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Patience as a Predictor for Environmental Attitudes

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Abstract

This paper aims to show the relationship between an individual's value of patience and the degree to which they exhibit pro-environmental attitudes. My hypothesis is that country-wide patience has a strong impact on an individual's attitudes towards protecting the environment. I present two methods to address this relationship, each method employs a different variable used to measure environmental attitudes. Given some discrepancies in the results from the first method, the second was the one utilized to reach the conclusion. The paper concludes that there is a positive and significant correlation between patience and environmental attitudes.

Keywords

patience, environmental attitudes, long term orientation, environmental economics, time perception

Cover Page Footnote

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1. Introduction

This paper aims to show the relationship between an individual's value of patience and the degree to which they exhibit pro-environmental attitudes. Environmental attitudes are now more significant than ever due to the high impact that external pressure exerted by the public can have on policy as well as on the cultural mindset as a whole. By examining the factors that play a role in a societies' attitude towards the environment, we can better understand why some countries are leading the way towards sustainability while others are not.

People that feel strongly about the natural environment along with all the benefits that come from its conservation are more likely to play an active role in different levels of sustainability. This can range from avoiding unnecessary plastic bags to a more life-changing approach like becoming vegetarian. No matter the approach or the extent to which an individual takes it, without strong environmental attitudes it is unlikely that any significant action will be given towards the preservation of the natural world. Environmental attitudes are what make people proactively choose to adjust their lifestyle to protect the natural world despite the discomfort, the extra expense, and the lack of immediate solutions to the situation.

Patience or long-term orientation is the weight that is given to future events, therefore, it shows whether or not an individual is more likely to wait for a larger reward over a smaller immediate one. Patience is a variable that tends to be positively correlated with a higher GDP, income, wealth, etc. This is because by sacrificing smaller short-term comforts for a large reward further in the future, there tends to be a more intense pursuit towards growth and innovation. The research question of this paper seeks to further the research by examining the role of patience in developing strong environmental attitudes. There has been research done analyzing the connection between patience and the natural environment. Conservation is, after all, sacrificing the immediate monetary or comfort-based need for a much larger intangible reward, the wellbeing of the natural world. When individuals are willing to give up an immediate comfort as well as convenience for greater rewards in the future, such as a healthy natural world, they exabit the patience required to invest in the future of the planet.

There has been extensive research done on both patience and environmental attitudes. Schoder (2017) and Heal (2017) show the importance of environmental attitudes by evaluating the economic characteristics of policy and climate change. Some of the determinants of environmental attitudes that are observed are education, knowledge, and religion. This literature provides information that will be relevant when controlling for certain variables in the regressions. Galor and Özak (2014) provide information on the origins of patience. Howard (2013) and Hübner and Vannoorenbergh (2015) take a look at the economic importance of the patience variable. In summary, patience is strongly correlated with the development and success of policy that promotes growth. The existing literature on patience and

the natural environment includes Hellman (2020) who takes the first step in observing the impact that patience has on sustainability. The literature proposes that patience is positively and strongly correlated with environmental policy. What this paper adds to the existing literature is a direct connection between patience and environmental attitudes rather than policy.

My hypothesis is that country-wide patience has a strong impact on an individual's attitudes towards improving and protecting the environment. I present two methods to address the relationship between patience and pro-environmental views. The first is by taking a look at an OLS regression employing the Global Preference Survey (GPS) measure for patience and observing its impact on whether people are willing to spend more in protecting the environment or not. This measure of environmental attitudes comes from a survey question on the General Social Survey (GSS). The second method is by employing an additional measure for environmental attitudes from the World Value Survey (WVS) to examine the consistency of the initial results. With these, I aim to provide insight into the correlation between the two variables.

My primary finding on the first regression shows a negative, as well as a significant relationship observed between patience and environmental attitudes. It remains even after controlling for individualism together with other significant variables, which was not consistent with the existing literature on the subject of the hypothesis. The relationship remained negative when using Hofstede's measure for Long-Term Orientation instead of the original measure for patience. Because of these results, I was motivated to develop the second method in which a different measure for environmental attitudes is employed. The results showed a positive and significant relationship between patience along with views concerning the importance of protecting the environment over economic growth. More research is needed to find the cause for the unusual results on the first regression, however, the second regression shows results that are consistent with the literature review and support the initial hypothesis.

In the next section, I provide an overview of the existing literature that is related to the research question by showing that patience is, in fact, positively related to many long-term-oriented behaviors, including, environmental attitudes. Section 3 will present the data together with the methods used to link the measurement of country-level patience with environmental attitudes. Section 4 shows the results obtained from the OLS regressions along with the interpretation of the results as well as an additional method employed to test the initial results. Lastly, Section 5 concludes the paper in addition to reflecting on the additional tests that could be done to further expand the research question.

2. Background

2.1. Importance of Environmental Attitudes

Several different factors can shape the way that a person acts concerning the protection of the natural world. Most of these factors are sociocultural such as income, level of education, mental health, etc. therefore the question becomes how significant are environmental attitudes in determining pro-environmental behavior. Martinsson, Lundqvist, and Sundström (2011) examine energy-saving behavior in Swedish households to find an answer. He finds that households with higher income generally tend to save less energy because they do not have that extra incentive to save money on electricity whereas households with a lower income do have the incentive to economize their resources more. When people with high income exhibit strong environmental attitudes, they can cause a greater impact.

As the threat to the natural environment grows in scale, the economic consequences become more and more apparent. Natural disasters fueled by changing temperatures cost millions of dollars in damage and are strong hits to the local economy (Schoder. 2017). The threat of climate change is economically unquantifiable in that the risk is simply too large. The economic impact of a single disaster caused by climate change can prove to be crippling to an already unstable economy. The degree of destruction is tremendous and apart from the massive economic loss which ranged in the billions of dollars, there are also significant fatalities.

Heal (2017) evaluates the economic characteristics of policy around climate change. As the cost for renewable energy falls, it is profitable to invest in solutions to combat climate change now. However, there are contradicting arguments from economists as to whether or not the investment that we would have to make today in order to avoid future loss through climate change is worth it. Climate change is a considerable threat to future economies, even now it has already cost billions in damage.

