

Support for environmental protection: an integration of ideological-consistency and information-deficit models

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ABSTRACT

The divergent roles of education in predicting environmental support among liberals, conservatives, and moderates in the United States are explained by integrating ideological-consistency and information-deficit models. Increased political polarization among elites has led to divergent environmental positions advocated by liberal and conservative political and media leaders; it was predicted that education would increase public attention to these elite cues and, consistent with the ideological-consistency model, increased education would lead to attitudes in line with consensual positions endorsed by party elites. Across two nationally representative data sets, higher levels of education were associated with stronger environmental support among liberals and weaker environmental support among conservatives. Moderates were predicted to have fewer elite cues on which to base their attitudes; consistent with the information-deficit model, higher levels of education among moderates were associated with strengthened environmental support. A moderated-mediation model supported the differential application of these two theories.

KEYWORDS Ideological consistency; information deficit; environmental support; partisans; moderates

Introduction

In the United States, there is a stark partisan divide on support for environmental protections and belief in climate change. To understand predictors of individuals' political opinions on such environmental issues, two prominent theoretical approaches are used: ideological-consistency models and information-deficit models. Each set of models offers an explanation for how a person determines whether or not to support environmentally relevant issues, such as a revenue-neutral carbon tax (e.g., Metcalf 2009). Ideological-consistency models argue that individuals form their political attitudes from political ideological norms and political elite cues

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(e.g., messages from partisan media sources and political leaders). According to this view, increased education leads to increased awareness of and influence by the normative position of individuals' political party. People may see resolute support for a carbon tax by Democratic party leaders and opposition by Republican party leaders, and adopt attitude positions that are in line with elite positions (e.g., Zaller 1992, Cohen 2003, Kahan *et al.* 2012, Kahan 2013). On the other hand, information-deficit models argue that increased education leads to increased support for positions supported by scientific and technical consensus (Bord *et al.* 2000, see Brulle *et al.* 2012, Kellstedt *et al.* 2008, for discussion). According to this view, higher education levels are associated with a greater propensity for people to investigate the prevailing scientific wisdom and determine as best they can what is the appropriate position to hold. We test both models and predict that they can – when integrated – foster greater understanding of the role of education in forming political opinions among partisans¹ and moderates² in the United States with the information-deficit models predicting opinions of moderates and the ideological-consistency models predicting the opinions of partisans.

We focus on the issue of environmental support (i.e., individuals' beliefs that action is needed to protect the environment), an issue domain where these two models are frequently applied independently of each other, and, at times, in opposition to each other. For example, a recent discussion described an 'academic feud' between these two models, centering on whether or not educating people about the scientific consensus regarding climate change is a viable route to increasing environmental support, or if we need to abandon information-only approaches (Vaidyanathan 2014). The environment has become one of the most important issues amongst the public (Yeager *et al.* 2011), yet Congress is highly polarized along party lines,³ making partisan elite cues salient (Levendusky 2010). In this highly polarized political context, ideological-consistency and information-deficit models make different predictions about the role of education in forming political opinions for partisans and moderates.

Education and ideological-consistency models

Political psychology and political science researchers have argued that education interacts with political ideology, where more highly educated individuals hold opinions more consistent with the stances of their respective parties (Zaller 1992, Smith 2002, Hamilton 2008, 2011, Hamilton and Keim 2009, Carlisle *et al.* 2010; Hamilton *et al.* 2010, McCright and Dunlap 2011a, 2011b, Brulle *et al.* 2012, Kahan *et al.* 2012, Kahan 2013, Makowsky and Miller 2014, Hamilton and Saito 2015). We refer to this general body of research collectively as

ideological-consistency models. These models propose that increased education decreases environmental support among conservatives and increases environmental support among liberals in the United States because increasing education leads individuals to become more aware of the stated political consensus of their party (e.g., Zaller 1992). In addition to increased awareness, highly educated partisans mobilize more of their own cognitive resources to support the stance of their political leaders (e.g., Kahan *et al.* 2012). These models have taken a prominent role in explaining environmental attitudes in the United States, given that the environment used to be a much less partisan issue and that only in the last 20–30 years has a strong partisan divide emerged, largely driven by changing party stances on environmental issues (Kraft 2000).

Political scientists posit that individuals' policy opinions are variable, and messages from party elites (e.g., radio pundits and elected officials) are highly influential (Zaller 1992). Individuals must be aware enough of political messages to actually receive them, at which point underlying ideological affiliations determine whether they accept or reject each message. Then, when asked about their opinions – on issues ranging from foreign policies to social spending – individuals sample from a range of personal considerations (e.g., 'I generally support spending cuts') and choose their answers based on the salience of those considerations (Zaller 1992, for limitations, see Goren 2004). For example, one study analyzed data sourced from 74 separate surveys over a 9-year period and found that elite cues were a major predictor of public concern over climate change, and that increasing publically available scientific information had only a minor effect on climate change opinions (Brulle *et al.* 2012). Further, more highly-educated individuals are more aware of elite cues and respond to them across political issues (Zaller 1992, Price and Zaller 1993). Thus, individuals with higher levels of education are more likely to hold attitudes consistent with their party, largely because of the cues given by partisan elites, and this has been shown across a range of environmental issues (Smith 2002).

