

# Hispanics' Behavioral Intentions Toward Energy Conservation: The Role of Sociodemographic, Informational, and Attitudinal Variables\*

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*Objectives.* This study is aimed at examining energy-related behavioral intention among Hispanics in the United States. It examines the role of nationality and geographic location, as well as informational and attitudinal factors. *Method.* The study used survey data from the University of Texas at Austin Energy Poll. Data were analyzed using ANOVA and regressions analysis. *Results.* Results show that Hispanics overall in the West had higher levels of intention to save energy than those in any other region, while there is no clear pattern indicating that intentions to save energy were linked to Hispanics' ethnic groups. Besides information dissemination and various measures of environmental concern, belief and interest were strongly related to energy-related behavioral intentions. *Conclusions.* Findings contribute to the understanding of Hispanics' energy behaviors, concluding that environmentalism and information dissemination are important predictors of behavioral intention within the Hispanic population.

Recent research into the social-psychological basis of environmentalism has clearly established the role of culture in shaping environmental attitudes and behaviors (Carter, Silva, and Guzman, 2012; Stern et al., 1999; Mukherji, 2005). But culture can have many different enactments in practice, and the cultural influences on environmental belief can vary depending on the culture in question. The multiple cultural changes involved in immigration and the subsequent process of acculturation (Cabassa, 2003; Negy and Woods, 1992) suggest that the experience should have an effect on environmental values, making it an especially valuable place to study how environmentalism is shaped by culture. Different populations from different places can define nature and environmental protection differently (Vaske and Donnelly, 1999; Dunlap, Xiao, and McCright, 2001). Agrawal (2005) says culture affects environmental laws and policy, but not directly. Culture works indirectly, through its effects on public knowledge, political culture, institutions, and subjective human perception. All of these, except for institutions, play a role in the immigrant acculturation process, making the cultural changes that accompany immigration worth examining for their effects on environmentalism. Therefore, questions about the cultural

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characteristics of immigrants are particularly relevant to how environmental protection takes shape; conversely, questions about the meaning of environmentalism are relevant to how ethnic identity is formed. Our study contributes to this underresearched area by examining sociodemographic, informational, and attitudinal variables among Hispanics in the United States, the largest minority in the country, as well as behavioral intentions toward an important environmental issue, energy consumption.

Previous studies, though limited, have found important differences in environmental attitudes between Hispanics and the general U.S. population. Some studies suggest that Hispanics have a different worldview, hold stronger collectivist and egalitarian values than other ethnic groups, and that they have a stronger connection to the land and nature (Carter, Silva, and Guzmán, 2012; Johnson, 2011; Johnson, Bowker, and Cordell, 2005). In addition, a survey by the Pew Research Center found Hispanics report higher levels than whites on beliefs about the role of human activity in global warming (70 percent vs. 44 percent) (Krogstad, 2015). Similarly, a study commissioned by the Sierra Club and the National Council of La Raza (Anon., 2012) found Hispanic voters were also observed to strongly support clean energy and conservation measures and to believe that climate change is already happening. Our study complicates that picture, finding effects that were real, but only operated in a small number of Hispanic subgroups. This raises questions about under what conditions ethnic acculturation affects environmental beliefs and on whom and whether environmentalism has a special status in the acculturation process.

The study is framed within the existent social-psychological literature on environmental behaviors, but it incorporates the concept of multiethnic groups within Hispanics, which has not been fully explored in this context, but that has been used to explain the ways in which Hispanics engage in other behaviors, for example, those related to health (e.g., Blanco et al., 2014; Borrell and Lancet, 2012). Most discussions about environment and Hispanics (both within political and academic circles) tend to treat Hispanics as a monolithic and homogeneous group. One of the goals of this study is to begin to make nuances among this group, both in terms of nationality and geographic location.

Closing this research gap could potentially allow for the development of evidence-based strategies to communicate environmental issues by taking into consideration nuanced differences among Hispanics, their concerns, and a core concern for community. The analysis uses survey-based data from the Energy Poll conducted by the University of Texas at Austin.

## Literature Review

The Hispanic population in the United States continues to grow in terms of numbers, purchasing power, and political relevance (Passel, Cohn, and Lopez, 2011). But at the same time, Hispanics are disproportionately negatively affected by many environmental problems, such as local air pollution (Quintero et al., 2011) and global climate change (Martinich et al., 2013; Wilson et al., 2010). In addition, many Hispanics living in states such as Texas, Florida, New York, and California that have large Hispanic populations suffer from poverty, unemployment, marginalization, and health problems (Crowley, Lichter, and Turner, 2015; Kim, Collins, and Grineski, 2014; Vaughan et al., 2014). In this context, few scholarly efforts have attempted to examine how Hispanics engage in environmental practices, and what differences and similarities exist among subgroups.

The next sections explore the role that sociodemographic variables, such as age, gender, income, ethnic group, and place of residence, among others, affect behavioral intentions. More importantly, this discussion is placed within the larger role that culture plays in this

process. In addition, the role of information exposure and information dissemination is examined, which is argued to be particularly relevant for Hispanics. Finally, the review covers cognitive and attitudinal variables such as environmental concern and interest in environmental issues, among others, that have been extensively studied in the context of environmental behaviors (Diamantopoulos et al., 2003; Roe et al., 2001).

### ***Are All Hispanics the Same?***

A recent meta-analysis of the literature examining environmental behaviors suggests that intentions, habits, perceived behavioral control, and norms are important predictors of these behaviors (Klöckner, 2013). On the other hand, an extensive body of research on social-psychological bases of environmental concern and behavior has examined how different populations, with different characteristics such as age, gender, education, income, place of residence, would logically have different levels of environmentalism (Chen et al., 2011; McCright and Xiao, 2014). But the broad hypothesis stating that demographics explain important aspects of environmentalism has found only weak and inconsistent support (Buttel, 1987; Oskamp et al., 1991). This does not, however, mean demographics might not function differently in particular communities, including the Hispanic. While this has rarely been studied at this level of detail for environmentalism, it has been studied for health behaviors, where noticeable demographic differences have emerged among Hispanics (e.g., Cantrell, 2014).