Nevertheless, the question remains, would a present investment offset the effects of climate change payoff in the long run. Economists have not been able to come up with a definitive model that can answer this question since it all depends on which discount rate they choose to use. When people use a low discount rate the current investment seems relatively low and therefore they end up defending expensive solutions to climate change (Schoder. 2017) Those that use high discount rates argue that policies that aim to reduce the effects of climate change have investments that are simply not worth the cost. Heal concludes that the costs of climate change are not specific which is why the choice between discount rates is ambiguous. Therefore, the decision to invest in solutions to halt climate change should be based on the small but disastrous probability of a crippling outcome.

2.2. Determinants of Environmental Attitudes

Environmental education is key to building up habits that lead to a more sustainable lifestyle. Liu, Teng, and Hang (2020) analyze the impact that environmental knowledge has on pro-environmental behavior by looking at survey data from China. The main findings are that "environmental knowledge has a significant positive effect on environmental attitudes, environmental attitudes have a significant positive effect on environmental behavioral intentions and pro-environmental behaviors, and environmental behavioral intentions have a significant positive effect on pro-environmental behaviors" (Liu et al. 2020, pg. 1).

There is not a strong direct effect between environmental knowledge and pro-environmental behaviors but it is still one of the main variables that exert its influence on it through environmental attitudes. In order to go from knowledge to action, there needs to be more than just mere consciousness of a problem, there must be emotion tied to it which is where environmental attitudes show up. Factual knowledge is not enough to influence a person's behavior, especially since knowledge about the problem does not guarantee that you will know a solution that applies to your daily life.

We previously saw that Liu et al. (2020) shows that there is a relationship between environmental knowledge and pro-environmental behavior. However, at what ages do people start to develop environmental attitudes. Otto, Evans, Moon, and Kaiser (2019) show that environmental attitude changes from childhood to adulthood but it starts to form from the age of 10. This means that childhood is a very formative time in terms of shaping a person's attitude towards the environment. They might be irregular during those years but they certainly still play a very important role in what eventually goes on to become a person's environmental attitude and behavior.

The main finding is that children between the ages of 7-10 increase their environmental awareness and behavior which then remains the same until they reach 14. From then they decrease until 18 years of age (Otto et al. 2019). However, there did seem to be a difference between a child's environmental attitude and their pro-environmental behavior at different stages of childhood and adolescence. Younger children seemed to have less "social pressure" to act in a pro-environmental manner since they did not fully grasp society's expectations of them. Still, at the moment of gathering data, children had the most contact with their interviewers and engaged the most with them which potentially accounted for a sense of social pressure to behave a certain way. Overall, environmental education is significantly important in children and young adults. Even though environmental attitudes take several years to form and both rise and fall as the years pass, they are essential to the final pro-environmental behavior that an individual will exhibit in their adult life.

Religion is perhaps one of the most influential factors when it comes to beliefs and attitudes towards the world. Different religions take very different approaches to the way that the natural world is seen. For example, Christianity tends to describe the world as the gift given to mankind by God for them to do with it as they will. On the other hand, Buddhism and its belief in the reincarnation of the soul, teaches that no living thing should be harmed since it has a soul. The USA is incredibly diverse religiously in both different religious beliefs, the extent or intensity to which they are followed, and the different denominations within a single religion.

Arbuckle and Konisky (2015) examine the relationship between religiosity, religious group, and environmental attitudes. Individuals that identify as members of Judeo-Christian denominations tend to show less concern about the environment than individuals that do not. But there are also several variations within the Judeo-Christian traditions. For example, evangelical Protestant denominations show less pro-environmental attitudes. Furthermore, the results show that individuals that identify with a religious tradition exhibit a conditioned relationship between religious affiliation and environmental attitudes (Arbuckle and Konisky. 2015). The reason why Judeo-Christian traditions are closely related to a lack of interest in environmentalism is due to the "dominion of the world" point of view, the idea that the world was made to be ruled by men as they see fit.

According to the study, people associated with a Judeo-Christian faith are less likely to make economic sacrifices in favor of environmentalism. "Catholics and Protestants tend to be less concerned about global warming compared with those not affiliating with a religious tradition… By contrast, Jews appear more likely to express concern about climate change compared with those individuals that do not associate with a tradition." (Arbuckle and Konisky. 2015, pg. 1254). This shows how the negative effect that religion has on environmental attitudes is central mostly to Christianity.

Overall, the stronger the biblical teachings, the less interest there is in the environment which is shown by how the negative connection between being Protestant and environmental attitudes tends to be significantly strong in evangelicals (Arbuckle and Konisky. 2015). The paper goes on to show the degree to which religion affects environmental attitudes in relation to political party affiliation and political ideology. It shows that both of these characteristics have a very significant role in determining environmental attitudes and therefore, religion is not the sole cause. Still, it is hard to describe what it is about each religion or denomination that makes some people more likely than others to show less interest in the environment.

2.3. Importance of Patience as a Cultural Variable

Patience is a highly significant variable that relates to several desirable situations such as higher economic growth, income, savings, and pro-

environmental behavior. Godoy, Byron, Reyes-García, Leonard, Patel, Apaza, Pérez, Vadez, and Wilkie (2004) take a look at how patience varies across cultures and on how patience is positively correlated to income, wealth, conservation of natural resources, etc. The paper pulls data by focusing on a test group of 154 Amerindians of varying ages to look at how patience is correlated to modern human capita, personal affluence, and age. The results are then contrasted with western standards and reflect a strong negative correlation between schooling and impatience and a negative correlation between impatience and modern human-capital skills. Therefore, there is a strong negative and significant relationship between years of schooling and impatience, so more years of schooling on average make an individual more patient. (Godoy et al. 2004).

