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A Survey on Climate Change: How Beliefs Shape Responsibility

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A Survey on Climate Change: How Beliefs Shape Responsibility

Abstract

This paper examines the lack of awareness and feelings of personal responsibility for climate change. Previous literature suggests that while part of the United States population may be aware of climate change, they do not feel personally responsible for causing it despite feeling climate change's effects just like everyone else. Furthermore, studies suggest that individuals also do not believe climate change will affect them now, but rather it is an issue for future generations. Using a survey, we examine which demographics and personal factors are most important in eliciting awareness for climate change, and furthermore, personal responsibility for its effects. Finally, we examine how an individual's beliefs regarding the effects and cause of climate change shape their sense of awareness and responsibility. Results show that for this sample, respondents take more responsibility for climate change if they believe climate change will impact them in the near future or was caused by human; respondents take less responsibility if they are "riskier" or older. These results have broader implications since those who feel responsible for climate change often take more action than those who do not. Our study supports previous research, adds onto it, and leaves the groundwork to conduct choice experiments to determine willingness to pay to stop climate change.

Keywords

climate change; beliefs; responsibility; economics

Cover Page Footnote

We would like to thank Assistant Professor of Economics at Colby College, Sahan Dissanayake for his support and guidance during this project, as well as students in EC476 for suggestions and feedback. We would also like to thank students of Colby College's EC231 and EC476 classes for conducting our survey.

I. Introduction

Despite the antics of many policy makers, economists, and journalists, climate change is not a new phenomenon. In fact, Earth's climate has changed many times throughout our planet's relatively young history. In the last 650,000 years there have been seven cycles of climate change, which can formally be defined as the encompassing process of glacial advance and retreat (T.C. Peterson 2009). The last climate change ended 7,000 years ago, finalizing the last "ice age" and marking the beginning of the modern climate era and human civilization. While climate change is cyclical and an innate process to Earth, the current warming trends our planet faces now are not. Rather in the past 1,300 years, the amount of global warming (climate change) is proceeding at an unprecedented rate (T.C. Peterson 2009). The exact cause for this deviation from Earth's regular, homeostatic cycle can readily be attributed to the heat-trapping nature of carbon dioxide and other gases that have become more abundant in our atmosphere than normal. While the media and corporations who stand to lose revenues from accepting climate change may paint a highly uncertain scientific consensus on climate change, this is far from the truth (Kellstedt et al. 2008). As the Intergovernmental Panel on Climate Change (IPCC) proclaims, "Scientific evidence for warming of the climate system is unequivocal" (Oreskes 2004).

The visual and tangible evidence for climate change is compelling. Global sea levels have risen 17 centimeters (6.7 inches) in the past century, a rate that has doubled in the last decade; glaciers are retreating in the Alps, Himalayas, Andes, and Rocky Mountain ranges; the number of recorded high temperature extreme weather events has increased considerably since the 1950's; and most of all, global temperatures have continued to rise: ten of the warmest years since 1880 have been in the past twelve years, even in the face of an unusually deep solar minimum from 2007-2009 (Allison et al. 2009). Not only does climate change pass the eye test, but so too through computer models and the scrutinous scientific process. Accurate models have confirmed that climate change is occurring and faster than natural, cyclical processes intend for (Houghton 1995).

Naturally when a problem arises, an instigator should be sought out for its cause. After shuffling around the truth for many years, the scientific community has come to a firm understanding that we are to blame. That the human beings who inhabit this planet, use its resources, and live day in and day out are unequivocally responsible for the current global climate change trends. Obviously when the general population was accused of this, many fired back with harsher

accusations. But the scientific community stands firm and in consensus. The IPCC explicitly states “Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy. ... Most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations” (Oreskes 2004). And the IPCC is not alone in its conclusions. The National Academy of Sciences, the American Meteorological Society, the American Geophysical Union, and the American Association for the Advancement of Science all have issued statements in recent years concluding that the evidence for human activities modifying Earth’s climate is compelling.

To further demonstrate scientific consensus, 928 abstracts published in refereed scientific journals between 1993 and 2003 and listed in the ISI database with the keywords “climate change” were analyzed. Of those papers, 75% either explicitly or implicitly accepted the human processes theory of accelerated climate change, while 25% took no position; none of these papers disagreed with the human processes position (Oreskes 2004). Despite the overwhelming evidence, the general public believes climate change to be a moderate risk issue at best (Leiserowitz 2006). Politicians place climate change low on their agendas and comedians mock those who believe in climate change. But why does our population refuse to listen to the potentially life threatening presence of climate change?