There is evidence that Hispanic views of the environment differ from those of non-Hispanic Americans (Whittaker, Segura, and Bowler, 2005), yet there is little agreement about how those views are shaped by their culture. Hispanics overall tend to be more concerned about environmental issues than whites (Schultz and Zelezny, 1999; Whittaker et al., 2005). Schultz, Unipan, and Gamba (2000) also found higher environmental concern as measured with the New Environmental Paradigm scale for foreign-born Latinos than for the U.S.-born sample, even when using only English proficiency as a predictor. But they did not find a similar difference for environmental behavior. Carr and Williams (1993) also distinguished between U.S.-born Hispanics, who defined respect for the forest as specific forms of behavior such as not littering, and foreign-born immigrants who connected respect for the forest with respect for one's house. Finally, Hispanics, along with another racial and ethnic minority in the United States, show less political polarization than whites in their views about climate change (Schuldt and Pearson, 2016).

However, in the present study, based on existing literature, we argue that Hispanics should not be considered a homogeneous group. For example, Macias (2016a, 2016b) found a greater pattern of ecocentricity in recent Mexican immigrants than in the second generation. Recent Mexican immigrants were more likely to save water, drive less, and reduce household energy consumption for environmental reasons. They were also more likely to pay higher taxes, pay higher prices, and sacrifice living standards for the same reasons. U.S.-born descendants of Mexican immigrants did not show significant differences from the general U.S. population, suggesting a pattern of environmental assimilation. Mukherji (2005) argued that strategies trying to influence environmental attitudes of Hispanic groups should consider the role of acculturation and the cultural differences among subcultural groups. This literature also shows different levels of acculturation among these subgroups. For instance, Johnson, Bowker, and Cordell (2005) described that both Mexican immigrants and U.S.-born Mexicans show the most resistance to acculturation among Hispanics when it comes to participation in nature-based activities. These studies highlight the importance

of examining racial, ethnic, and cultural identities in environmental matters with a more precise conceptual lens.

Specific cultural background can play an important role in how Hispanics engage in environmental issues. Individuals who have migrated from different countries or who have different ethnic background (e.g., Mexican, Colombian, or Peruvian) will carry a different set of cultural practices (Bechtel, Verdugo, and De Queiroz Pinheiro, 1999). There is, however, some evidence that a hybrid Hispanic identity emerges, so the acculturation process can have a multiplicity of cultural influences, which can include the dominant Anglo culture, but also include only other Latin American cultures. Carter, Silva, and Guzman (2012) found that the environmental attitudes of Hispanics, Mexican immigrants in particular, differ from those usually found in the United States. Those researchers call for a new theory to explain immigrants as environmental actors and how new ideas of the environment might create new kinds of environmental identities and shape national environmental thinking generally. In the United States, these perspectives are a combination of the landscapes of memory and U.S. life, which already implies the blending process of acculturation. In many Hispanic populations, the “nature versus development” perspective is replaced by beliefs that place humans in continuity with nature, which Lynch (1993) says has roots in indigenous ideas about the environment. However, no studies examine in detail the differences between different Hispanic origins and their engagement with environmental behaviors in the United States, despite the evidence that shows that residents of Latin American countries vary in terms of environmental concern (Bechtel et al., 1999).

### ***Place and Situational Influences on Environmental Concern and Behaviors***

Another important consideration refers to social and situational factors (e.g., park use, recreational activities), which may also play a role in influencing environmental attitudes, beliefs, and behaviors (Johnson, Bowker, and Cordell, 2005; Noe and Snow, 1990). Previous studies suggest that place attachment, geographic conditions, and amenities can influence the engagement in environmental and place protective behaviors (Takahashi and Selfa, 2015). For example, urban residency has predicted environmental concern in some studies (Gifford and Nilsson, 2014). On the other hand, Huddart-Kennedy et al. (2009) and Mostafa (2007) reported higher scores in basic values related to the environment, environmental attitudes, behavioral intentions, and in environmentally supportive behaviors in rural residents compared to urban residents. However, these researchers argue that place of residency might be less important than opportunity to engage in the behavior.

In addition to place of residence, other studies show that social and physical environment can have significant impacts on individuals' concern about the environment and their behavioral intentions. For example, case studies of particular rural regions conducted by Hamilton et al. (2014) revealed that the details of place (e.g., local rates of population change, resource-based employment) were associated with people's perceptions about the environment and natural resources. Also, physical environmental attributes such as temperature and precipitation can affect environmental concern and well-being (Duffy and Verges, 2010). This past research provides justification to expect regional differences in behavioral intention related to environmental protection. For example, we could expect that individuals living in places with warm weather and little precipitation (e.g., California) to differ from individuals living in colder places in terms of behavioral intentions, such as water conservation. Consistent with this, Hamilton Colocousis, and Duncan (2010) found respondents in the Far West had greater levels of concern about the effects of development on their community than residents of other regions. Similar regional differences in

attitudes emerged toward use versus conservation of natural resources and conservation versus development. The authors concluded that environmental views do vary from place to place in systematic and consistent ways. Other contextual factors, for example, the political climate in the region, the existence of recycling facilities, or the household size (Abrahamse and Steg, 2011), can also affect the engagement in environmental behaviors.