Long-term orientation is the only cultural variable to have been influenced by agriculture and the effects of "long-term investment" that a natural return provides. Galor and Özak (2014) identify the emergence of patience across regions through agriculture. The regions that developed patience had a higher natural return to investment and therefore were more likely to invest in agriculture, a "long-term investment". The study suggests that societies whose ancestors had a higher crop yield have a higher long-term orientation. The "rewarding experience in agricultural investment triggered selection, adaptation, and learning processes which have gradually increased the representation of traits for higher long-term orientation in the population." (Galor and Özak 2014, pg. 3065). The analysis also focuses on second-generation migrants and the crop yield of their parent's country which makes it possible to look at long-term orientation being passed down generations. "Geographical variations in the natural return to agricultural investment generated a persistent effect on the distribution of time preference across societies" (Galor and Özak 2014, pg. 3065).

Howard (2013) focuses on the role of patience in a cost-benefit analysis. It looks at several different variables and how patience is correlated to them. It examines the appropriateness of discount rates based on returns to private investment. The paper aims to test whether individuals discount personal and social benefits at different rates in relation to patience. The results show that individuals discount their personal payments at a much higher rate than charitable contributions. Charitable contributions are an example of a social good much like clean air in a neighborhood. It is a good that benefits society in general and not just the individual, much like most environmental amenities (Howard. 2013).

This is very closely related to Heal (2017), who discussed how different discount rates provide different approaches to environmental policy and a small change in discount rates can be the difference between deciding to make a large investment in protecting the natural world or simply considering it too high a cost. Discount rates are very valuable in guiding cost-benefit analysis on economic policies. The discount rates are the main factor in many environmental policies.

This is because these policies or regulations sustain a cost today in order to benefit or avoid damage in the future. "Examples of environmental policies that exhibit these qualities include carbon mitigation, biodiversity preservation, nuclear waste disposal, and investment in water management" (Howard. 2013, pg. 583).

Patience plays a significant role in economic growth (Hübner and Vannoorenbergh. 2015). This paper shows how patience is important in determining long-run income growth differences between different countries. It does this by looking at language in order to account for endogeneity. It takes a look at how time is encoded in a language to account for a cultural variable, patience. The main findings are that patience is very strongly correlated with high income per capita. In this case, the future tense reference was not the best tool to use. "Due to the already strong correlation of Hofstede's Index of Long-Term Orientation with the geographic controls, the strong FTR variable is not a good instrument for this particular proxy for patience in the full specification" (Hübner and Vannoorenbergh. 2015, pg. 166).

2.4. Existing Literature on Patience and the Natural Environment

Hellman (2020) takes a general view on the impact that patience has in regard to sustainability. It explains how a general sense of urgency is what is often associated with strong environmental attitudes. It goes on to explain how patience plays a more significant role in environmental policy than people might be first inclined to believe. The impact of patience is described as something that has high significance in maintaining long-run interest and change as opposed to simply a rapid sense of urgency. This article points to the question of how exactly does patience influences environmental attitudes, a question that is answered by Cai, Murtazashvili, Murtazashvili, and Salahodjaev (2020).

Several experimental studies have proved that patience or future orientation improves the individual's incentive to cooperate with others (Cai et al. 2020). This paper explores how societies show varying degrees of future orientation which is their level of urgency towards the future, or their patience. Societies that show higher patience are more likely to develop strong environmental attitudes which might come out as a surprise since strong environmental attitudes are often attributed to some sense of urgency. The paper explains why this is and argues that patience leads to strong resilience when faced with climate change. "[the] theory suggests patience will influence the emergence and robustness of institutions to address climate change vulnerability. Addressing climate challenges head-on requires open knowledge and learning systems that facilitate collaborative problem-solving." (Cai et al. 2020, pg. 6). Societies that exhibit higher patience tend to have stronger environmental attitudes and similarly, patient societies tend to invest more in sustainability efforts.

Mavisakalyan, Tarverdi, and Weber (2018) aim to show a correlation between the use of future tense in language to predict environmental behavior.

Languages that use a marked future tense like English or French, make the future seem separate from the present and therefore, "further away" and less significant (Chen. 2013). It appears to be disconnected from the now. Languages that do not have a marked future tense like German speak about future events as if they were in the present (Mavisakalyan et al. 2018). Future tense marking influences the way that an individual behaves in relation to long-term-oriented decisions. As Chen (2013) notes, people that speak languages that do not have a marked future tense are more likely to save money since they do not view the future as something separate but rather as something of equal importance to the present.

Since pro-environmental behavior is generally future-oriented given that the payoffs are not immediately seen, languages that lack a future tense are more likely to exhibit pro-environmental behavior. Mavisakalyan et al. (2018) propose two separate channels that explain the influence that language has on pro-environmental behavior; "a cultural channel via speakers' long-term orientation or a linguistic–cognitive channel via speakers' perception of temporal distance. Both affect agents' intertemporal preference structure such that weak-FTR speakers discount future costs and rewards less than do strong-FTR speakers." (Mavisakalyan et al. 2018, pg. 23). Therefore, suggesting that individuals that speak about the future in the present tense tend to care more about the future as it seems more present in their lives. The study controls for both geographic and historical factors that might affect environmental behavior and do conclude that there is a causal effect between language and environmental behavior.

My contribution to the literature comes by observing patience as a determinant of environmental attitudes. As previously noted, the existing literature tends to focus more on environmental policy rather than attitudes since attitudes tend to be harder to obtain data from. Policy is much easier to measure and it also provides a measured effect that attitudes fail to provide. I argue, however, that attitudes provide the basis for behavior and policy as it was described by Liu et al. (2020). This paper aims to show that there is in fact a strong relationship between patience and environmental attitudes.

3. Data and Methods

3.1. Data for Environmental Attitudes

The dependent variable that will be observed is environmental attitudes, which are the beliefs that a person has regarding the natural environment and how strongly they feel about them. The data comes from the GSS, from the variable *natenvir*. There is a total of 35,416 observations for this variable. It is measured with the answers to the following survey question, "We are faced with many problems in this country [USA], none of which can be solved easily or inexpensively. I am going to name some of these problems, and for each [improving and protecting the environment] l would like you to tell me whether you think we're spending too much money on it, too little money, or about the right amount". This

question aims to measure an individual's willingness to pay for additional environmental quality by asking whether or not they think that the current amount spent is too much, too little, or just right. The question purposefully leaves out the subject that does the spending by using "we are". It does not ask whether the government, environmental organizations, or you personally are spending too much or too little. This way the question feels much more collective and communal.