This paper examines the lack of awareness and feelings of personal responsibility for climate change. Using a survey, we examine the demographics and personal factors most important in eliciting awareness for climate change, and furthermore, personal responsibility for its effects. Finally, we examine how an individual's’ beliefs regarding the effects and cause of climate change shape their sense of awareness and responsibility. Results show that for this sample, particular demographics, the timeframe of when the impacts will accrue to the respondents, the differences between when respondents will feel impacts personally and when others will, and the likelihood of severe weather being caused by climate change are significant in determining if an individual feels responsible for climate change. These results have broader implications since those who feel responsible for climate change often take more action than those who do not. While the sample of respondents limits the applicability of our study, further studies may be used to target campaigns for awareness and education of climate change. Hopefully, this will increase the total number of individuals who

feel responsible for the effects of climate change and cause more people to take action.

II. Literature Review

A multitude of studies have examined individuals' knowledge and beliefs regarding climate change. Kellstedt et. al (2008) were compelled to study climate change preferences because despite the increase in scientific consensus regarding climate change, the media portrays climate change as a debate. While media portrayal of climate change being skewed was common knowledge, Kellstedt et. al conducted a survey to look more closely at public informedness along with confidence in scientists and personal efficacy. Interestingly enough, the analysis of this survey shows that with an increase in knowledge or "informedness" regarding climate change, individuals felt less responsible and showed less concern for the issue. This paradox led us to consider the role of responsibility in risk perception and beliefs regarding climate change in the United States.

Climate change is associated with abstract images and because of this, utility maximizing individuals are unable to absorb how dangerous it is (Leiserowitz 2006). Despite high awareness, climate change remains a low priority issue in the United States (Leiserowitz 2005). The fact that climate change remains so low on the United States' political agenda may speak to the fact that America is in a wishful thinking state (Leiserowitz 2006). This means that because Americans' cannot always see the impacts of climate change, they believe it is irrelevant to them to try and fix it. Furthermore, Americans' believe that the impacts of climate change accrue to others and occur far in the future (Leiserowitz 2005). Because of this, individuals adopt the mindset that climate change is "not their problem" and because the effects of climate change currently aren't drastic enough to illicit feelings of concern or responsibility in the United States, people refrain from action.

Public risk perceptions shape the type of action, political, social or economic that is taken and therefore are imperative to mitigating the effects of climate change (Leiserowitz 2005). Due to the standing of climate change in the United States as a moderate risk issue, it remains low on our national environmental priority list. Global warming was ranked twelfth out of thirteen national environmental issues faced by Americans (Dunlap and Saad 2001 as cited by Leiserowitz 2006). Leiserowitz notes that despite being concerned and

aware of climate change, Americans deem climate change less important than nearly all other environmental issues facing our nation.

We believe that United States' citizens lack of responsibility for climate change on the individual level contributes to the low/moderate priority nature of this issue within the country. Because of this we decided to create a study based on Leiserowitz' (2014) study conducted as a part of the Yale Project on Climate Change Communication which looks at beliefs, attitudes, risk perception and values regarding climate change. In order to adapt their survey for our research, we chose to include factors such as responsibility, who will be impacted the most heavily by climate change and beliefs on some of the likely impacts of climate change. Our study aims to provide the data necessary to assess how various beliefs regarding climate change, and the perceived risks of climate change, shape one's sense of responsibility for the issue. This will contribute to the existing literature by determining whether or not personal responsibility is a critical element in raising the perceived risk of climate change in the United States.

III. Respondent Characteristics and Initial Findings

In order to test our research question, we formulated a survey that would capture beliefs on climate change, its causes, impacts, and potential solutions, as well as demographic information. Questions about beliefs on climate change covered respondents' familiarity to the issue and how serious they felt climate change was to themselves, the United States, and their community. The section on beliefs about climate change's causes, impacts, and solutions sought respondents' beliefs of if climate change was caused by natural or human processes, what contributes to causing climate change, which factor impacted climate change the most, and if they felt personally responsible for causing climate change. Finally, the survey was rounded out with demographic questions about risk preference, education, employment, gender, age, income bracket, political views, and risk preferences. Surveys to collect data were administered by members of Colby College Economics classes EC231 and EC476 during the last week of March 2015 and first week of April 2015. Surveys were taken at locations ranging from Austin, Texas to Washington D.C. to right here at Colby College, with all occurring in the time range from 8am to 11pm (local time). In total, we collected 345 responses, which had significant demographic trends.