### ***The Role of Information***

A particular contribution of the present study is the inclusion of information-related variables to the analysis of environmental behaviors among an ethnic minority in the United States. Studies about Hispanics, acculturation, and environmental behaviors have omitted the inclusion of information, communication, and media use variables. On the other hand, studies of the general U.S. population that examine the effects of media use or information-seeking behaviors on environmental behaviors have not explored minorities in much detail (e.g., Arlt, Hoppe, and Wolling, 2011; Shanahan et al., 1997).

In general, mass media use plays an important role in cultivating public environmental concern and in influencing self-reported environmental behaviors (Ader, 1995; Shanahan et al., 1997; Takahashi et al., 2017). This has been reported in studies of self-reported environmental behaviors (Ho, Liao, and Rosenthal, 2015), concern over global warming (Zhao, 2009), and concern about environmental risks (Dahlstrom and Scheufele, 2010). There has been, however, limited focus on the role of information dissemination. This study argues that information exposure and information dissemination among Hispanics can play an important role in explaining environmental behaviors.

Research examining information exposure and seeking among Hispanics overwhelmingly focuses on health issues (e.g., Peña-Purcell, 2008; Waters, Sullivan, and Finney Rutten, 2009). There is evidence that suggests that English proficiency influences trust and use of different communication channels (e.g., media, interpersonal communication) related to health issues among Hispanics (Clayman et al., 2010). Similarly, having a bicultural identity is associated with preferences for family sources and mediated messages as sources of information in the case of breast cancer among Hispanic women (Oetzel et al., 2007). Overall, information seeking about health concerns for Spanish-speaking Hispanics is a more complex task than for English speakers (Vanderpool et al., 2009). There is limited evidence about the role of information exposure and seeking, and information dissemination, on Hispanics' environmental behaviors. However, the literature on health issues provides a justification to examine how such processes affect the intention to engage in environmental behaviors.

A concept central to this study is information dissemination through interpersonal communication. Most research on information dissemination about energy conservation or other related environmental issues has focused on dissemination through communication campaigns (Wilson and Dowlatabadi, 2007). However, prior research suggests that information about energy innovations is more likely to be communicated via social networks than across mass media or other channels (Koger and Winter, 2011). Similarly, peer education in the workplace has been shown to be more effective than information-only attempts to reduce energy use (Carrico and Riemer, 2011). Dixon et al. (2015) reported that the awareness and attention to energy information were related to the numbers of both strong and weak ties within their community, but their motivation to adopt the recommended conservation measures were related to the strength of their ties. In addition, new social media channels have also been shown to have a similar effect on energy-saving behaviors as word-of-mouth communication (Sweeney et al., 2014). In summary, "seeking information

from personal contacts will generally be associated with higher adoption rates, and is thus an important aspect to the diffusion of energy-reducing innovations” (McMichael and Shipworth, 2013:166). Based on the extant literature, information dissemination can be effective in promoting energy conservation. But there is not much evidence about the relationship between disseminating information and the conservation behaviors of those sharing such information. It could reasonably be argued that those individuals disseminating information would agree with such information and therefore be more likely to also engage in those practices.

This literature on energy behaviors and information, similarly to most of the literature discussed above about environmental behaviors, has not directly studied Hispanic populations. However, while not studied directly, information dissemination is likely governed by two broadly known principles. One is psychosocial: the recognition that different individuals have different reasons for following particular kinds of information, that these reasons often lead them to spread this information to others, and that this diffusion follows recognizable patterns, affecting which information is disseminated, to whom, and how it spreads. The other is structural. Granovetter (1973) and others (e.g., Burt, 2009) showed that what groups of people do, think, or believe are not simply a large-scale version of their individual choices or tastes with regard to what the information was about, but that the structure of social relationships also affects information diffusion at the individual and group level. In particular, the “strength of weak ties” concept shows how individuals are more likely to use strong ties to others (those that are longstanding or based on emotional power, reciprocity, or intimacy) to convey certain kinds of knowledge, whereas weak ties (between individuals or groups of individuals who most likely would not have connected otherwise) provide bridging capacities that make other kinds of information transmission likely. Further research (Brancaleone and Gountas, 2007; Brown and Reingen, 1987) has shown that much of this information diffusion happens by interpersonal means and is driven partly by psychosocial needs such as desire for social influence or leadership (Feick and Price, 1987). Such word of mouth happens through both strong and weak ties, but different kinds of information are likely to activate different kinds of ties. Moreover, when these ties operate, information conveyed through strong ties tends to be used more for decision making, whereas information conveyed through weak ties is used more for pure diffusion.

Powerful and influential as these processes are, this still left many questions unanswered about how the two processes work for energy or for specific populations such as Hispanics. Because the processes are relationally and socially consequential, questions arise whether information diffusion might function differently for product purchases than for ideologies or for products like energy sources that may have both functional and ideological components. Another question is whether particular populations, such as Hispanics, might have different patterns of information diffusion than the U.S. population at large. Diffusion can be motivated by a desire to share, a desire for social status, a sense of obligation or the gratification that comes with sharing, or a need to feel unique and different (Goldsmith, Clark, and Goldsmith, 2006). In doing this, they may be responding to influences of culture and class. As a result, they frequently play the role of information filters for others, passing on news about products they do not necessarily buy themselves. In the case of Hispanics, who have an egalitarian and communitarian social structure (Lynch, 1993), social ties are stronger and therefore the diffusion of information through those networks can have unique effects on behaviors. These processes have been identified in studies about health communication. Wilkin and Ball-Rokeach (2006), studying Hispanics’ use of health information, found that use of interpersonal information ranked above

any other, followed by ethnic television. Rather than addressing strong and weak ties directly, they envisioned their subjects navigating and seamlessly integrating a three-sided storytelling network consisting of ethnic media, families, and community organizations. Each contributed or failed to contribute to the total process of civic engagement as their subjects sought health information.