Psychological researchers have also argued for an interaction between education and political ideology such that increasing knowledge leads to more consensual partisan positions among liberals and conservatives (Kahan *et al.* 2012, Kahan 2013). A pair of studies found that low levels of concern about climate change did not stem from insufficient intellectual ability to process information or lack of thought behind climate change attitudes. Instead, low concern about climate change arose from motivations to adopt the attitudes of individuals' political groups (Kahan *et al.* 2012, Kahan 2013). Moreover, belief in climate change has more to do with group affiliations than with scientific knowledge (Kahan 2015). Ideological

consistency was highest among those with higher literacy and reasoning skills, with liberals most concerned and conservatives least concerned with climate change (Kahan *et al.* 2012). These findings support the notion that higher levels of knowledge and cognitive skills do not directly result in increases in concern or belief in climate change, but lead to individuals using their greater knowledge and cognitive skills to form attitudes more consistent with their political parties, affirming their identities as conservatives or liberals (Kahan *et al.* 2012, Kahan 2013, 2015).

Partisans who have higher levels of education and correspondingly higher intellectual abilities are more attuned to information from their respective political parties and better able to use it to form opinions consistent with political elites. Although specific ideological-consistency models propose different mechanisms (cf. Zaller 1992, Kahan 2012), both models lead to the inference that education may underlie the differential levels of ideological consistency among the public. We focus here on education as a unifying construct that correlates with the different mediators of other studies. Indeed, research directly comparing factors that predict increased attention to elite cues (i.e., news media) found that educational attainment was the second best predictor after general political knowledge (Price and Zaller 1993). In information-deficit models, increased education is a proxy for specific comprehension of scientific issues (Ziman 1991, Locke 1999).

A number of studies have found an interaction between education and ideology or party identification, such that higher levels of education led to greater attitude consistency with individuals' political groups across different environmental domains (e.g., McCright and Dunlap 2011a, 2011b, Hamilton *et al.* 2015). One study found an interaction between educational attainment and political orientation, such that higher levels of educational attainment among liberals led to greater concern for and belief in climate change, whereas the relationship was weaker or negative among conservatives (McCright and Dunlap 2011a). Other studies have found this general interaction and pattern of results with general environment and climate change concerns (Hamilton *et al.* 2015, Hamilton and Saito 2015), local environmental concerns (Hamilton *et al.* 2010), local effects of climate change (Hamilton and Keim 2009), the threat of climate change (Hamilton 2011), and denial of climate change (McCright and Dunlap 2011b). These studies have focused primarily on partisans rather than moderates.

Our approach builds on previous findings in three ways:

- we provide a broader theoretical integration that includes both ideological-consistency and information-deficit approaches, which we

predict will be differentially impactful in understanding political opinions of partisans and moderates, respectively;

- we include two national samples with sufficient numbers of moderates; and
- we use a moderated-mediation model to test the role of paying attention to elite cues in accounting for the education–political opinion link, examining the differential strength of this mediator for partisans and moderates.

Education and the information-deficit model

The information-deficit model offers a relatively straightforward relationship between education and political opinions, regardless of political ideology. The more highly educated individuals are, and the more knowledge they possess, the better they can comprehend scientific information thus leading to greater understanding and appreciation of scientific findings (Bord *et al.* 2000, Frick *et al.* 2004, see Brulle *et al.* 2012, Kellstedt *et al.* 2008, Weber and Stern 2011, for discussion). Therefore, educating individuals is one means by which to increase pro-environmental attitudes when there is strong scientific consensus that environmental protection is needed, such as exists for many prominent environmental issues (e.g., climate change (IPCC 2013), acid rain (Krajick 2001), and the ozone hole (Grundmann 2006)).

The central proposition of the information-deficit model is that public understanding of science will increase with more education (Ziman 1991, Locke 1999). Researchers have applied this approach in the environmental domain, largely with regard to climate change, and found that correct knowledge about the causes of climate change significantly predicted conservation behaviors (Frick *et al.* 2004). Climate change knowledge was also associated with behavioral intentions and hypothetical voting intentions, over and above environmental attitudes and perceived threats of climate change (Bord *et al.* 2000, see also Kearney and De Young 1995). However, other research has identified limitations of the information-deficit approach. For example, one study found that increasing knowledge about climate change led to more concern about climate change among Independents and Democrats, but not among Republicans (Malka *et al.* 2009). The authors proposed that this finding was in part due to Republicans relying on elite cues (Malka *et al.* 2009), suggesting the need to consider both ideological-consistency and information-deficit models together to understand drivers of environmental support (see also Hart *et al.* 2015).

Integrating ideological-consistency and information-deficit models

The ideological-consistency and information-deficit models make different predictions for how education relates to political opinions such as environmental support. To understand when these models apply, we must examine the broader context in which individuals form their political opinions. Contemporary American politics is highly polarized (Layman *et al.* 2006, Huxster *et al.* 2015), resulting in salient and increasingly strong elite cues from elected officials and partisan media sources (Levendusky 2010). Research has shown that for partisans, and particularly strongly identifying partisans, these elite cues are a primary motivator of environmental support (Zaller 1992, Smith 2002, Carlisle *et al.* 2010, Brulle *et al.* 2012). Thus, there is strong support for the application of the ideological-consistency models to partisans' attitude formation. However, partisan elite cues largely do not influence moderates' opinions since moderates are not constrained by partisan ideology and/or may not pay attention to these partisan elite cues (Layman and Carsey 2002a, 2002b). The context most relevant for moderates may be the increased consensus and dissemination of information regarding the need for environmental protection. With fewer relevant elite cues, moderates rely on other sources of information to inform their opinions, and the information-deficit model proposes that one important source of information would be scientific information (e.g., Bord *et al.* 2000, Brulle *et al.* 2012). This does not mean that moderates disregard all partisan cues; in fact, it may be that ideological-consistency models can apply to moderates, but to a lesser degree, a point we return to in the discussion. Nevertheless, the key theoretical distinction between the two different applications of the ideological-consistency models to partisans, and the information-deficit models to moderates, is the mechanism by which education influences political opinions.