The gender distribution of our respondents was fairly equal with 54% identifying as male and 46% of respondents identifying as female (Figure 1).

However, most of these respondents were undergraduate and graduate college students aged 18-25. The only other sizable age demographic in our respondent pool was ages 50-59, most likely representing parents of the surveyors from Colby College classes EC231 and EC476 (Figure 2).

Figure 1

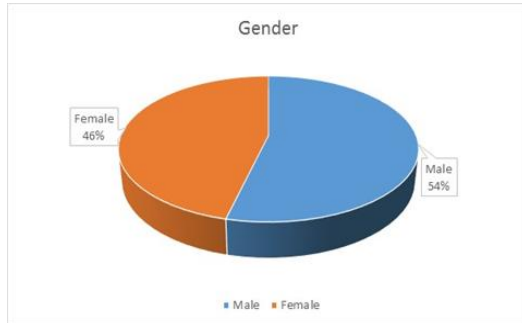
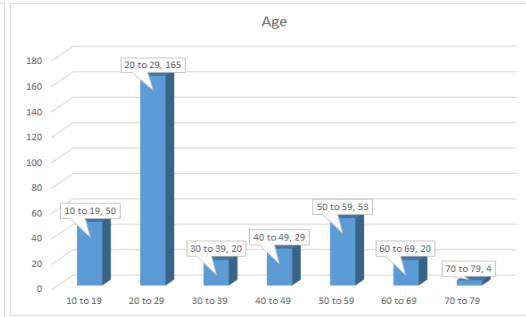


Figure 2



The age distribution of our sample could explain a highly educated and employed pool. Approximately 51% of respondents reported having a Bachelor's, Graduate, or Professional Degree; another 42% responded with only having a high school degree, however this statistic most likely contains the large number of college aged students who are highly educated but still currently enrolled in school (Figure 3). In terms of employment, only 4 respondents are unemployed meaning that nearly 98% of our sample is either a student or working part or full-time (Figure 4).

Figure 3

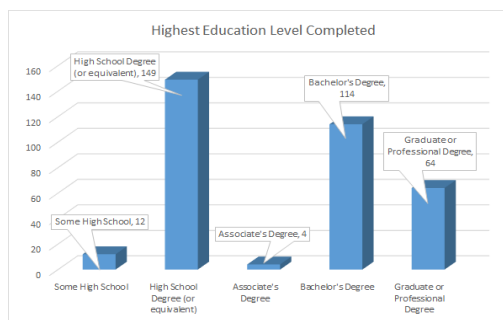
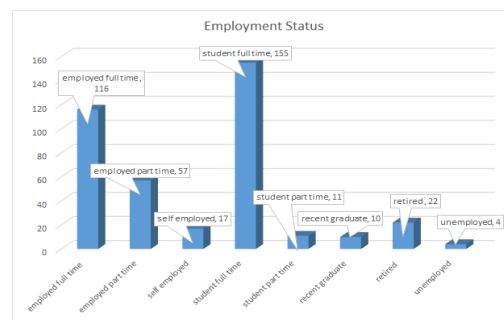


Figure 4



Not only does our sample represent the upper echelon of education and employment in society, but they also represent the top of wealth in the United States. 166 respondents characterized their approximate household income as equal to or greater than \$100,000 (Figure 5). This statistic most likely is inflated with the household incomes of parents from Colby College surveyors. Nevertheless, this statistic further demonstrates the affluence of our sample, which should be taken into account when analyzing our data and thinking about applying this proportion to the greater United States population.

The two final demographics complement each other well. Figure 6 shows political views ranging from Very Liberal to Very Conservative. This distribution is skewed slightly right, centering between moderate and very liberal. Figure 7 shows risk preferences. This distribution is skewed right, centering on a sample that identifies as particularly risky. These demographics mirror each other well as more liberal respondents usually have riskier mindsets (Carney 2008).