The answers are coded with "too little", "about right", and "too much" being 1, 2, and 3 respectively. The answers "don't know", "not answered" or "not applicable" will not be used as they don't supply any information. The answer "too little" is the only one that actively demonstrates a pro-environmental attitude since, given the current state of the natural world and its decline in quality and size, there could always be more done. However, we are not discarding the data for "about right" or "too much". I generated an additional variable *envirpay* which takes the value of 4- *natenvir*, therefore, the higher the value in *envirpay* the more an individual believes that we are spending too little in improving and protecting the environment. This new variable shows how pro-environment an individual is. It makes it easier to observe compared to the initial coding for *natenvir* in which a higher value showed less of an interest in the environment.

A second variable will be used in order to examine the results obtained with the initial variable from the GSS data. The data comes from the seventh wave of the WVS from question 111 (*Q111*). There is a total of 67,661 observations for this variable. It is measured with the answers to the following survey question, "Protecting environment vs. Economic growth: Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view? A. Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs B. Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent". This question aims to measure the level of importance that the subject gives to protecting the environment over economic growth.

The answers are coded with "A- protect the environment", "B-economic growth", and "C- other answer" being 1, 2, and 3, respectively. The answers for 3, "other answer" were dropped since they do not provide any meaningful insight". I generated an additional variable *envireco* which takes the value of 1- *Q111*, therefore, the higher the value in *envireco* the more an individual believes that protecting the environment should be a priority over economic growth. This new variable shows how pro-environment an individual is. It makes it easier to observe compared to the initial coding for *Q111*.

By forcing the individual to choose between the two, the question provides an insight into the priorities of the person. It is important to note that an individual's preference for environmental protection over economic growth shows a certain

degree of patience and long-term orientation. This is due to the fact that the returns for environmental protection are not as immediate, as noted in the literature review, as those for economic growth. This will prove to be highly significant in the discussion of the results from Table 5.

Table 1: Summary Statistics GSS DATA

Variable	Obs	Mean	Std. Dev.	Min	Max
envirpay	23,989	-0.4711743	0.6507175	-2	0
patience	23,989	0.3876282	0.3095655	-0.4309163	1.071452
hof_idv	23,869	63.97608	21.53413	20	89
hof_lto	23,869	49.31665	24.21524	9	88
female	23,989	0.5433324	0.4981292	0	1
realinc000	21,943	33.37672	29.59227	0.227	162.607
age	23,907	45.70766	17.43282	18	89
ethnic	23,989	12.452	7.017695	1	35
realinc	21,943	33376.72	29592.27	227	162607
year	23,989	1992.016	13.83619	1973	2018
educ	23,933	13.01981	3.076526	0	20
paeduc	18,245	10.714	4.321566	0	20
maeduc	20,888	10.82052	3.755681	0	20
attend	23,821	3.821754	2.692973	0	8
natenvir	23,989	1.471174	0.6507175	1	3
wrkstat	23,985	3.029685	2.436492	1	8
marital	23,984	2.241411	1.610309	1	5
childs	23,928	1.890463	1.769492	0	8
partyid	23,868	2.763658	2.046202	0	7
relig	23,918	1.896438	1.555384	1	13
race	23,989	1.191588	0.4875241	1	3
region	23,989	4.817583	2.521872	1	9
sei	9,643	49.52401	19.28551	17.1	97.2
sex	23,989	1.543332	0.4981292	1	2
polviews	20,938	4.093657	1.362531	1	7
income	21,830	9.952726	2.807205	1	12
born	20,026	1.086538	0.2811631	1	2
parborn	20,020	1.192258	2.73838	0	8

3.2. Data for Patience

The Independent variable, patience, is defined as the level of tolerance for time in a preference survey. It can be measured as to how willing people are to wait for something when there is a reason not to, the capacity to accept a delay with the promise of something better in the future. It comes from a time preference approach which observes a quantitative question and a qualitative question. The data comes from the GPS and there are 79,730 observations at the individual level and 76 at the country level.

To obtain the value for patience, the answers to the qualitative and quantitative questions from the GPS are combined. The qualitative measure of patience is obtained by having the people that answer the survey rate their "willingness to wait on an 11-point Likert scale". The question being asked is "how willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?". The quantitative data is obtained through what is known as a "staircase" procedure, which is a combination of "hypothetical binary choices between immediate and delayed financial rewards" (Falk et al. 2018, pg. 1654), with five separate entries. This is done by presenting the respondent with the following scenario, "Suppose you were given the choice between receiving a payment today or a payment in 12 months. We will now present to you five situations. The payment today is the same in each of these situations. The payment in 12 months is different in every situation. For each of these situations we would like to know which you would choose". Ideally, the individual must assume that there is no effect of inflation or any other factor that might discount the value of the future payment. Overall, the idea is to make people choose between a small payment now or a larger payment in the future.

The weight that is placed on the qualitative and quantitative approaches are different due to the accuracy as well as the measurement error of the measurements. The staircase method, which measures the intertemporal sequence of choice weighs 0.712 of the final value whereas the self-assessed willingness to wait weighs the remaining 0.288. Given this, the final value is recorded through the equation "Patience = 0.712 × Staircase patience + 0.288 x will. to give up sth. today" (Falk et al. 2018, pg. 1653).

In order to add the variable patience to the master dataset, the edited GSS data, I used the GPS country-level data, which has data for a total of 76 countries, and matched it with the *ethnic* variable in the GSS. There were a few countries for which there was no patience data, or at least, no specific data. For example, for the country of origin Africa, there was no singular value to be matched so I averaged the value of three of the countries located in West Africa for which there was a patience value, Nigeria, Ghana, and Algeria. However, some countries of origin were left without data such as Denmark or Puerto Rico since I could not find a value that would accurately fit them with the least error. Still, most of the countries under

the *ethnic* variable were successfully matched with only a few adjustments made to the data. This left a total of 23,989 observations in the variable for patience.

