4.29***
$R^2$	0.32	0.32	0.32

*Note.* Controlling for gender, race, age, religious affiliation and attendance, residence, environmental unawareness and environmental concern variables at their means.

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ .

TABLE 4  
Unstandardized Coefficients and Standard Errors (in parentheses) from  
Linear-Multiplicative Regression on Environmental Concern Index

Independent Variables	Model 1	Model 2	Model 3
Education	0.12** (0.04)	0.11** (0.04)	0.11** (0.04)
Income	0.23** (0.08)	0.22** (0.08)	0.23** (0.08)
Ideology	-0.57*** (0.07)	-0.57*** (0.07)	-0.63*** (0.08)
Free Rider Fear	-1.46 (1.36)	-2.03** (0.73)	-3.45*** (0.87)
Free Rider Fear × Education	-0.02 (0.11)	-	-
Free Rider Fear × Income	-	0.13 (0.25)	-
Free Rider Fear × Ideology	-	-	0.43* (0.20)
Constant	21.42***	21.48***	21.73***
R <sup>2</sup>	0.30	0.30	0.30

Note. Controlling for gender, race, age, religious affiliation and attendance, residence, and environmental unawareness at their means.

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ .

Examining the interactions in greater depth provides a very different insight than what we can learn from simply looking at interaction term coefficients seen in Tables 3 and 4. The conditional slope effects of the free rider fear variable along selected values of education, income, and ideology as moderating variables are presented in Table 5. Interactions between free rider fears and education were tested for every two years of completed education (10 years to 20 years) as well as exhaustive observed values of income and ideology. These results show that the free rider variable interacts with most values of education, income, and ideology in determining environmental concern and most values of education and ideology in determining environmental sacrifice at statistically significant levels.

TABLE 5  
Conditional Slope Effects of Environmental Free Rider Fears Moderated by Values of Education, Income, and Ideology on Environmental Sacrifice Willingness Index (ESWI) and Environmental Concern Index (ECI)

	Education		Income		Ideology	
	ESWI	ECI	ESWI	ECI	ESWI	ECI
1	0.05 (0.34)	-1.65*** (0.39)	-0.43 (0.45)	-1.90*** (0.51)	-1.45* (0.60)	-3.02*** (0.69)
2	-0.41 (0.27)	-1.68*** (0.31)	-0.46 (0.30)	-1.77*** (0.34)	-1.14* (0.45)	-2.60*** (0.52)
3	-0.76* (0.30)	-1.72*** (0.36)	-0.49 (0.28)	-1.64*** (0.32)	-0.83* (0.33)	-2.16*** (0.38)
4	-1.12** (0.42)	-1.76*** (0.50)	-0.51 (0.39)	-1.51*** (0.46)	-0.51 (0.33)	-1.73*** (0.31)
5	-1.47* (0.58)	-1.79** (0.68)	-0.54 (0.57)	-1.38* (0.68)	-0.20 (0.30)	-1.30*** (0.35)
6	-1.83* (0.75)	-1.83* (0.88)			0.11 (0.42)	-0.88 (0.48)
7					0.43 (0.56)	-0.45 (0.65)

Note. Controlling for gender, race, age, religious affiliation and attendance, residence, environmental unawareness, and environmental concern variables at their means. Education ranges from 1 = 10 years of education to 6 = 20 years of education; Income ranges from 1 = bottom quintile to 5 = top quintile; Ideology ranges from 1 = extremely liberal to 7 = extremely conservative.

\* $p \leq .05$ ; \*\* $p \leq .01$ ; \*\*\* $p \leq .001$ .

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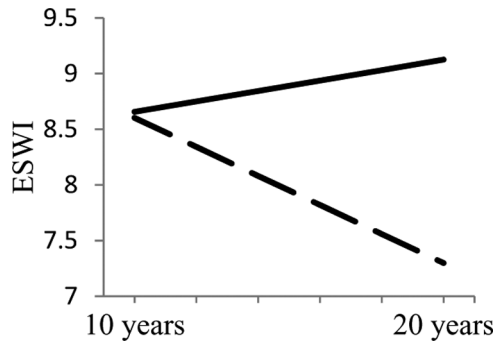


FIGURE 1 Interaction of Free Rider Fear (Dashed Line) with Education on ESWI.