Figure 5

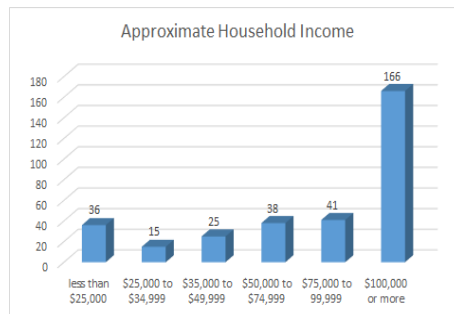


Figure 6

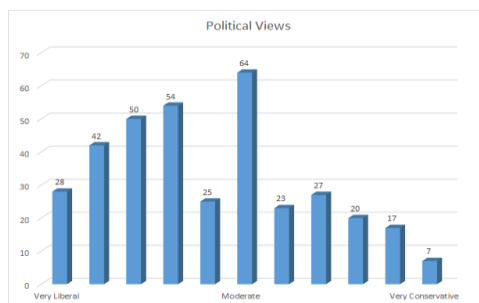
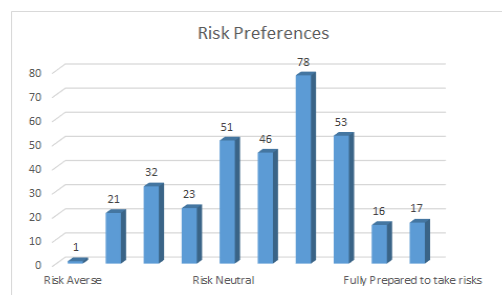


Figure 7



The demographic characteristics of our sample lead well into initial findings on respondents' beliefs about climate change. From our raw data, we find that respondents are extremely aware of climate change. In fact only, 5% of respondents declared they were not familiar with the issue of climate change (Figure 8). Furthermore, 87% of respondents accurately believe that climate change is changing, regardless of the cause (Figure 9). However when quantifying how familiar respondents are with climate change, only 39% identify as having expert or very high familiarity while 47% claim to have moderate levels of familiarity (Figure 10). So while many understand climate change on the surface, many do not feel they are truly educated on the issue.

Figure 8

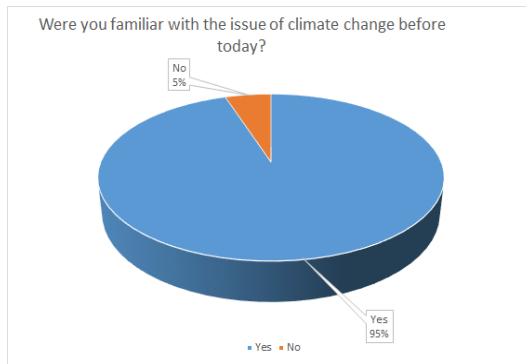


Figure 9

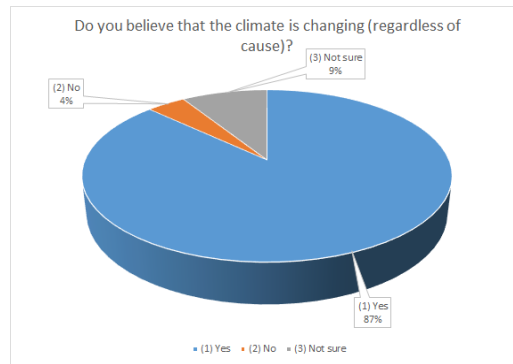
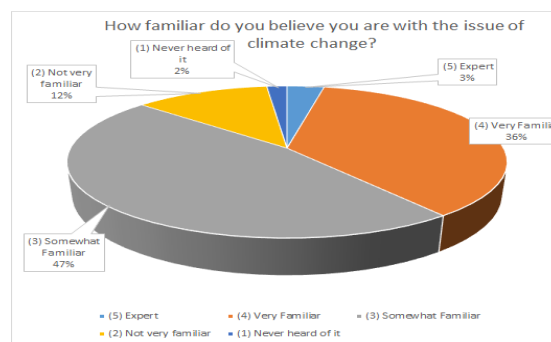