An alternative for the variable patience was used for Table 3, Hofstede's Long-Term Orientation Variable in order to examine the results in Table 2. This variable shows a country's degree of LTO. A lower value in this index, or a short-term orientation, indicates that the society places traditions in high regard, and they are honored and kept. These countries tend to value individuals that are resolutely firm and unwavering and tend to view societal change with suspicion. On the other hand, societies with a high value in this index, or a long-term orientation, view adaptation and change as necessary. They tend to display pragmatic problem-solving attributes and encourage thrift and "modern education as a way to prepare for the future".

3.3. Control Variables

Several factors can account for environmental attitudes apart from country-level patience. The control variables used account for several demographic components, for example, gender, age, the year the survey was taken, race, and religion. Women tend to be more pro-environment than men, I generated a dummy variable *female* which takes the value of 1 when the respondent is female and 0 otherwise in order to ease the interpretation of the coefficients. Younger generations also show more active environmental attitudes than their older counterparts. Religion is a very important aspect of the life of many people which makes it an important determinant of an individual's attitudes towards the natural world. I control for both religious preference and how often they attend religious services (*relig* and *attend*) which shows how devoted the person actually is. Marital status and the number of children in a household can drastically alter the priorities of a person which is why I have controlled for both of these variables.

There is a lot of discussion on the effect that economic development has on the environment. For this, I am incorporating real income (as well as real income in thousands *realinc000*), labor force status (*wrkstat*), total family income, and the respondent's socio-economic index (*sei*). These variables will account for individual economic development. For this reason, I also control for regional fixed effects such as regional income. Another aspect of development can be considered to be education which is why I control for the level of education and the parent's level of education (*paeduc* and *maeduc*).

In our current society, political views and affiliations have proved to control the way that many people view global issues including climate change and our impact on the natural world. For this I use political views (*partyid*) and whether the respondent views himself as liberal or conservative (*polviews*). The country of birth of the respondent and their parents (*born* and *parborn*) is controlled for since it can show inherited values. Lastly, Hofstede's individualism measure was also added as a control in order to account for the omitted variable bias generated.

Table 2: Summary Statistics WVS DATA

Variable	Obs	Mean	Std. Dev.	Min	Max
envireco	41,050	-0.4011449	0.4901362	-1	0
memberenvir	44,202	0.2057599	0.5341998	0	2
patience	44,882	-0.0638328	0.3431879	-0.6125203	1.071452
female	44,882	0.5229268	0.4994797	0	1
age	44,751	42.76852	16.58635	16	103
child	44,355	1.842904	1.800591	0	24
educ	44,882	3.378348	2.068975	0	8
homepop	44,682	3.993957	2.297449	1	63
marital	44,664	2.636575	2.119226	1	6
incomescale	43,618	4.710257	2.124677	1	10
incomeinde~I	44,209	0.7624878	0.1110587	0.496	0.967
lnGDPpercap	42,664	9.75778	0.7830359	7.950132	11.72776
GDPpercap2	42,664	23561.73	20484.15	2835.95	123965.3
co2percap	44,807	5.037021	4.31003	0.53	15.54
relig	44,063	3.049747	2.482845	0	9
countrybirth	44,882	442.6319	256.328	4	862
electdemoc~x	43,544	0.5462138	0.2224314	0.166	0.873
v2x_polyar~y	43,544	0.5462138	0.2224314	0.166	0.873
employment	44,388	3.235762	2.050041	1	8
ethnic	38,141	331201.3	293947.9	1	840005
happiness	44,600	1.842018	0.7193572	1	4
dgi	43,516	0.944494	0.0645471	0.747	1.015
regionWB	44,882	5.170202	1.579435	1	7
attend	44,336	3.856527	2.065753	1	7
hdi	44,209	0.7693314	0.1043882	0.534	0.939
imp_democr	43,923	8.279375	2.218603	1	10
thrift	44,175	1.710968	0.4533181	1	2
unselfish	44,131	1.725001	0.4465191	1	2
lifeexpect	44,161	75.02837	5.432265	54.33	84.93
rightwing	14,910	5.026238	1.784265	0	10
conservative	15,293	6.079318	2.376756	1	10
Trade	37,443	65.51294	39.55128	28.98	352.82
years	44,882	2018.113	0.8844816	2017	2020

Patience is highly correlated with individualism and therefore the results for patience would be biased without it. The control variable for individualism was matched using the *ethnic* variable and it is called *hof_idv*.

In Table 5, I incorporate the WVS data instead of the GSS. The control variables used differ to a certain extent. The same basic controls are included; age, gender, number of children (*child*), number of people in the household (*homepop*), level of education (*educ*), marital status, employment status, religion, ethnicity, and regional fixed effects. The new controls were added due to their availability in the WVS dataset and their usage in the existing literature.

Table 5 includes a control for Income Index (*incomeindexHDI*) given that there was no variable for real income. CO_2 emissions in metric tons per capita were also controlled for (*co2percap*) as greater CO_2 emissions suggest less strict environmental policy and regulations which can, in turn, foment a more tolerant mindset towards individuals that display weak or no environmental attitudes. Economic development, measured by GDP per capita (*lnGDPpercap*) is also controlled for as it accounts for the relationship between economic growth and patience. The variable takes the natural logarithm of the variable *GDPpercap2* which measures the GDP in terms of the base period 2017 in US dollars in order to ease the interpretation of the coefficients. Trade is another additional control variable. More trade can raise awareness of the importance of combating climate change but it can also weaken environmental standards as noted by Cai et al (2020). I have included a control variable *Trade* which measures Trade as a percentage of GDP.