Plotting the predicted scores of the ESWI and ECI according to these interactions demonstrates the significant impact of free rider fear interactions on both dependent variables as well as how it affects each of these differently. Figures 1 and 2 visualize the interaction between the free rider variable with education. Controlling for environmental awareness, increased education positively predicts environmental concern, regardless of whether or not an individual is likely to fear free riders. However, we see a very different pattern predicting the ESWI. Here we see that people unlikely to fear free riders are more willing to cooperate toward environmental protection through sacrifice, but that free rider fears have an inverse interaction with education, predicting less willingness to sacrifice as a person’s education increases. Prior research has recognized the gap between increased education with pro-environmental behavior and environmental concern, where education predicts the latter but is only weakly associated with the former. The results presented here provide free rider fears as a key variable interacting with education that results in different relationships for behavior versus concern.

The interaction with income presents a different set of results (Figures 3 and 4). Although most prior research indicates that income serves as poor predictor of environmental concern, this model shows increased income correlated with increased environmental concern. While the free rider fear predicts lower levels of concern across all income quintiles, the gap in concern levels remains relatively constant between those who suspect free riding behavior and those who do not

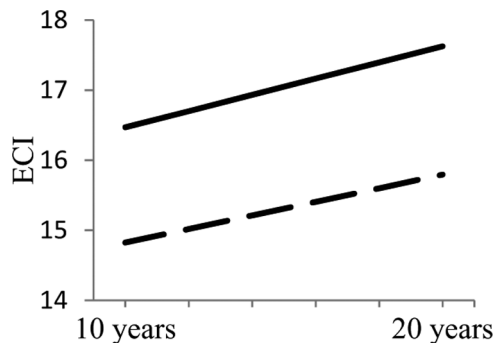


FIGURE 2 Interaction of Free Rider Fear (Dashed Line) with Education on ECI.

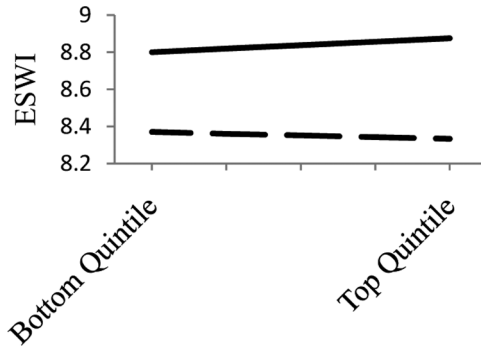


FIGURE 3 Interaction of Free Rider Fear (Dashed Line) with Income on ESWI.

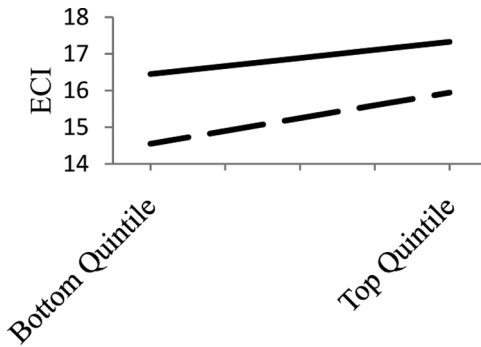


FIGURE 4 Interaction of Free Rider Fear (Dashed Line) with Income on ECI.

across the range of income values. A different pattern emerges looking at environmental sacrifice willingness, where the interactions are not significant. Increased income has a slightly positive interaction with the absence of free rider fears and a slightly negative interaction with the presence of free rider fears in predicting outcomes.

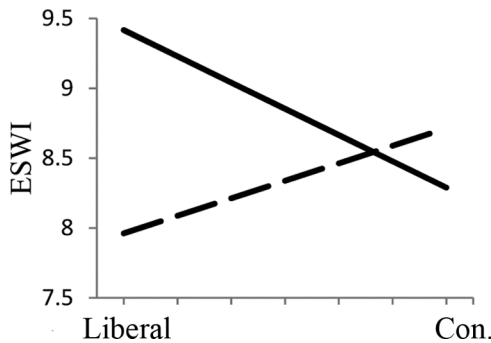


FIGURE 5 Interaction of Free Rider Fear (Dashed Line) with Ideology on ESWI.