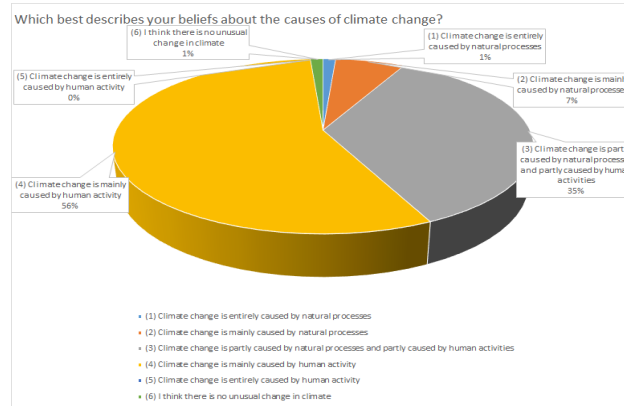
Figure 10



Despite not feeling informed about climate change to the point of calling oneself an expert or very familiar, nearly all respondents correctly believe that human activity is responsible for the rapid increase of climate change effects; 56% of respondents feel climate change is mainly caused by human activity and

another 35% believe climate change is partly caused by natural processes and partly caused by human activities (Figure 11). While this last group is not completely correct in their beliefs, they are correct in realizing natural processes are not the only factor contributing to the effects of modern climate change.

Figure 11



Correct sentiments on climate change can further be seen in respondents' beliefs on the causes of climate change. When asked to rank the extent to which harsher winters, higher temperatures, extreme weather, and other factors shown below would be caused by climate change, respondents felt that climate change would be likely to very likely in causing those factors (Figures 12-22). This data demonstrates that although respondents may not believe they are completely informed about climate change, they have internalized its effects.