When applying the ideological-consistency models to partisans, education leads to consensual political attitudes; this is because increased education leads to greater awareness of elite cues (see [Figure 1](#)). Thus, elite cues mediate the effect of education on political attitudes as represented by the solid lines from education to awareness of political cues to political attitudes. For the information-deficit model and its application to moderates, partisan elite cues do not mediate the relationship because these cues are less relevant to moderates as represented by the solid line between only education and political attitudes. Instead, increased education may be positively related to increased environmental support through greater understanding and trust in scientific findings as suggested by information-deficit models. To test this proposed integration, we examined whether the elite cues differentially mediated the effect of education on political attitudes between partisans and moderates.

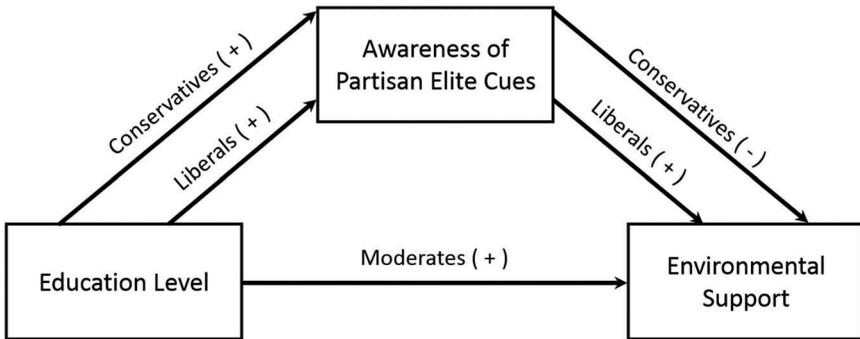


Figure 1. Proposed mediational model.

We predict awareness of elite cues to mediate the direct relationship for partisans but not for moderates as noted by solid lines.

Current study

Drawing on two nationally representative data sets, we first describe overall levels of environmental support before investigating the effect of education and ideology on environmental support.

Next, we test three hypotheses.

Hypothesis 1: Levels of environmental support would vary across all levels of ideology, with liberals expressing higher levels of environmental support compared to moderates and conservatives.

Hypothesis 2: Environmental support among the different ideologies would be moderated by levels of education (i.e., the education by ideology interaction), with higher levels of education being associated with increasing environmental support among moderates and liberals, and decreasing environmental support among conservatives.

Hypothesis 3: Attention to current events and media (i.e., elite cues) would mediate the education by ideology interaction more strongly for partisans than for moderates.

Research design

Data from two nationally-representative data sets – the 2012 Cooperative Congressional Election Study (CCES; Ansolabehere and Schaffner 2012) and the 2012 American National Election Time Series Study (ANES;

American National Election Studies 2012) – were obtained for this investigation. First, we report levels of environmental support among liberals, conservatives, and moderates measured by participants' preferences to protect jobs or the environment (CCES) or to increase or not increase federal spending on the environment (ANES). To investigate the interaction between self-reported ideology and education, we analyzed the frequency of environmental supporters across sequential levels of educational attainment. Nine groups were constructed within both data sets: economically focused (i.e., choosing to protect jobs or to decrease spending); environmentally focused (i.e., choosing to protect the environment or to increase environmental spending); and neutral (i.e., weighing jobs and environment protection equally or keeping spending the same) liberals, moderates, and conservatives. Analyses with ideology and environmental attitudes treated as continuous variables are included in the supplemental material,⁴ but we present the categorical treatment as it allows for clear comparisons between meaningfully distinct groups (e.g., liberals vs. conservatives).

The CCES data set was used for two follow-up analyses: a hierarchical logistic regression of the interaction between ideology and educational attainment with regard to predicting environmental support; and a moderated-mediation analysis to examine the differential strength of awareness of elite cues (i.e., how much one follows and is interested in political affairs) in explaining the relationship between education and environmental support for partisans and moderates.

Data sets

The primary data set was the 2012 CCES (Ansolabehere and Schaffner 2012), an online survey of a national sample of individuals ($N = 50,676$). The second data set was the American National Election Survey 2012 Time Series ($N = 5914$; ANES 2012). Additional information on data sets is provided in the supplemental material.

Measures

Ideology

Across both data sets, individuals reported their ideology on a 7-point scale. The response options were strongly or extremely conservative, conservative, slightly conservative, moderate or middle of the road, slightly liberal, liberal, strongly or extremely liberal. Exact survey items for all measures are available in the supplemental material.

Environmental support

In the CCES, participants reported their environmental attitudes by responding on a 5-point scale, from 1 (*Much more important to protect the environment even if it means losing jobs and a lower standard of living*) to 5 (*Much more important to protect jobs even if environment gets worse*). In the ANES, participants indicated environmental support by reporting if federal spending to protect the environment should be increased, decreased, or kept the same or about the same. Although imperfect, these items correlate closely to more specific measures of environmental support (Ansolabehere and Konisky 2014). We also included a measure of climate change belief from the CCES to examine the education by ideology interaction and moderated-mediation model analyses with another important, frequently studied outcome (McCright and Dunlap 2011a, Kahan *et al.* 2012). Participants read, 'From what you know about global climate change or global warming, which one of the following statements comes closest to your opinion?' Participants could then select one of five statements ranging from 1 (*Global climate change is not occurring; this is not a real issue*) to 5 (*Global climate change has been established as a serious problem, and immediate action is necessary*).