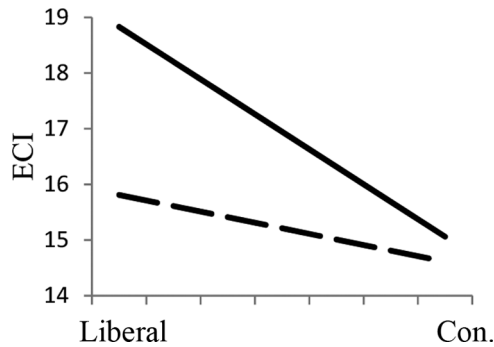


FIGURE 6 Interaction of Free Rider Fear (Dashed Line) with Ideology on ECI.

Perhaps the most interesting interaction is that between ideology and free rider fears (Figures 5 and 6). Conservatives appear much less affected by the interaction with the free rider variable than liberals. This interaction accounts for a decreasing difference in environmental concern as political ideology becomes more conservative, and accounts for virtually no gap among conservatives in terms of the willingness to sacrifice. Somewhat surprisingly, liberals are much more affected by free rider fears. Liberal ideology has consistently predicted greater levels of concern and pro-environmental behavior through decades of sociological research, and this result is confirmed by those unlikely to fear free riders. However, this must now be interpreted with a significant caveat. After controlling for environmental concern, the positive association between liberal ideology and willingness to sacrifice for the environment is depressed among individuals likely to fear free riders. We see a similar trend regarding the interaction of ideology and free rider fears in predicting environmental concern, though to a lesser degree.

## DISCUSSION AND CONCLUSION

Encouraging members of a society to participate in environmentally significant behavior presents a social dilemma where people must cooperate against their narrow individual interests to secure a collective good from which all can benefit. By making individual contributions to environmental protection, it is important that people feel confident that their behavior is not done in vain. This research demonstrated that people likely to suspect that others will free ride on their sacrifice are more disposed to act in their narrow interests rather than cooperate toward collective environmental benefits.

The main contribution of this research lies in demonstrating the conditional effects of free rider fears according to different levels of factors predicting pro-environmental behavior. In the absence of free rider fears, increased education and income predict slight increases in pro-environmental behavior and concern, while ideology serves as a strong indicator of both measures. However, the presence of free rider fears produced notably different patterns predicting sacrifice versus concern, although the interaction effects between income and free rider fears were not significant.

For those most likely to suspect free riders, increased education predicts much less willingness to sacrifice for the environment. Since increased education predicts greater awareness of environmental issues, free rider fears may correlate with feelings of resignation that some individuals develop in reaction to the gravity of perceived problems. This finding can help contextualize the shortcomings of strategies promoting environmental behavior through information sharing; greater inputs of information about environmental problems may incapacitate individuals if they do not believe collective efforts are possible. Interestingly, the interaction between free rider fears and years of education appears as strong as the effects of ideology.

This study also gives insight into how the effects of ideology in predicting the willingness to engage in environmental sacrifice are contingent upon the presence or absence of attitudes regarding collective effort. After controlling for the fear of free riders, liberal ideology negatively predicts sacrifice, and these fears appear to unite liberals and conservatives in a shared unwillingness to sacrifice individual interests for collective environmental goods. However, we can assume that individuals on each end of the ideological spectrum arrive at this mutual point through different sets of values. Interactions with conservative ideology were not significant, and since many strands of modern conservative ideology do not value environmental public goods, it is not surprising that ideological conservatives display low levels of sacrifice willingness and concern. For liberals, this attitude regarding free riders may reflect dismissiveness about the possibility of collective efficacy or the effectiveness of individualized strategies. Liberals are often united by the perception that status quo political and economic systems produce social inequalities and environmental harms that need to be addressed through large-scale actions. Free rider fears may affect how liberal individuals approach their personal behavior. Even though they maintain greater levels of environmental concern, some liberals may perceive environmental problems as so vast that they view individual behavior as irrelevant or ineffective. In other words, they possess an “all or nothing” attitude that reconciles their environmental concern with their relative unwillingness to personally sacrifice—it should either be done in concert, or not at all.