Figure 12

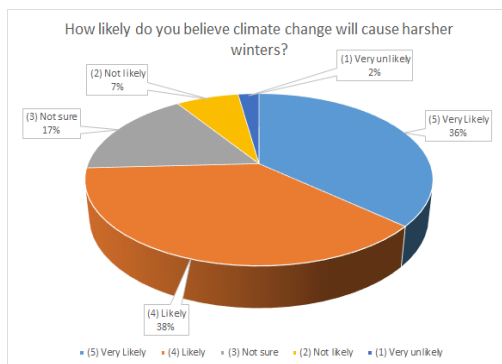


Figure 13

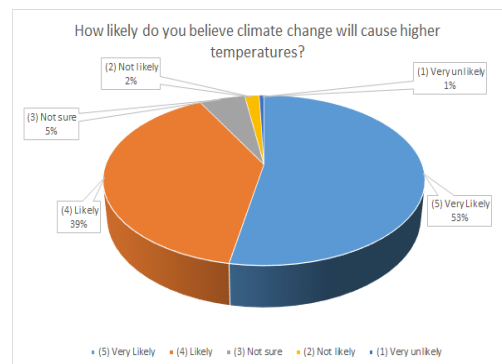


Figure 14

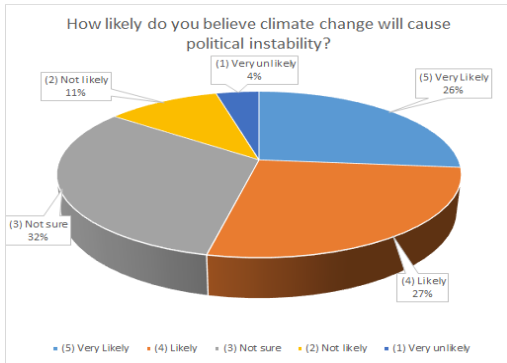


Figure 15

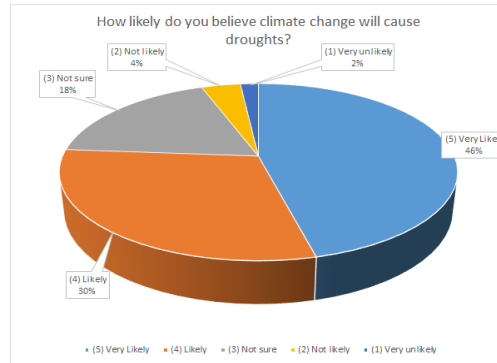


Figure 16

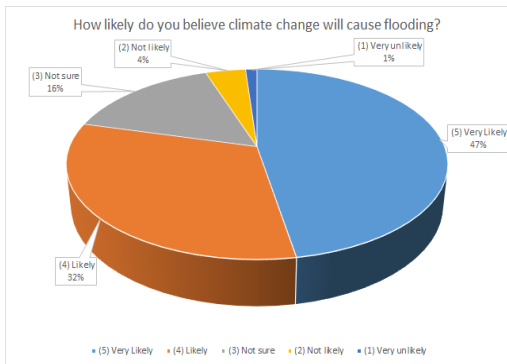


Figure 17

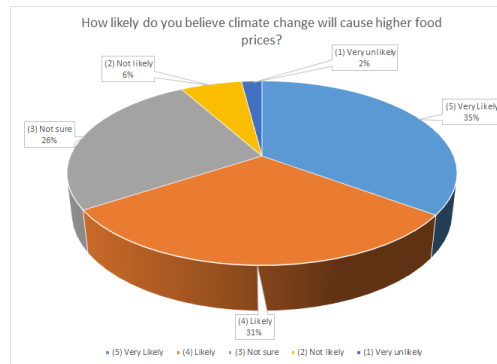


Figure 18

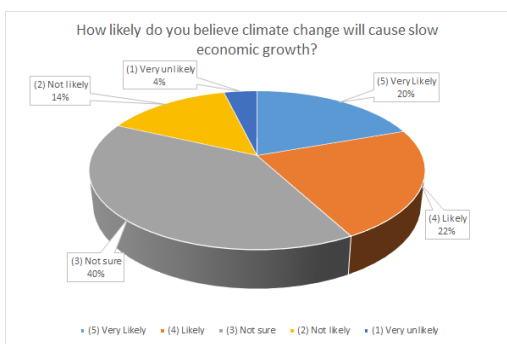


Figure 19

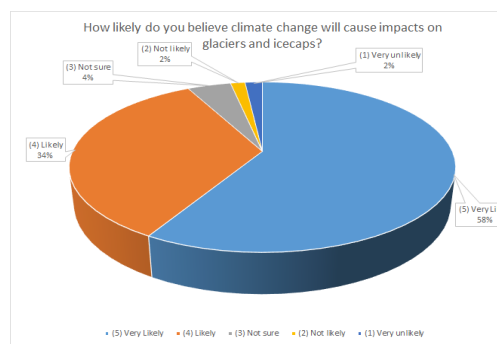


Figure 20

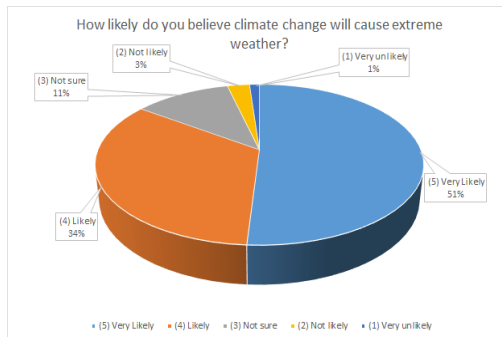


Figure 21

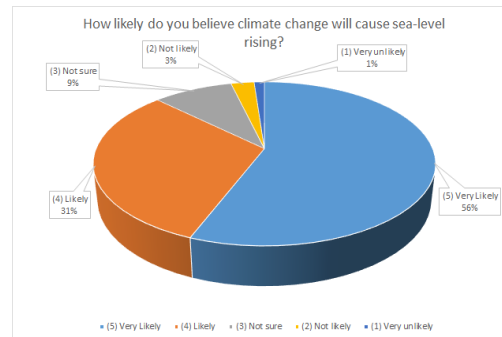
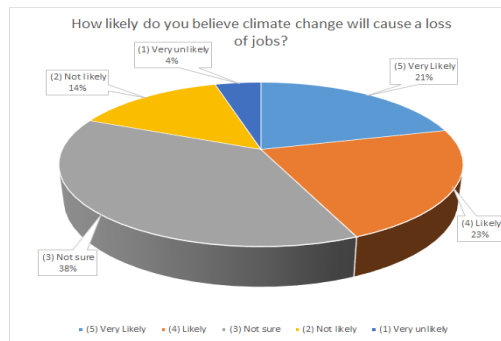


Figure 22



However, while respondents believe they are aware of climate change and demonstrated correct beliefs on its causes, respondents deviated from scientific proof in their beliefs on climate change when in relation to different entities. From Figures 23-26, our sample demonstrated that respondents believe climate change is in fact a serious issue for the world and United States, as there were very low rates of selections for options of “not serious at all” and “not very serious.” However, while respondents believe this, they don’t rate the seriousness of climate change for themselves personally or their community nearly as high; 37% of respondents don’t see climate change as serious for themselves personally in comparison to only 8% for the world. This data matches previous literature that individuals see climate change as an issue that is serious, but not serious to their immediate surroundings; that they are somewhat impenetrable to the effects of climate change, an obviously false belief.