Political groups

In order to examine the frequency of environmental supporters, we first created three ideological groups: conservatives, liberals, and moderates. Conservatives and liberals were those who identified as conservative/liberal or strongly conservative/liberal. Moderates were those that identified as moderate or only slightly liberal/conservative. Next, we divided liberals, conservatives, and moderates into environmental supporters or greens, neutrals, and economic supporters. Environmental supporters were those who chose to protect the environment even at the cost of jobs (CCES), or indicated spending should be increased (ANES). Neutrals were those who reported that it is equally important to protect jobs and environment or that spending should be kept the same. Economic supporters were those who chose to protect jobs at the cost of the environment or indicated spending should be decreased. The exact operationalization of ideology and environmental support for the nine groups is provided in the supplemental material as well as analyses with alternative categorizations of moderates.

Educational attainment

We measured educational attainment across four levels: high school diploma or less; some college or 2-year college degree; 4-year college degree; and postgraduate study or degree.

Interest in government and public affairs

We also examined within the CCES participants' interest in government and public affairs as a measure of attention to cues from political elites, which we predicted would differentially mediate the relationship between education and environmental support for the different ideological groups. Individuals read, 'Some people seem to follow what's going on in government and public affairs most of the time, whether there's an election going on or not. Others aren't that interested. Would you say you follow what's going on in government and public affairs...?' Individuals then responded from 1 (*Hardly at all*) to 4 (*Most of the time*). Individuals who reported they 'Don't know' ($n = 1167$, 2% of the sample) were not included in the analyses.

Demographics

We used four additional items in the CCES that served as covariates in regression analyses: self-reported age in years, gender (male or female), race, and family income.

Results

Frequency of environmental support

We calculated the frequencies of individuals within each ideology and across all ideologies who supported the environment (labeled 'greens'), were neutral, or supported economics (see [Table 1](#)). All analyses used sample weights provided by the data sets.

Education and ideology

Frequency of environmental support across education levels

We plotted the frequency of green liberals, green moderates, and green conservatives across education levels (see [Figure 2](#)). This provides a visual depiction of how among those who supported the environment, their frequency varied by level of education. Collapsing across ideologies, the frequency of people who supported the environment increased as education level increased (high school degree or less to postgraduate degree), from 25% to 41% in the CCES data set and from 38% to 46% in the ANES data set. Taking ideology into account, it appears that at the lowest level of education (i.e., high school degree or less), conservatives were more likely to support the environment than were more highly educated conservatives. Liberals followed the opposite pattern; at the lowest level of education, liberals were least likely to be green, whereas at the highest level of education, liberals were the most likely

Table 1. Frequencies of environmental support within and across ideologies.

Data sets	Frequency within ideologies									
	Conservatives			Liberals			Moderates			
	Green	Neutral	Economic	Green	Neutral	Economic	Green	Neutral	Economic	Economic
CCES	13% (n = 2534)	28% (n = 5329)	59% (n = 11232)	51% (n = 6762)	30% (n = 4057)	19% (n = 2522)	33% (n = 5948)	39% (n = 7038)	28% (n = 5254)	
ANES	17% (n = 215)	43% (n = 551)	40% (n = 519)	72% (n = 552)	4% (n = 28)	24% (n = 192)	40% (n = 1343)	12% (n = 405)	48% (n = 1569)	
	Frequency across all ideologies									
	Green conservatives	Neutral conservatives	Economic conservatives	Green liberals	Neutral liberals	Economic liberals	Green moderates	Neutral moderates	Economic moderates	
Data sets	CCES 5% (n = 2534)	11% (n = 5329)	22% (n = 11232)	13% (n = 6762)	8% (n = 4057)	5% (n = 2522)	12% (n = 5948)	14% (n = 7038)	10% (n = 5254)	
	ANES 4% (n = 215)	10% (n = 551)	10% (n = 519)	10% (n = 552)	1% (n = 28)	4% (n = 192)	25% (n = 1343)	7% (n = 405)	29% (n = 1569)	

CCES; 2012 Cooperative Congressional Election Study; ANES: 2012 American National Election Time Series Study. Frequencies calculated within ideology for the top table, and across ideology for the bottom table as emphasized with the gray shading.