In summary, this scattered but complementary literature suggests that the patterns of information exposure and seeking, and information dissemination, are attached to cultural norms and social structures. It can be expected that individuals who are perceived as opinion leaders in tight-knit communities (e.g., Hispanic) play an important role when it comes to environmental decisions, and that they themselves might engage in those behaviors if they see themselves as knowledgeable and trustworthy.

### **Hypotheses and Research Questions**

The following research questions and hypotheses are presented to examine environmental behaviors among Hispanics, particularly the role of subcultures and place of residence, as well as the role of information exposure and information dissemination. This study approaches this topic by examining the particular case of energy use. Energy use is partially linked to both environmental and economic concerns (Abrahamse and Steg, 2011), both of which are relevant to Hispanics because of perceived higher environmental concern and because of overall lower income relative to other ethnic groups. Also, energy production and consumption is strongly related to climate change (Dale, Efroymson, and Kline, 2011; Vaughan et al., 2014), a highly salient environmental issue. With that in mind, this study proposes:

**RQ1:** Do Hispanics in the United States behave as a homogeneous group in relation to behavioral intentions about energy use?

More specifically:

- RQ1a:** What are the differences and similarities in behavioral intention about energy use of different Hispanic origin groups in the United States?
- RQ1b:** What are the differences and similarities in behavioral intention about energy use of Hispanics in the United States based on their geographic location?
- RQ1c:** What is the effect of the relationship between geographic location and Hispanic origin on behavioral intentions?

This study also examines the relationship between sociodemographic variables and psychological variables such as concern, and energy behavioral intentions. Abrahamse and Steg (2009, 2011) reported that household energy use was most strongly related to sociodemographic variables (income, household size, age), attitudinal variables such as the effect of energy conservation on lifestyle, and self-transcendence values (tradition/security and power/achievement). Others have also reported a significant positive relationship between sociodemographic variables and energy conservation behaviors (Pelenur and Cruickshank, 2012). Zarnikau (2003) found younger respondents were more interested in paying a premium for renewable energy than older respondents.

In addition, the focus on information dissemination and information exposure is highlighted. Based on what has been learned about information diffusion by such researchers as Feick and Price (1987), Brown and Reingen (1987), and Brancaleone and Gountas (2007), the following research questions and hypotheses are then presented:

**RQ2:** What is the combined role of sociodemographic variables, race and ethnicity, information exposure and dissemination, and environmental beliefs and perceptions on behavioral intentions?

More specifically:

**RQ2.1:** What is the role of information exposure and information dissemination on behavioral intentions about energy use among Hispanics?

**H1:** Sociodemographic variables (age, gender, education, and political orientation) will positively predict behavioral intentions.

**H2:** Environmentalism (concern, beliefs, knowledge, identity, and trust) will positively predict behavioral intention controlling for all other variables.

## Method

This study used data from the University of Texas at Austin Energy Poll.<sup>1</sup> The poll examines public perspectives on current energy issues. The online poll includes respondents in the United States who are 18 years of age or older. The poll has been conducted twice every year (in March and September) since September 2011 (eight waves at the time this study was conducted). More than 2,000 responses are collected and weighted to match the U.S. population (as set forth by the U.S. Census Bureau), but only the Hispanic portion of the poll was taken and used in this study, which represents the Hispanic population in the United States. The percentage of Hispanics in each wave is around 14 percent, meaning that each wave has around 300 Hispanic participants. In order to maximize our sample size, wave 5 (March 2013), wave 6 (September 2013), wave 7 (March 2014), and wave 8 (September 2014) were combined to create the sample for this study, assuming that the perceptions about energy issues should not have changed significantly across these time periods. The final sample consists of 994 participants, but the regression analyses are based on 734 Hispanic participants after listwise deletion of missing data. The listwise deletion was used because the data were found to be missing completely at random in the Little's missing completely at random (MCAR) test ( $p > 0.05$ ) (Little, 1988). Other data limitations are discussed in the Discussion section. Table 1 lists all variables used in this study.

## Dependent Variable

**Behavioral Intention.** This variable is based on six items asked in the survey. Participants were asked to indicate how likely they were to adopt energy-efficient behaviors in the next five years. The items asked participants about their likelihood to own a hybrid vehicle, to own a fully electric vehicle, to own a vehicle that runs on natural gas, to use "smart meter" technology that allows better management of a household's demand for electricity, and the likelihood to install solar panels at home. The scores for the six items were combined to form an additive index of behavioral intention, for a range of scores from 1 to 7 ( $M = 4.05$ ,  $SD = 1.74$ ). Cronbach's alpha = 0.853.

<sup>1</sup>"About the Energy Poll," retrieved September 24, 2015, from (<http://www.utenergypoll.com/about/>)



TABLE 1

List of Variables

Dependent Variables	Independent Variables	Block	
Behavioral intention (BI)	Age (A)	Block 1	
	Gender (G)		
	Income (I)		
	Education (E)		
	Political affiliation (PA)		
	Place of residence (PC)		
	Region (R)		
	Immigration status (IS)		
	Hispanic origin (HO)		Block 2
	Race heritage (RH)		
	Information exposure (IE)		Block 3
	Information dissemination (ID)		Block 4
	Perception of knowledge (PK)		
	Climate change beliefs (CC)		
	Trust toward energy organizations		
Interest in energy issues			
Environmental identity (EI)			
Environmental concern (EC)			

**Independent Variables**

**Sociodemographic Variables.** Previous studies have reported that in addition to attitudinal variables, the differences in the actual use of energy in the home or for transportation are especially related to sociodemographic variables, for example, income and household size (Poortinga, Steg, and Vlek, 2004); moreover, more recent research shows that most of the socioeconomic and demographic variables have mixed impacts on energy-saving behaviors (Urban and Ščasný, 2012). Given this existing body of research, age, gender, family income, education, political affiliations, place of residence (rural, urban, or suburban), and geographical region were measured and tested.