These findings confirm some prior research results and contradict others regarding social dilemmas and collective action. Consistent with research on the conditionality of cooperation, many individuals are more willing to sacrifice personal interests for collective environmental goods if they believe others will contribute as well. These results are different from the findings of Oliver (1984). We can explain this discrepancy by the fact that Oliver analyzed small-group dynamics. In that setting, individuals with higher education were latently empowered by their pessimistic attitudes about the possibility of group effort, encouraging them to take leadership roles in local organizations. Returns on local, small-group efforts are more immediate and tangible than the personal sacrifice made for environmental benefit in the form of increased taxes, higher prices, or lower standards of living. Situations concerning more abstract environmental public goods provide a contrasting setting where the pool of potential participants is seemingly limitless and returns on effort are more diffuse and long-term. In this context, free rider fears likely inhibit participation for those with high levels of education or liberal ideology.

In answering the question of why pro-environmental attitudes and behavior are poorly correlated, Carolan (2010) focused on the ambivalence produced by contradictions in social roles. To this I add that fear of environmental free riders—the non-sacrificing other negating one’s own contribution—looms as another factor leading to the incongruence between pro-environmental attitudes and behavior. This suspicion makes people hesitant to act against their individual

material interests if they do not believe it will meaningfully contribute to positive environmental outcomes. Future research could explore these interactions further to assess how suspicions of free riders work differently across contexts to arrive at similar results. For example, it may be of interest whether there are divergent motivations among liberals and conservatives that make them equally unwilling to participate in environmental sacrifice.

This analysis carries some implications for environmental policy. First, to the extent that people worry that the environmental gains made through the sacrifice of their individual interests will be negated by the excesses of free riders, promoting green consumer practices is limited in offering solutions to long-term environmental degradation. Further, calling for state interventions to ensure standards of environmentally significant behavior is complicated by low levels of institutional confidence. Irwin and Berigan (2013) argued that social dilemmas play out differently in the U.S. South where institutional and not interpersonal trust more significantly affects cooperation toward environmental public goods.

What may be most helpful going forward is the suggestion by Elinor Ostrom (2000b) that facilitating the ability of individuals to create their own rules and allowing the development of new social norms offers the greatest likelihood of individuals cooperating to address problems requiring collective action. In line with the research of McKenzie-Mohr (2000), policymakers and activists at the community scale can think of ways that environmental sacrifice can be made visible as a means of developing and reinforcing social norms regarding behavior. To the extent that these efforts develop organically, individuals who fear free riders may find new motivation to participate in pro-environmental behavior as a means of expressing community attachment.

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APPENDIX A  
Zero-Order Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. ESWI	—																	
2. ECI	.52	—																
3. Female	.08	.12	—															
4. Black	-.03	-.05	.09	—														
5. Age	-.03	-.05	.00	-.09	—													
6. Education	.12	.16	.03	-.10	.01	—												
7. Income	.04	.08	-.10	-.19	.12	.40	—											
8. Ideology	-.26	-.35	-.11	-.04	.08	-.07	.03	—										
9. Evang. Protestant	-.13	-.13	.04	.30	.03	-.14	-.12	.14	—									
10. Relig. Attendance	.00	-.07	.09	.11	.14	.03	.00	.18	.15	—								
11. Pop. Under 10k	-.09	-.04	-.02	-.08	.14	-.09	.00	.07	.14	.04	—							
12. Env. Unawareness	-.33	-.42	-.16	-.08	.02	.05	.14	.27	-.01	.03	.02	—						
13. Green Concern	.45	.65	.08	.06	-.02	.02	-.06	-.23	-.06	.00	-.05	-.43	—					
14. Green Economy	.38	.74	.03	-.14	-.07	.26	.20	-.24	-.18	-.08	-.04	-.23	.31	—				
15. Green Progress	.30	.67	.06	-.08	.04	.16	.14	-.16	-.10	-.02	-.02	-.17	.23	.45	—			
16. Green Exagg.	.39	.76	.17	.04	-.08	.11	.01	-.38	-.08	-.08	-.06	-.36	.39	.45	.39	—		
17. Green Progress	.27	.64	.08	-.03	-.02	-.01	-.01	-.17	-.04	-.06	.02	-.28	.34	.27	.26	.38	—	
18. Free Rider Fear	-.14	-.20	.00	.14	.02	-.20	-.15	.01	.07	.03	-.03	.02	-.09	-.17	-.13	-.14	-.17	—