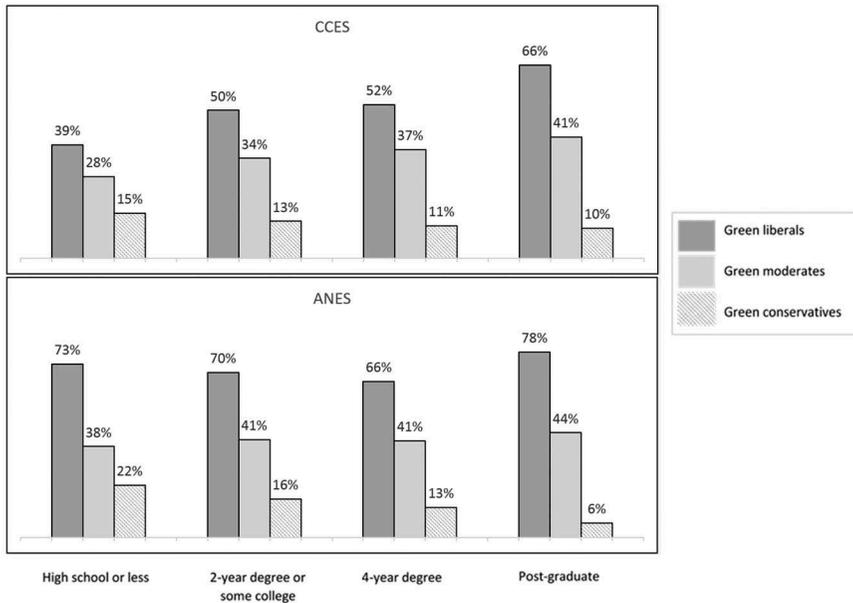


Figure 2. Frequencies of green liberals, green moderates, and green conservatives across education levels.

Frequencies are within ideology at each level of educational attainment (e.g., 15% of conservatives in the CCES data set with a high school degree or less report environmental support).

to be green. Overall, increasing education levels had opposite effects on environmental support for partisans. For moderates, however, increasing education levels had a positive although weaker effect with higher levels of education associated with more environmental support.

We also examined differences between ideologies at different levels of education. At the lowest levels of education, there was a smaller gap between the proportion of liberals and conservatives who supported the environment (24% gap in CCES and 51% gap in ANES) than among those with the highest levels of education (56% gap in CCES and 72% gap in ANES). Thus, education is associated with greater polarization of environmental support between liberals and conservatives.

Predicting environmental support from education and ideology

In order to predict individuals' environmental support as a function of their education levels and ideologies, a pair of logistic regression models estimated a dichotomous outcome of whether an individual supported the environment or not (those who were neutral or indicated economic support). The models included ideology (dummy coded), educational

attainment, and the interaction of ideology and educational attainment as predictors, with one model using moderates as the reference group and the other refit with liberals as the reference group to complete all between-group statistical comparisons. The models also included the covariates of gender (male = 1, female = 2), age, race, and family income.⁵

The models found a significant interaction between education and ideology ($p < .001$); however, this was expected given the large sample size (see [Table 2](#) for all coefficients). To help interpret the effects, we calculated the effect size (Cohen's d) for each B (i.e., the log of the odds of an individual supporting the environment) (Sánchez-Meca *et al.* 2003). All effect sizes are relative to another group and represent the degree of difference in the probability that individuals in each group will support the environment. The larger the effect size, the greater the difference in probability between the two groups supporting the environment. Effect sizes varied: conservatives compared to liberals $d = .39$, moderates compared to liberals $d = .11$, and moderates compared to conservatives $d = .29$. The greatest difference in the probability of supporting the environment as education level increased was between the partisans, followed by moderates compared to the partisans. The interactions are plotted and displayed in [Figure 3](#), which shows that conservatives were less likely to support the environment as their education levels increased, while liberals and moderates were more likely to support the environment as their education levels increased, with the effect being stronger for liberals than moderates.⁶

We also ran a pair of models that predicted belief in climate change to extend our analyses to this important and related environmental issue. These models mirrored the previous models except that we used a continuous dependent variable. Once again, we found a significant interaction between education and ideology ($ps < .001$). All coefficients are reported in the supplemental material, and the interaction is displayed in [Figure 3](#). Conservatives were less likely to believe that climate change is a problem that necessitates action as their education levels increased, and liberals and moderates were more likely to believe climate change is a serious problem that necessitates action as their education levels increased.

Interest in government and political affairs as a mediator

In order to assess the role of interest in government and political affairs as the mediator of the education by ideology interaction, we conducted a moderated-mediation model using PROCESS (Hayes 2013; Model 76). This analysis tests the mediational model proposed earlier in [Figure 1](#) for each group (i.e., conservatives, liberals, and moderates). Education level was the predictor, environmental support (dichotomous, support or do not support) was the outcome measure, interest in government and political

Table 2. Regression coefficients predicting environmental support from education and ideology with covariates.

	Regression 1 (liberals as reference group)				Regression 2 (conservatives as reference group)			
	B (SE)	Odds ratio	<i>p</i> Value	95% CI	B (SE)	Odds ratio	<i>p</i> Value	95% CI
Constant	-.44 (.07)	.64	<.001		-1.15 (.08)	.32	<.001	
Gender (males = 1, females = 2)	-.21 (.02)	.81	<.001	.77-.84	-.21 (.02)	.81	<.001	.77-.84
Age	.00 (.00)	1.00	.802	1.00-1.00	.00 (.00)	1.00	.802	1.00-1.00
Family income	.00 (.00)	1.00	.450	1.00-1.01	.00 (.00)	1.00	.450	1.00-1.01
Race (below groups compared to Whites)								
Black	-.15 (.03)	.87	<.001	.81-.93	-.15 (.03)	.87	<.001	.81-.93
Hispanic	-.05 (.04)	.95	.211	.88-1.03	-.05 (.04)	.95	.211	.88-1.03
Asian	-.15 (.07)	.86	.029	.75-.98	-.15 (.07)	.86	.029	.75-.98
Native American	.09 (.13)	1.09	.496	.85-1.41	.09 (.13)	1.09	.496	.85-1.41
Mixed	.05 (.08)	1.05	.519	.91-1.22	.05 (.08)	1.05	.519	.91-1.22
Other	.38 (.09)	1.45	<.001	1.22-1.74	.38 (.09)	1.45	<.001	1.22-1.74
Middle Eastern	-.18 (.23)	.84	.441	.53-1.32	-.18 (.23)	.84	.441	.53-1.32
Education	.42 (.02)	1.52	<.001	1.46-1.59	-.29 (.03)	.75	<.001	.71-.80
Ideology								
Moderates compared to liberals	-.46 (.06)	.64	<.001	.56-.72				
Conservatives compared to liberals	-.71 (.08)	.49	<.001	.42-.57				
Moderates compared to conservatives					.26 (.07)	1.30	<.001	1.13-1.48
Liberals compared to conservatives					.71 (.08)	2.04	<.001	1.74-2.39
Education × Ideology								
Moderates compared to liberals	-.20 (.03)	.82	<.001	.78-.86				
Conservatives compared to liberals	-.71 (.04)	.49	<.001	.46-.53				
Moderates compared to conservatives					.52 (.04)	1.67	<.001	1.57-1.79
Liberals compared to conservatives					.71 (.04)	2.04	<.001	1.89-2.20