Age was measured using 11 categories. Approximately 52 percent of the respondents were females. In order to measure family income, respondents were asked to identify their income level ( $M = 4.01$ ,  $SD = 2.05$ ) within the item category, ranging from “less than \$20,000,” to “\$200,000 or more.” Education was measured using nine categories ranging from “grade school or less” to “postgraduate degree (e.g., MA, MBA, LLD, Ph.D),” with an average of 5.82 ( $SD = 1.91$ ). Political orientation was measured with three categories: conservative, independent, and liberals; place of residence includes rural, suburban, and urban areas; and the region includes Northeast (17.20 percent), Midwest (11.07 percent), South (36.62 percent), and West (35.11 percent). In terms of immigration status, 54.6 percent have a U.S. passport.

**Race and Ethnicity Variables.** Respondents were asked to identify among five ethnicity options: “No, not of Hispanic, Latino or Spanish origin (0 percent),” “Mexican, Mexican-American, Chicano (50.6 percent),” “Puerto Rican (15.4 percent),” “Cuban (8.4 percent),” and “Another Hispanic Latino or Spanish origin (25.7 percent).” They were also asked about their race: African American or black (5 percent), American Indian or Alaska Native (3.2 percent), Asian (2.6 percent), Native Hawaiian or Pacific Islander (0.9 percent), white (71.7 percent), and others (20.8 percent).

**Information Exposure.** This variable is based on one item asked in the questionnaire. Respondents were asked to rate approximately how frequently they have read, seen, or heard anything in particular about energy issues such as electricity costs, government policy, environmental crises, or alternative energy sources over the past three months, using a scale of 1 (Have not read, seen, or heard anything about energy issues) to 7 (Almost daily). Average score was 3.98 ( $SD = 1.66$ ).

**Information Dissemination.** The information dissemination index is measured by two questions on five-point scales, from 1 = never to 5 = frequently. Respondents were asked about their frequency of giving people advice or information on energy issues and were asked about the frequency of being asked by other people for advice or information on energy issues. The scores for the two items were averaged to form an index of information dissemination, for a range of scores from 1 (never) to 5 (frequently) ( $M = 2.53$ ,  $SD = 1.13$ ). Cronbach's alpha = 0.856).

**Perception of Knowledge.** This variable is based on one item asking how knowledgeable respondents perceive themselves to be about how energy is produced, delivered, and used in comparison with other people. Respondents were asked to rate on a five-point scale, from 1 (not at all knowledgeable) to 5 (very knowledgeable). The average score was 3.15 ( $SD = 0.99$ ).

**Trust.** Respondents were asked 11 questions to report the degree to which they trust a variety of energy groups or organizations to provide them information on how to use energy more efficiently and how to conserve energy. The score of trust ranges from 1 = "do not trust at all" to "5 = trust completely." After exploratory factor analysis, it was found that three questions asked about respondents' trust toward environmental groups, renewable energy companies, and academic/scientific communities, and seven other questions loaded on another factor component asking about respondents' trust toward their electric provider, oil and gas company, retail store, U.S. business community, state government office/agency, local government office/agency. These seven items were used and averaged to form an index of trust, for a range of scores from 1 (do not trust at all) to 5 (trust completely) ( $M = 2.84$ ,  $SD = 0.86$ ). Cronbach's alpha = 0.866.

**Interest in Energy.** This variable is based on six items. The first item asked participants, compared to others they know, how interested they are in energy issues. The second item asked participants, in general, how important they view energy issues to them. The third item asked participants how relevant energy issues are to them. The fourth item asked participants how involving energy issues are for them. The fifth item asked overall how excited participants feel about energy issues, and the last item asked how valuable participants feel about information on energy issues. Exploratory factor analysis was conducted for the items, and items loaded on a single component. The scores for the six items were averaged to form an index of interest in energy ( $M = 3.52$ ,  $SD = 0.88$ ). Cronbach's alpha = 0.912.

**Environmental Concern.** This variable is based on 10 items asking participants to rate how concerned they are about a variety of environmental issues, among which the following items loaded on the same factor component and thus were utilized. Questions asked about concern about consumption of oil from foreign sources, developing renewable sources of energy, the energy efficiency of home, depletion of water resources, the effect

of the nation's energy production and consumption on carbon emissions, the impact of hydraulic fracturing on the natural environment, and the impact of domestic oil drilling and production on the natural environment (factor loading  $\geq 0.60$ ). The other three items under this question asked participants' concern about the cost of gasoline, the cost of electricity, and the household budget spent on energy, and these three items were loaded approximately equally on both components (loading  $< 0.60$ ) and thus were not included. The final environmental concern measurement contains seven items ( $M = 3.82$ ,  $SD = 0.80$ ). Cronbach's  $\alpha = 0.994$ .

***Environmental Identity.*** This variable is based on one item asking participants if they consider themselves to be environmentalists. The responses were recoded into three dummy variables, "active environmentalist" (15.1 percent), "passive environmentalist" (41.4 percent), and "not environmentalist" (43.5 percent), the last category being the reference group.

***Climate Change Beliefs.*** Although this has frequently been studied for the population as a whole (e.g., Maibach et al., 2011), research on climate change beliefs has rarely focused on subpopulations such as Hispanics. This variable is based on one item asking if participants believe that climate change is occurring. A great majority (80.7 percent) of respondents believe it is happening, 10 percent of the participants do not believe that climate change is happening, and the remaining 9.4 percent of the individuals chose the "don't know" option. These were then recoded into three dummies, and the "don't know" group was used as the reference group.