Figure 23

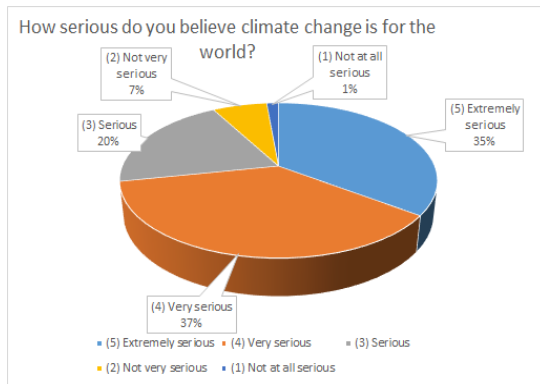


Figure 24

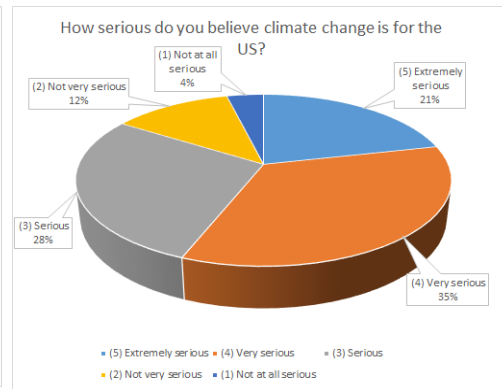


Figure 25

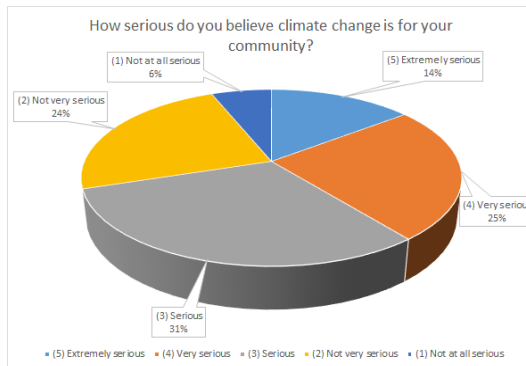
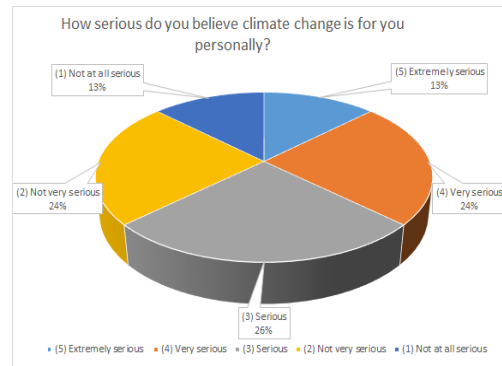


Figure 26



Furthermore, our data matches previous literature that not only do individuals feel climate change is not an issue for them personally, but also that it won't be affecting them now; rather than climate change is an issue for future generations to deal with. Based on Figures 27-30, at least 65% of respondents feel that the world, United States, and communities feel the effects of climate change now or in the next 5-10 years, respectively. However, this belief does not translate to personal feelings as only 34% of respondents believe climate change's impacts will be felt now or in the near future, while 56% felt that climate change would affect Earth in 10-50 years.