Data from CCES, $n = 45,274$. An odds ratio greater than 1 indicates that an increase in the value of the predictor increases the probability of environmental support; an odds ratio less than 1 indicates a decrease in the probability of environmental support.

affairs was the mediator, and two dummy coded variables representing conservative and liberal ideology represented the ideology moderator. This modeling estimated how much of the relationship between education and environmental support was mediated by interest in government and political affairs (i.e., awareness of elite cues) for liberals, conservatives, and moderates. Because these estimates are from the same model, we can make direct comparisons between the three groups.

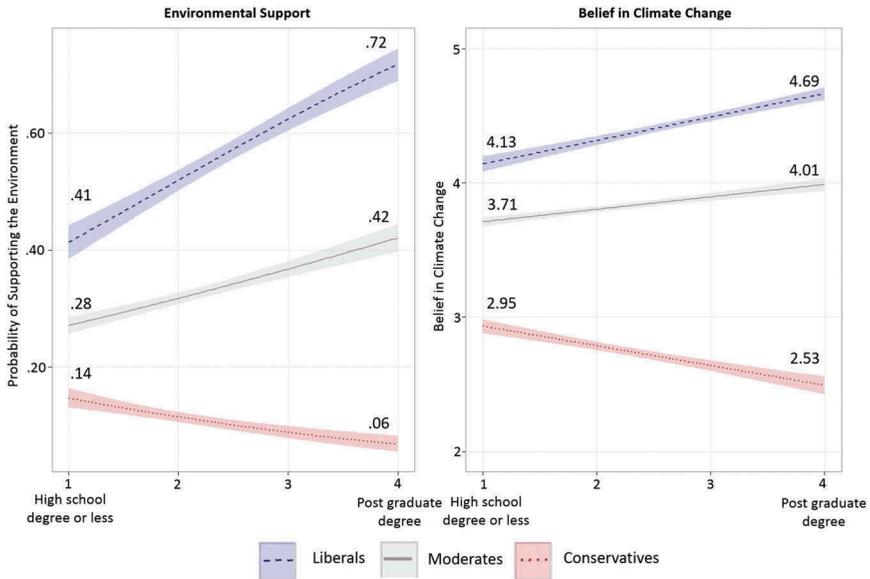


Figure 3. Education by ideology interaction with covariates for environmental support and climate change.

Data from CCES. Model controlling for age, gender, race, and family income. Shaded regions represent 95% confidence intervals.

We obtained evidence of different degrees of mediation for conservatives, liberals, and moderates. All mediation analyses were significant, so we focused on the size of the indirect effects (i.e., how much of the relationship between education and environmental support is carried through interest in government and political affairs for each ideological group). For conservatives, the direct effect of education on environmental support (i.e., the relationship without accounting for the mediator) was $-.134$ (standardized β , 95% CI = $-.191$ to $-.077$, 20,000 bootstrap samples) and the indirect effect of education mediated through interest in government and political affairs was $-.080$ (standardized β , bias-corrected bootstrap 95% CI = $-.091$ to $-.070$). In other words, interest in government and political affairs explained 37% of the relationship between education level and environmental support. For liberals, the direct effect was $.324$ (standardized β , 95% CI = $.283$ – $.375$), and the indirect effect of education through interest in government and political affairs accounted was $.108$ (standardized β , bias-corrected bootstrap 95% CI = $.095$ – $.122$), meaning 25% of the relationship between education level and environmental support was mediated by interest. Thus, for partisans, interest in government and public affairs mediated a sizable portion of the relationship between education and environmental support.⁷ For moderates, the direct effect was $.179$ (standardized β , 95%

CI = .151–.208), and the indirect effect of education through interest in government and political affairs accounted was .033 (standardized β , bias-corrected bootstrap 95% CI .025–.042), meaning 16% of the relationship between education level and environmental support was mediated by interest. Importantly, these percentages reflect the proportion of mediation within each ideology and do not depend on the different strengths of the meditation between the different ideologies. These results suggest that for moderates, interest in government and public affairs does not mediate as much of the relationship between education and environmental support. Likely other mediators not measured in the data set are operating on the relationship for moderates, a point we return to in the discussion.