### ***Multicollinearity Test***

Bivariate correlations and variance inflation factors (VIF) are usually used to diagnose multicollinearity, and no consistent standard on the threshold of VIF value has been found. But a value of 10 has been recommended as the maximum level of VIF (e.g., Iraldo et al., 2011; Pasurka, 2008), with the tolerance recommendation of 0.10 (i.e.,  $1/0.10 = 10$ ). Maximum VIF values of 5 (e.g., Ahern, 2012) and 4 (e.g., Newman and Fernandes, 2016) were also found in the literature. In this study, the maximum VIF value is 2.912, which is within the acceptable range.

### ***Analysis***

Analysis of variance (ANOVA) tests were used to answer RQ1a and RQ1b. RQ1c was answered using a two-way ANOVA. In order to provide additional support to answer these questions, to answer RQ2a and to test H1 and H2, a regression analysis with four models is presented. Each model incorporated a block of variables, where the first model had only one block, and the last one had four blocks (see Table 1). The first block in the regression model has the basic demographic variables; the second block added race demographics in order to determine whether Hispanics in the United States behave as a homogeneous group in terms of their energy-saving behavioral intention. After that, information exposure and information dissemination were added as a separate block, and the last block includes environmental concern, trust, knowledge, climate change beliefs, environmental identity, and interest variables related to energy-saving behavioral intentions.

TABLE 2  
Respondents' Mean Behavioral Intention Score by Ethnicity

	Mean	SD	N
Mexican, Mexican American	3.90	1.77	503
Puerto Rican	3.73	1.79	153
Cuban	3.50	1.79	83
Another Hispanic, Latino, Spanish origin	3.97	1.7	255

TABLE 3  
Respondents' Mean Behavioral Intention Score by Region

Region	Mean	SD
Northeast	3.61	1.79
Midwest	3.84	1.79
South	3.75	1.72
West	4.11	1.76

## Results

One of the study's main goals was to determine whether Hispanics in the United States differed in their behavioral intentions about energy issues based on their origin or geographic place of residence. An ANOVA comparing the effect of Hispanic origin on behavioral intention between Mexican American, Puerto Rican, Cuban, and other Hispanic, Latino, or Spanish origin groups (RQ1a) reported no significant effect at the  $p < 0.05$  level for the four groups ( $F(3, 990) = 1.826, p > 0.05$ ) (see Table 2). Results from the regression model also show that there are no significant differences among the subgroups in terms of their energy-related behavioral intention, after controlling for demographic variables ( $p > 0.05$ ) (see Table 4).

Results of a one-way ANOVA show that there was a significant difference among Hispanics in different geographic regions in terms of their behavioral intention (RQ1b) ( $F(3, 990) = 3.94, p < 0.01$ ). Respondents in the West show higher behavioral intention ( $M = 4.11, SD = 1.76$ ) than respondents in the Northeast region ( $M = 3.61, SD = 1.79$ ), Midwest region ( $M = 3.84, SD = 1.79$ ), and South region ( $M = 3.75, SD = 1.72$ ) (see Table 3). Regression model 1 showed that participants from the West region of the country had significantly higher behavioral intention than the participants from the Northeast region ( $\beta = 0.573, p < 0.01$ ). But the effect of this difference on behavioral intention changed in the following models. The effect of the difference on behavioral intention increased in Model 2 and was then attenuated in Model 3; the statistical significance level also dropped from  $p = 0.01$  level to  $p = 0.05$  level in Model 4 when the environmental concern variables were included (see Table 4).

Figure 1 reports mean differences in behavioral intentions based on both Hispanic origin and geographical location (RQ1c). Results from a two-way ANOVA test showed that there was no effect of the relationship between ethnicity (Hispanic origins) and geographical location on behavioral intention ( $F(9) = 0.492, p > 0.05$ ).

RQ2 asked about the combined role of sociodemographic variables, race and ethnicity, information exposure and dissemination, and environmentalism in predicting

TABLE 4  
Regression of Behavioral Intentions

	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$
Constant	2.982***		3.056***		1.482***		-0.512	
Block 1: Demographics								
Age	-.093***	-0.155	-.089***	-0.149	-0.037	-0.061	-0.067***	-0.113
Gender (male)	0.228	0.065	0.224	0.064	0.021	0.006	0.09	0.026
Income	0.06	0.071	0.069	0.081	0.02	0.024	0.058	0.068
Education	0.081*	0.089	0.083*	0.09	0.067*	0.073	0.051	0.056
Political affiliation <sup>a</sup>								
Conservative	-0.235	-0.055	-0.213	-0.05	-0.161	-0.037	-0.202	-0.047
Liberal	0.327	0.091	0.309	0.086	0.268	0.074	0.027	0.008
Place of residence <sup>b</sup>								
Urban	0.188	0.053	0.184	0.052	0.125	0.036	0.069	0.02
Rural	-0.172	-0.032	-0.186	-0.035	-0.199	-0.037	-0.025	-0.005
Region <sup>c</sup> (Midwest)								
South	0.059	0.011	0.138	0.025	0.142	0.026	0.068	0.013
West	0.301	0.083	.383*	0.106	0.332	0.091	0.265	0.073
Immigration status (has U.S. passport)	0.573**	0.158	0.642**	0.177	0.488**	0.134	0.391*	0.108
	0.432**	0.122	0.454**	0.129	0.164	0.046	0.142	0.04
Block 2: Race and ethnicity								
Hispanic origin <sup>d</sup>								
Mexican			-0.099	-0.029	-0.239	-0.069	-0.11	-0.031
Puerto Rican			0.086	0.017	-0.101	-0.02	-0.021	-0.004
Cuban			-0.363	-0.057	-0.566*	-0.089	-0.274	-0.043
Race heritage <sup>e</sup>								
Black			-0.041	-0.005	-0.371	-0.045	-0.309	-0.038
American Indian or Alaska			-0.132	-0.01	-0.387	-0.028	-0.45	-0.033
Asian			-0.507	-0.049	-0.369	-0.035	-0.296	-0.028
Hawaii or Pacific Islander			-0.004	0	-0.923	-0.039	-0.749	-0.032
White			-0.168	-0.045	-0.085	-0.023	-0.094	-0.025
Block 3: Information								
Exposure					0.04	0.039	-0.015	-0.014
Dissemination					0.731***	0.475	.333***	0.217
Block 4: Environmentalism								
Perception of knowledge							0.008	0.004
Climate change believer							-0.377	-0.081
Climate change denier							-0.455	-0.082
Trust							0.186**	0.092
Interest							0.427***	0.207
Environmental identity								
Active							0.490**	0.106
Passive							0.353**	0.101