The literature also suggests a strong relationship between the presence of democracy and action against climate change. It has been demonstrated that democracy tends to have a positive effect on environmental attitudes. For this, I have included the variables *imp_democr* and *electdemocracyidx* which measure the importance of democracy on a 1 to 10 scale, with 10 being absolutely important, and the electoral democracy index respectively. Lastly, in order to account for political party affiliation, I have included the control variables *rightwing* and *conservative* which were renamed from the WVS. The variable *rightwing* measures if the subject's political party is leftwing or rightwing in a range from 0 being leftwing to 10 being rightwing in their economic values. Similarly, the variable *conservative* measures if the party is liberal (0) or conservative (10) in their social values.

3.4. Model Specifications and the Empirical Model

In order to estimate the relationship between patience and environmental attitudes for the baseline regression I will be using the following model:

$$ENVIR_i = \beta_0 + \beta_1 Patience_i + \beta X + \varepsilon_i$$

$$ENVIR_i = -0.569 - 0.0933 Patience_i + \beta X + \varepsilon_i$$

Where *ENVIR* is the measure of environmental attitudes, *patience* is the measure of patience or LTO, and *X* is the measure of control variables that have been used. The key coefficient of interest is the coefficient on patience with respect to the variable *ENVIR.* This variable shows an individual's willingness to spend in the protection of the natural environment or how it prioritizes protecting the environment over economic growth. As patience increases, environmental attitudes are expected to increase on average holding other things constant as shown in the hypothesis.

The control variables used account for several demographic components for the baseline regression on Model 1. They include gender, age, the year the survey was taken, race, number of children, highest year of school completed, real income in thousands of dollars, and the categorical variables marital status, region, and work status. In Models 2 through 6, I include the categorical variables race, religion political party affiliation, political views which show whether the subject identifies as a liberal or conservative, and finally Hofstede's individualism measure.

The initial results lead to the addition of Hofstede's LTO which is included to supply an alternative variable for patience. A similar thing was done with the variable for environmental attitudes by employing the data from the WVS as opposed to the initial GSS data.

4. Results

4.1. Main Results- GSS Patience Data

The main results are presented in the regression Table 2. Model 1 shows the baseline regression between patience and environmental attitudes. The results are not consistent with the initial hypothesis that individuals that exhibit higher levels of patience tend to have stronger pro-environmental attitudes. The coefficient for patience is negative and highly significant and it is relatively large in comparison to the remaining coefficients. The coefficients on the control variables are all highly significant and do support the literature associated with them and environmental attitudes. The coefficient on the dummy variable *female* is significantly and positively associated with *envirpay* as we know that women tend to have stronger pro-environmental views than men. Similarly, the coefficient on education is positive and significant in agreement with the existing literature as it shows that higher levels of education are associated with stronger environmental attitudes.

On the other hand, the coefficient on age is negative as younger generations tend to show more active environmental attitudes than their older counterparts. The number of children is significantly and negatively associated with *envirpay* which seems understandable as values shift in a household when there are more children to support since more money must be spent on them which can potentially leave little for the natural environment.

Table 3: Results Patience

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
envirpay						
patience	-0.0837***	-0.0680***	-0.0662***	-0.0578***	-0.0169	-0.0692***
	(-5.825)	(-4.153)	(-4.410)	(-3.806)	(-1.166)	(-3.653)
year	0.00160***	0.00167***	0.00130***	0.00226***	0.00210***	0.00154***
	(4.799)	(4.966)	(3.835)	(6.397)	(6.355)	(4.593)
age	-0.00752***	-0.00752***	-0.00744***	-0.00692***	-0.00741***	-0.00749***
	(-20.46)	(-20.41)	(-20.14)	(-17.70)	(-20.21)	(-20.22)
female	0.0600***	0.0597***	0.0658***	0.0502***	0.0530***	0.0605***
	(6.307)	(6.277)	(6.895)	(5.007)	(5.631)	(6.344)
childs	-0.00888***	-0.00979***	-0.00741***	-0.00666**	-0.00916***	-0.00933***
	(-3.113)	(-3.411)	(-2.596)	(-2.197)	(-3.252)	(-3.248)
educ	0.0139***	0.0139***	0.0129***	0.0110***	0.0154***	0.0140***
	(8.673)	(8.640)	(7.991)	(6.380)	(9.670)	(8.649)
realinc000	-0.000610***	-0.000583***	-0.000686***	-0.000549***	-0.000287*	-0.000588***
	(-3.704)	(-3.538)	(-4.160)	(-3.155)	(-1.758)	(-3.550)
Constant	-3.379***	-3.535***	-2.832***	-4.526***	-4.322***	-3.247***
	(-5.154)	(-5.329)	(-4.223)	(-6.494)	(-6.633)	(-4.908)
Observations	21,824	21,824	21,783	19,138	21,752	21,712
R-squared	0.062	0.063	0.066	0.093	0.090	0.062
Region FE	YES	YES	YES	YES	YES	YES
Marital FE	YES	YES	YES	YES	YES	YES
Wrkstat FE	YES	YES	YES	YES	YES	YES
Race FE		YES				
hof_idv FE						YES
partyid FE					YES	
polviews FE				YES		
relig FE			YES			

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficient on real income was significant and negative but relatively smaller than the others but this is mainly since the variable is measured in thousands of dollars. On Model 1, I also controlled for several demographic controls including region, marital status, and work status. Marital status was added because marital status, just like the number of children in a household, can drastically alter the priorities of an individual. Labor force status is closely tied to real income since individuals that are employed full-time tend to have a higher real income than people that are unemployed or still at school on average. Lastly, the baseline regression controls for regional fixed effects. These controls remain in Models 1-6.

In Model 2, I add the categorical variable for race of the respondent and find that the coefficient for patience is negative and highly significant. This is consistent with the value of the baseline regression. Model 3 looks at religion and much like race, it does not change the coefficient for patience by much. The coefficient on patience remains negative and highly significant.