We ran the same moderated-mediation model predicting belief in climate change and found similar results. For conservatives, the direct effect of education on belief in climate change was $-.061$ (standardized β , 95% CI = $-.076$ to $-.045$, 20,000 bootstrap samples) and the indirect effect of education mediated through interest in government and political affairs was $-.064$ (standardized β , bias-corrected bootstrap 95% CI = $-.070$ to $-.058$). In other words, interest in government and political affairs explained 52% of the relationship between education level and belief in climate change. For liberals, the direct effect was $.110$ (standardized β , 95% CI = $.092$ – $.129$), and the indirect effect of education through interest in government and political affairs accounted was $.053$ (standardized β , bias-corrected bootstrap 95% CI = $.047$ – $.058$), meaning 33% of the relationship between education level and environmental support was mediated by interest. Thus, for partisans, interest in government and public affairs mediated a sizable portion of the relationship between education and belief in climate change. For moderates, the direct effect was $.079$ (standardized β , 95% CI $.066$ – $.092$), and the indirect effect of education through interest in government and political affairs accounted was $.006$ (standardized β , bias-corrected bootstrap 95% CI $.003$ – $.009$), meaning 7% of the relationship between education level and belief in climate change was mediated by interest. These results replicate the previous findings with environmental support. The supplemental material provides a full description of both moderated-mediation models and reports all the coefficients.

Discussion

The descriptive results from the ANES and CCES data sets support the first hypothesis and show – as has been indicated by others – that there is polarization on environmental issues. Environmental support is highest among liberals, with 51% of liberals choosing environmental protection over jobs and 72% supporting increased environmental spending, but there is also a sizable portion of moderates, 33% and 40%, and

conservatives, 13% and 17%, who also supported protecting the environment over jobs and increasing environmental spending. Here, we focus on the role of education in understanding this polarization and the disparate support of environmental positions among those on the right and left by integrating ideological-consistency and information-deficit models to predict political opinions.

Partisans' opinions

Among partisans, increased levels of education led to diverging environmental support, with liberals increasing their environmental support and conservatives decreasing their environmental support. These results support the second hypothesis and are congruent with ideological-consistency models. Further, mediation analyses found support for the third hypothesis: that higher levels of education led to increased attention to and awareness of elite political cues, which was associated with the greater adherence among partisans to partisan consensus positions. Elite cues can come from many sources, such as candidate speeches, political pundits, and/or partisan news outlets. For partisans, a large portion of the relationship between education and environmental support was carried through increased interest in government and political affairs, supporting the application of ideological-consistency models to partisans. Importantly, we see this mediation result for both environmental support and belief in climate change. It may be the case that there is greater consensus among experts around the need to address climate change (IPCC 2013) than to increase federal spending to support the environment or support the environment over economic issues. This may also explain why elite cues to climate change beliefs are a stronger mediator for partisans and weaker for moderates as compared to cues to environmental support. That we see a similar education by ideology interaction for the different environmental variables including climate change and environmental support, and that we find support for elite cues mediating the relationship between education and both environmental outcomes, lends broader support to our second and third hypotheses.

Although we find significant mediation, it is important to note that we do not find complete mediation among partisans nor the absence of mediation among moderates that we predicted – and thus not complete support for the third hypothesis. This is not very surprising considering that our variable measuring elite cues is imperfect, and that there are likely other unaccounted for mediators. The central finding is the differential strength of elite cues in explaining the relationship between education and environmental support between partisans and moderates, as it supports our proposed differential application of the ideological-consistency and information-deficit models.

It is important to point out that elite cues may not mediate as much of the relationship between education and environmental support among liberals as compared to conservatives because elite cues and scientific consensus, especially on climate change, tend to be consistent with each other. Thus, the individual effect of education and elite cues covary with each other, making it more difficult to isolate the effect of one over the other. It may be that in addition to following elite cues, liberals also follow scientific evidence, meaning that both ideological-consistency and information-deficit models are useful to understand liberals. Indeed, researchers have suggested that elite cues most strongly affect Republicans (Malka *et al.* 2009). Beyond elite cues and scientific information, there are – not surprisingly – other potential important mediators for liberals and conservatives not accounted for in these analyses, such as openness to new experiences, a personality trait associated with pro-environmental behaviors and ideology (Brick and Lewis 2016). Nevertheless, we find that elite cues still account for a sizable portion of the relationship between the education and environmental support for partisans, supporting the application of ideological-consistency models to explain liberals' and conservatives' environmental support.

Moderates' opinions

For moderates, we found increased environmental support as education increased, again supporting the second hypothesis, but for different theoretical reasons than for partisans. Moderates, who composed a large percentage of each sample (51% of the CCES; 62% of the ANES) and thus have great potential to swing public opinion on environmental issues, are interesting theoretically because they do not necessarily rely on partisan elite cues (Layman and Carsey 2002a, 2002b). Thus, we based our predictions on the information-deficit models, and examined whether increased education, presumably related to moderates better understanding environment-related information, increased their environmental support. The moderated-mediation model provided evidence of differential mediation of the relationship between education and environmental support by the three different ideologies. In support of the third hypothesis, a smaller portion of the relationship between education and environmental support was carried by interest in government and political affairs for moderates, suggesting elite cues are less important. Elite cues may still have mediated a portion of the relationship between education and opinions because the question we used to represent elite cues could have captured attention to other nonelite sources of information (e.g., scientific reports). For moderates, other mediators than elite cues are likely more responsible for education's effect on environmental support. We would expect that variables that reflect specific

understanding of environmental issues or awareness of environmental science would be a significant mediator for moderates.