continued

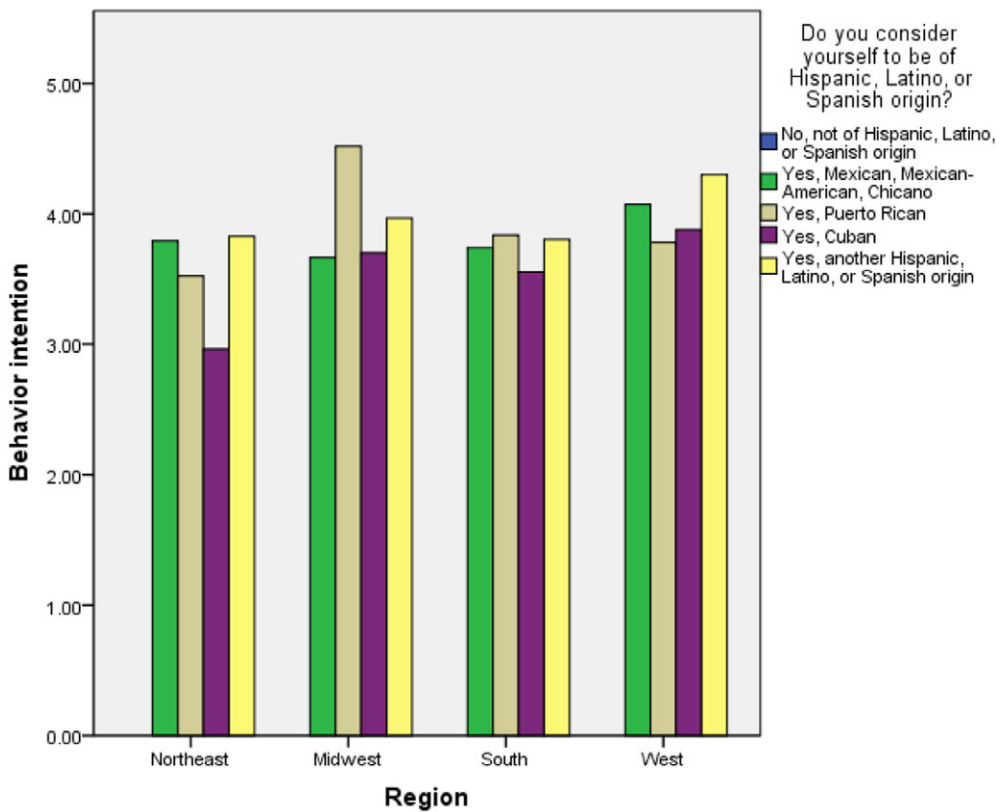
TABLE 4  
Continued

	Model 1		Model 2		Model 3		Model 4	
	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$	<i>b</i>	Std. $\beta$
Environmental concern							0.383***	0.177
<b>Adjusted R square</b>	<b>0.1</b>		<b>0.096</b>		<b>0.302</b>		<b>0.399</b>	

Note:  $N = 735$ .  
 \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .  
<sup>a</sup>Reference group: independent.  
<sup>b</sup>Suburban is the reference group.  
<sup>c</sup>Northeast is the reference group.  
<sup>d</sup>Other Hispanic origin is the reference group.  
<sup>e</sup>Other is the reference group.

FIGURE 1

Behavioral Intention, by Respondent's Region and Hispanic Origin ( $N = 994$ , not significant)



"No, not of Hispanic, Latino or Spanish origin ( $N = 0$ )"; this was deleted  
 Behavior intention includes own a hybrid vehicle, own a fully electric vehicle, own a vehicle that runs on natural gas, use "smart meter" technology that allows you to better manage the household's demand for electricity, install solar panels at your home in the next five years.

energy-related behavioral intentions. Results show that information exposure is not a significant predictor of behavioral intentions across the four models ( $p > 0.05$ ), whereas information dissemination is a significant positive predictor of behavioral intention about energy use ( $\beta = 0.333, p < 0.001$ ). The more information people disseminate, the higher behavioral intention they have about energy use (RQ2.1). H1 predicted sociodemographic variables (i.e., age, gender, education, and political orientation) would significantly predict behavioral intentions. This was only partially supported. Age was a significant negative predictor of behavioral intention across the four models ( $p < 0.001$ ), whereas there was no significant gender difference in terms of behavioral intention score. The effect of education on behavioral intention was also significant across the models, showing that the more educated people are, the higher intention they have to engage in energy-saving behaviors. Other remaining demographic variables were not significant predictors. Political affiliation and place of residence were not significant predictors across the four models ( $p > 0.05$ ). But results from the one-way ANOVA comparing across the setting where respondents live (urban, suburban, or rural) show significant differences in behavioral intention. Individuals in rural areas are less likely to engage with energy behaviors than those individuals in urban or suburban settings ( $F(2, 991) = 3.747, p < 0.05$ ). H2 stated that environmental variables (block 4) would positively predict behavioral intention after controlling for all other variables. The hypothesis was supported. People with higher environmental concern showed more intention to engage with energy-saving behaviors ( $\beta = 0.383, p < 0.001$ ). The regression model (Table 4) reports four models predicting energy behavioral intention. Most of the variance in model 4 (full model, adjusted  $R$  square, 0.399) shows that the variables in block 4 (e.g., trust in institutions, interest in energy issues, environmental concern, and environmental identity), and the variable information dissemination had the strongest predictive power.