Model 4 controls for political views and it shows the effect of political views which range from extremely liberal to extremely conservative. The coefficient on patience remains very consistently significant and negative. Model 5 shows the most drastic change in the coefficient for patience as it adds the variable for political party affiliation. The coefficient is still negative but much less significant. The political climate can prove to be quite divisive in terms of environmental policy when examining the views of republicans and democrats. This makes the coefficient on patience decrease notably and it no longer is highly significant.

Nevertheless, the reason why the coefficient on patience might be negative directly opposing the existing literature could be due to omitted variable bias caused by individualism. In Model 6, Hofstede's measure for individualism is controlled. However, the coefficient for patience remains largely unchanged. It remains negative and highly significant which leads to the assumption that there is an inconsistency arising from the dependent or independent variables. This is the reason why further research is done in Tables 3 and 5.

To sum up, the results for patience did not support the initial hypothesis but they still answer the research question since it supports that there is a negative but significant relationship between levels of patience and an individual's environmental attitudes. Overall, the results from Table 2 show a negative relationship which remains consistent when accounting for several different additional variables including Hofstede's individualism measure.

4.2. Robustness- Hofstede's Long-Term Orientation (LTO)

The results presented on the regression Table 3 show the correlation between Hofstede's Long-Term Orientation measure and the GSS variable for environmental attitudes *envirpay*. The initial GSS measure for patience was replaced in this regression for Hofstede's LTO (*hof_lto*) in order to attempt to obtain a positive coefficient on the variable for patience. Model 1, the baseline

regression includes the same controls as Table 2. They include gender, age, the year the survey was taken, race, number of children, highest year of school completed, real income in thousands of dollars, and the categorical variables marital status, region, and work status. Models 2-6 also contain the same additional controls which are race, religion, political views, political affiliation, and Hofstede's individualism respectively.

In this regression, the coefficient for LTO is much smaller than the one previously shown for patience in Table 2. However, once again in opposition to the hypothesis, the coefficient is negative and highly significant throughout most of the models. On the baseline Model 1, the coefficient is negative and highly significant but relatively small in comparison to the other coefficients. Once the control for race fixed effects is added on Model 2, the coefficient for patience decreases in significance to only significant to the 5 percent level. Model 3 controls for religious preference and, much like in Table 2, the coefficient for patience is negative and significant. Model 4 remains consistent with the results on the baseline regression and in Table 2 by controlling for political views and showing a negative and highly significant coefficient for patience. This is in direct contrast to Model 5 which contains the most distinct results since after controlling for *partyid* the coefficient for patience remains negative but is no longer significant at all. Lastly, Model 6 controls for Hofstede's measure of individualism in an attempt to show a positive relationship between patience and environmental attitudes. However, the coefficient for patience remains negative and highly significant even after controlling for individualism.

To sum up, once again the results for LTO did not support the initial hypothesis. There seems to be no clear difference in results between the measure for patience shown in Table 2 and Hofstede's LTO shown in Table 3. Overall, the results from Table 2 show a negative relationship which remains consistent when accounting for several different additional variables including Hofstede's individualism measure. This leads to further research done in Table 5.

4.3. Additional Results- WVS Patience

The results in Table 5 show patience regressed against the WVS variable for environmental attitudes (*envireco*) in order to provide an additional take on the hypothesis and observe if patience has a positive and significant relationship to environmental attitudes. Model 1 shows the baseline regression between patience and environmental attitudes. It controls for age, gender, number of children, number of people living in the household, education, income, marital status, region, and employment status. The coefficient for patience is positive and highly significant to the 1% level. These results support the hypothesis that patience positively affects environmental attitudes. After running a robustness check, the coefficient remains positive and significant throughout most of the models.

Table 4: Results Hofstede's Long-Term Orientation

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
envirpay						
hof_lto	-0.000798***	-0.000431**	-0.000912***	-0.000567***	-9.99e-05	-0.000597***
	(-4.488)	(-2.100)	(-5.105)	(-3.015)	(-0.559)	(-3.021)
year	0.00165***	0.00170***	0.00124***	0.00226***	0.00204***	0.00153***
	(5.055)	(5.118)	(3.728)	(6.556)	(6.308)	(4.634)
age	-0.00747***	-0.00745***	-0.00732***	-0.00683***	-0.00730***	-0.00741***
	(-20.69)	(-20.58)	(-20.18)	(-17.79)	(-20.24)	(-20.32)
female	0.0586***	0.0587***	0.0647***	0.0496***	0.0522***	0.0601***
	(6.267)	(6.276)	(6.906)	(5.034)	(5.641)	(6.393)
childs	-0.0104***	-0.0112***	-0.00929***	-0.00810***	-0.0105***	-0.0108***
	(-3.697)	(-3.966)	(-3.310)	(-2.717)	(-3.799)	(-3.812)
educ	0.0133***	0.0132***	0.0124***	0.0106***	0.0151***	0.0138***
	(8.423)	(8.381)	(7.857)	(6.282)	(9.637)	(8.688)
realinc000	-0.000540***	-0.000514***	-0.000614***	-0.000486***	-0.000229	-0.000532***
	(-3.319)	(-3.157)	(-3.776)	(-2.825)	(-1.421)	(-3.259)
Constant	-3.468***	-3.582***	-2.698***	-4.526***	-4.205***	-3.207***
	(-5.393)	(-5.482)	(-4.101)	(-6.627)	(-6.581)	(-4.906)
Observations	22,661	22,661	22,619	19,842	22,582	22,411
R-squared	0.061	0.062	0.066	0.093	0.089	0.062
Region FE	YES	YES	YES	YES	YES	YES
Marital FE	YES	YES	YES	YES	YES	YES
Wrkstat FE	YES	YES	YES	YES	YES	YES
Race FE		YES				
hof_idv FE						YES
partyid FE					YES	
polviews FE				YES		
relig FE			YES			

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Model 2 controls for CO_2 per capita and its coefficient is negative and highly significant which suggests that countries that have higher CO_2 emissions per capita, exabit lesser environmental attitudes which is consistent with the existing literature. Model 3 adds GDP per capita as a control and the coefficient is negative and highly significant. The coefficient for patience doubles in comparison to the baseline regression and it remains positive and highly significant. Model 4 controls for trade and the coefficient is negative and highly significant but also relatively small in comparison to the other coefficients. Model 5 controls for the importance of democracy and the coefficient is positive and highly significant. The coefficient for patience changes by a very insignificant amount from the baseline regression.