An alternative explanation for the reported mediation effect is that moderates, just like their partisan counterparts, also pay attention to elite cues but to a lesser degree. Thus, both ideological-consistency and information-deficit models apply to moderates. Nevertheless, elite cues only mediate a small portion of the relationship between the education and environmental support.

The theoretical and practical importance of education

Education can serve as a unifying theoretical construct, as it does here, because it is a common variable shared by different models and is available in virtually all data sets. In information-deficit models, increased education is a proxy for specific comprehension of scientific issues (Ziman 1991, Locke 1999). In ideological-consistency models, researchers have argued that increased education reflects increased intellectual ability (Kahan *et al.* 2012) and attention to elite cues (Zaller 1992, Price and Zaller 1993). Thus, education bridges different theories from different disciplines.

The challenges and importance of studying moderates

There are a number of challenges to understanding moderates, and we hope that this paper furthers discussion and understanding of this important political group. Approximately a third of the population in the United States describe themselves as moderates (Saad 2011). Based on our findings, we argue that moderates rely less on political elite cues than partisans do, but we cannot rule out the possibility that they have other cues, perhaps from nonpolitical elites, that they rely on to inform their opinions. Another challenge with understanding moderates is that it is unknown whether individuals report being moderates because they are truly apolitical. Research suggests that individuals who report they are moderate or Independents often lean toward one ideology or the other (Keith *et al.* 1992), suggesting elite cues are possibly still relevant to these individuals. However, our supplementary modeling shows the reported relationship between increasing education and increasing environmental support holds even when removing moderates who self-report leaning left or right.

Conclusion and future research

Our study integrated two prominent contemporary models of education and political attitudes. Our results demonstrate the merit in recognizing the distinct roles ideological-consistency and information-deficit models play;

specifically, that education can be polarizing among partisans, edifying among moderates. Certainly, our results do not suggest that ideological-consistency models among partisans and information-deficit models among moderates perfectly explain individuals' environmental support, but they do suggest that ideological-consistency models apply better to partisans and information-deficit models apply better to moderates (for an alternative theoretical perspective, unifying both ideological-consistency and information-deficit models in a public reason framework, see Torcello 2016). Although these results directly concern the United States political context, they may be applicable to other countries where environmental beliefs follow a similar ideological pattern (McCright *et al.* 2016).

These insights are likely to be of interest to researchers, advocacy groups, and anyone interested in communicating about environmental issues in the United States and potentially other countries with similar ideological divides. Communicating scientific consensus may be effective for moderates and, to some degree, liberals to increase their environmental support. However, our research suggests that, to be most impactful with partisans, messages advocating for environmental support should come from political elites. Without changing the messaging from political elites, simply communicating more about scientific findings will have little effect on partisans, particularly as their education levels increase. Although this represents a challenge, changing or providing alternative elite messaging could reduce the political polarization.

The results of our study also suggest important directions for future research. First, it is important to note that the mediation effects are only responsible for explaining some of the variance in the relationship between education and environmental support. Future studies investigating other mediators (e.g., knowledge about specific environmental issues, awareness of scientific consensus) will be necessary to better understand the relationship between ideology, education, and environmental support. Rather than searching for a global mediator, it is likely that the mediating processes driving environmental support differ as a function of partisanship; for example, nonpolitical elite cues may mediate for moderates or knowledge of elite messages may mediate for partisans. Second, future research can capitalize on the theoretical and practical applicability of education and investigate interactions and relationships between education and other relevant variables (e.g., scientific comprehension, political awareness) to develop a more comprehensive theoretical understanding of how education influences political opinions among moderates and partisans.

In the United States, partisans are strongly divided on support for environmental protections and belief in climate change. Instead of pitting ideological-consistency and information-deficit models against each other to determine which can better explain this polarization on environmental

issues, we suggest that both models, when integrated, can provide a more comprehensive understanding of the drivers underlying individuals' environmental support across the political spectrum. Recognizing the sources of the observed political polarization on environmental support may be a necessary step toward closing the partisan divide.

Notes

1. We use the term partisan for individuals who self-report strong ideological preferences (i.e., self-identifying as a conservative or a liberal). See the Measures section for the description of this operationalization.
2. In the United States, moderates are typically individuals who do not strongly identify with either liberal or conservative ideology, and often view themselves as 'middle of the road' on the left–right ideological spectrum.
3. For Democratic Senate Leaders in the 113th Congress, the average score was 100 (scale: 0–100 with 100 as the most environmentally friendly). In the House, the Democratic average for leadership was 87. Conversely, the average Senate Republicans in leadership scored 5, and their colleagues in the House even lower at 3 (League of Conservation Voters 2013).
4. Supplemental material is available at <http://www.phillipehret.com/Publications/>.
5. We also conducted a series of supplementary models to support the robustness of the education by ideology interaction (see supplemental material for all additional models and relevant statistics). There was no significant impact on the results depending on the treatment of the variables (continuous vs. categorical) or exclusion of covariates.
6. We also conducted an additional model that excluded those identifying as slightly liberal or slightly conservative (see supplemental material). This provided a stricter test of moderates. For all models, the pattern of results was largely unaffected.
7. When interpreting percent of variance explained, it is important to recognize that 80% of variance explained is typically considered complete mediation, so although these numbers are not near complete mediation, they are still accounting for a sizable amount of the variance of the education by ideology interaction for partisans.

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