## **Discussion**

This study was set up as a challenge to conventional wisdom about the homogeneity of Hispanics in regard to environmental matters. This exploratory study analyzed whether energy-related behaviors among Hispanics were linked to ethnic groups (e.g., Mexican Americans) and/or geographic location. The results do not show a clear pattern or difference, except for Hispanics overall in the West who scored higher than those in any other region.

This study also set out to add to the limited amount of information about the behaviors and attitudes of Hispanics in the United States toward energy use. The study examined the role that variables such as concern, environmentally-oriented activity, or information exposure play within the Hispanic population. The study found environmentalism in all its dimensions (e.g., environmental identity, environmental concern, climate change beliefs, and so on) was strongly associated with preference for energy-saving behaviors. Hispanics with greater levels of environmental concern showed higher levels of intention to save energy, as did Hispanics who considered themselves both active and passive environmentalists, which is consistent with studies of the general population. When the question of whether these intentions differed by subgroup was examined, it was found, contrary to Mukherji's (2005) findings about recycling, that ethnic subgroups did not differ from each other in their energy-saving intentions. Holding a U.S. passport positively predicted environmental behaviors, but significance disappeared once the environmental measures and information variables were taken into account. Living in different regions within the United States also made a difference, with Hispanics in the West (who are mostly Mexicans and Mexican

Americans) showing much higher energy-saving intentions than those from the Northeast. One explanation for the regional differences may lie in the strong role played by California in the country's environmental history as far back as the 19th century, as well as more recent energy crises such as the ones in the early 2000s and in 2011. However, this requires further analysis and better conceptualization.

It was also found that demographic variables mostly did not predict behavioral intention, except for age and education, which were both positive, something consistent with some studies of the general population (Buttel, 1987; Diamantopoulos et al., 2003; Oskamp et al., 1991). Older Hispanics were less likely to intend to save energy and the more educated more likely. Hispanics who considered themselves environmentalists, even if only passive ones, were strongly inclined to perform energy-saving behaviors. Interest in saving energy and trust in energy companies also positively predicted energy saving.

Hispanics who frequently were asked for or gave out energy information to others also showed a higher intent to save energy themselves. The role of information dissemination has been widely studied in respect to product purchases (Brancaleone and Gountas, 2007; Goldsmith, Clark, and Goldsmith, 2006). Some people play a strong but informal role as early adopters, opinion leaders, and market mavens, offering advice and guidance to others about how different products perform and which ones to choose. Diffusion of energy information has not been as widely studied. However, energy use is a product purchase with strong environmental consequences, so decisions about energy use could be more open to influence by information disseminators whose own knowledge or judgment about environmentally-friendly energy use are seen as useful by others. The great strength of information dissemination as a predictor of energy choices among our Hispanic population may be related to Wilkins and Ball-Rokeach's finding (2006) in Hispanics' use of health information that reported that interpersonal information was more important than any other form of communication. Similarly, some people in the Hispanic population in this study appear to have positions in the community or in a family that make them information exchangers. Even if they are not environmentalists, they could have the power to make an issue or a topic salient. By doing this, they could become more knowledgeable and conserve more energy themselves. This would require further investigation, since this finding could have important implications for public policy and communication campaigns, since it suggests that an approach that favors interpersonal communication can be more effective than traditional mass mediated approaches.

These findings could also be interpreted from the perspective of acculturation. The process of acculturation suggests that individuals who migrate, or those whose family has migrated and are raised in a culture different than the dominant culture, will create hybrid cultures from a melding of the dominant and their own culture (Archuleta, 2012; Cabassa, 2003). The study of acculturation among Hispanics and its effect on various forms of behaviors (e.g., health) has received continued focus throughout the years, but with limited attention to environmental issues (Johnson, 2011). What is clear is that the way immigrants and their children adapt to the dominant culture can have an effect on the ways in which they think about environmentalism, and how they behave. Acculturation may help explain some of these findings, but it was not measured directly in our study and awaits development of a more complete model. Collectively, our findings may indicate that some acculturation with the dominant Anglo culture is occurring. Or it could indicate that despite their differences of origin, Hispanics from different countries are losing their particular characteristics and acculturating to a more general Hispanic environmental identity within the United States, consistent with the findings of Lynch (1993), Carter, Silva, and Guzman (2012), and Peña (2003). There are historical precedents for this among



Jewish and Italian immigrants in earlier eras, with national origin differences disappearing but a more general ethnic identity remaining (Gans, 1994). If this is what is occurring, the processes by which it happens await further investigation.

This study was limited by its use of secondary data, which therefore did not allow the inclusion of other variables that could have explained the rest of the variance not explained by the full model. Despite its focus on information exposure and information dissemination as communication-related variables, the study did not include other variables of interest such as media use. In addition, the measures of information exposure and information dissemination used are limited because the first consists of only one item and the second of only two. In addition, no variables related to acculturation, such as language or time of residence in the United States, were measured. Variables at the household level (e.g., household size, home ownership) were also not included. Also, the study focused on energy behaviors only, which can also be influenced by more factors than just environmental beliefs, such as cost. To better understand the processes examined in this study, other types of behaviors would also need to be examined. Future studies should incorporate these variables to test their predictive power over various measures of behavioral intention. These could also include a stronger theoretical model following established theories such as the theory of planned behavior or the value-belief-norm theory. Data limits of a secondary data set made this impossible to test.

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