Model 6 on the continuation for Table 5 controls for the electoral democracy index and the coefficient is positive and significant which suggests that more democratic countries exhibit more pro-environmental attitudes. Models 7 and 8 control for political party, especially whether it is rightwing or leftwing and whether it is conservative or liberal respectively. Both coefficients are negative and highly significant which suggests that the more rightwing and conservative the individual identifies as, the less environmental attitudes that they will manifest. The results are also important because the coefficient for patience increases significantly for Models 7 and 8. Still, there are fewer observations for these two models which might account for the discrepancy. The last Models, 9 and 10, control for ethnic and religion fixed effects respectively. For Model 9 the coefficient for patience turns negative and becomes completely insignificant. Similarly, Model 10 has a positive but completely insignificant coefficient for patience.

To sum up, the results for patience in Table 5 did support the initial hypothesis by showing that there is a positive and mostly significant relationship between levels of patience and an individual's environmental attitudes. Overall, the results from Table 5 show a positive relationship that remains consistent when accounting for several different additional variables including CO_2 emissions per capita, GDP per capita, trade, democracy, etc.

This shows that the initial GSS variable used to measure environmental attitudes were not the most optimal choice to measure this variable. The variable used from the WVS which measures environmental protection against economic growth did show a positive coefficient for patience in the final regression which is what the existing literature suggested and the hypothesis proposed.

Table 5: WVS Results

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
envireco					
patience	0.0464***	0.0719***	0.0831***	0.0848***	0.0427***
	(3.902)	(5.709)	(6.658)	(6.749)	(3.585)
age	-0.00100***	-0.000980***	-0.00108***	-0.00116***	-0.00125***
	(-4.261)	(-4.171)	(-4.505)	(-4.487)	(-5.268)
female	0.00278	0.00444	0.00214	0.000175	0.00407
	(0.502)	(0.800)	(0.377)	(0.0289)	(0.730)
child	-0.000719	-0.000794	-0.000333	0.000955	-0.000728
	(-0.395)	(-0.436)	(-0.181)	(0.477)	(-0.398)
homepop	-0.00655***	-0.00712***	-0.00587***	-0.00489***	-0.00621***
	(-5.083)	(-5.516)	(-4.485)	(-3.387)	(-4.805)
educ	0.0186***	0.0202***	0.0183***	0.0174***	0.0168***
	(13.79)	(14.70)	(13.17)	(11.85)	(12.34)
incomeindexHDI	-0.228***	-0.0751	0.220	-0.384***	-0.251***
	(-5.452)	(-1.541)	(1.370)	(-8.472)	(-5.968)
co2percap		-0.00782***			
		(-6.090)			
lnGDPpercap			-0.113***		
			(-4.226)		
Trade				-0.000728***	
				(-9.842)	
imp_democr					0.0174***
					(15.66)
Constant	-0.436***	-0.518***	0.267*	-0.289***	-0.552***
	(-12.87)	(-14.22)	(1.888)	(-8.934)	(-15.91)
Observations	39,287	39,287	37,264	33,067	38,721
R-squared	0.033	0.034	0.040	0.041	0.039
Region FE	YES	YES	YES	YES	YES
Marital FE	YES	YES	YES	YES	YES
Employment FE	YES	YES	YES	YES	YES

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: WVS Results continued

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Model 6	Model 7	Model 8	Model 9	Model 10
envireco					
patience	0.0494***	0.205***	0.142***	-0.00172	0.00727
	(4.087)	(8.588)	(5.895)	(-0.0567)	(0.538)
age	-0.00112***	-0.000215	-0.000476	-0.000604**	-0.000575**
	(-4.717)	(-0.530)	(-1.181)	(-2.369)	(-2.412)
female	0.00124	-0.000899	0.000719	0.00461	0.00819
	(0.222)	(-0.0940)	(0.0760)	(0.778)	(1.462)
child	-0.000920	-0.00698**	-0.00605**	-0.00250	-0.00203
	(-0.503)	(-2.279)	(-1.985)	(-1.265)	(-1.108)
homepop	-0.00654***	-0.000439	-0.00141	-0.00314**	-0.00655***
	(-5.072)	(-0.211)	(-0.677)	(-2.281)	(-5.052)
educ	0.0199***	0.0169***	0.0193***	0.0238***	0.0197***
	(14.62)	(7.540)	(8.674)	(15.36)	(14.49)
incomeindexHDI	-0.463***	-1.086***	-0.913***	1.349***	-0.293***
	(-10.14)	(-9.459)	(-8.041)	(10.58)	(-6.630)
electdemocracyidx	0.107***				
	(6.809)				
rightwing		-0.0298***			
		(-12.29)			
conservative			-0.0191***		
			(-9.994)		
Constant	-0.352***	0.224***	0.0908	-1.476***	-0.409***
	(-10.24)	(2.798)	(1.180)	(-15.99)	(-11.06)
Observations	38,668	13,609	13,958	33,562	38,666
R-squared	0.037	0.054	0.048	0.069	0.039
Region FE	YES	YES	YES	YES	YES
Marital FE	YES	YES	YES	YES	YES
Employment FE	YES	YES	YES		YES
relig FE					YES
Ethnic FE				YES	

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

In brief, measuring environmental attitudes is hard due to the nature of preference data. Nevertheless, the final results do support the hypothesis by demonstrating that there is a positive and significant relationship between patience and environmental attitudes. Initially, the data from the GSS was used to provide the variable for environmental attitudes, however, after regressing it against the GPS value for patience, the coefficient was significant and negative. It remained that way even after controlling for Hofstede's measure of individualism and after replacing patience with Hofstede's long-term orientation. Additional research needs to be done in order to correctly measure and regress environmental attitudes.

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