Figure 27

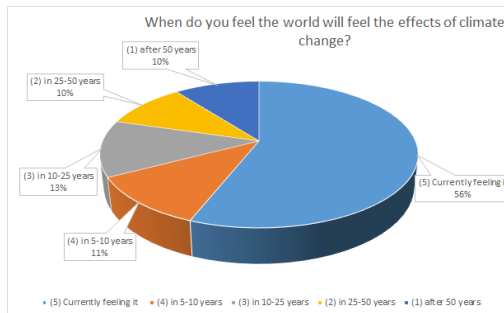


Figure 28

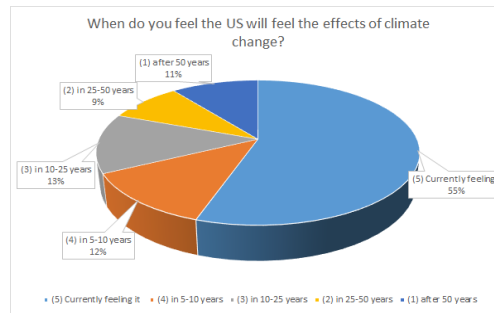


Figure 29

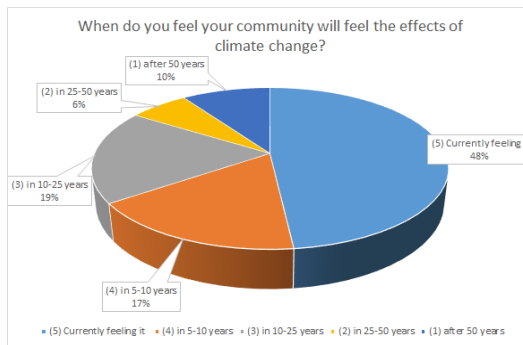
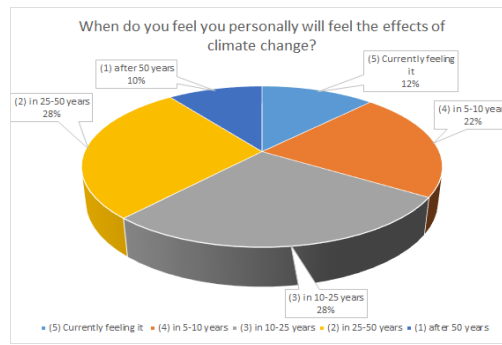
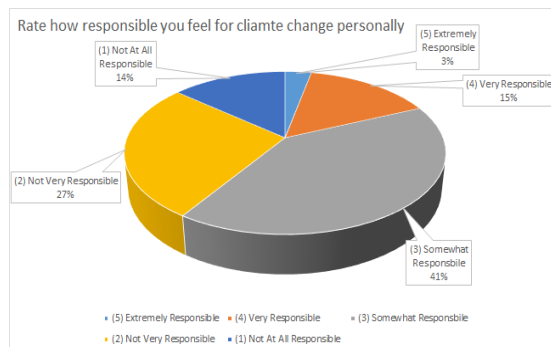


Figure 30



An explanation for these wrongly held beliefs that climate change will affect our planet but not necessarily the individual, nor the individual during the present time, could be linked to how responsible respondents feel personally for climate change. Based upon Figure 31, only 18% of respondents feel extremely or very responsible for climate change while 82% of respondents feel only somewhat, not very, or not at all responsible for climate change. So while respondents are aware of the issue and know a fair amount about it, they don't feel that the effects of climate change will hit them personally. Furthermore, although respondents understand that climate change is in fact being influenced primarily by human processes (Figure 11), they do not feel personally responsible for those effects.

Figure 31



IV. Methods and Results

In order to determine relationships between personal responsibility, beliefs and demographic data, we needed to create a simple linear regression. After running an initial “kitchen sink” regression with many of our variables, we realized that we needed to transform our data in order to get more meaningful and accurate results. Because our survey was somewhat repetitive and asked similar questions in different ways in order to elicit how specific changes effected respondents beliefs, many of our questions were related and prompted similar responses. In our survey, we looked at how serious climate change was for respondents personally, for their communities, for the country and for the world. In order to make these questions more meaningful, we generated three new variables subtracting beliefs of the severity of climate change personally from how serious respondents felt climate change was to the world, the country and the community. From this we could understand the differences in how serious respondents believed climate change to be for themselves and for others. When looking through our initial findings, we found that respondents believed the impacts of climate change would accrue to the world, country and community around the same time. Because of this we decided to create a variable containing the average of the community, country and world timeline variables. We then generated a new variable by subtracting respondents’ perception of when the impacts of climate change would accrue to them personally from the average of when they believed the impacts of climate change would accrue to the community, country and world. We also included their personal impact timeline because those results were so varied from the other three. Our survey included a small grid containing some of the possible results of climate change within the

categories of severe weather and socio-political unrest. We asked respondents to rate how likely they believed climate change would cause each of those impacts. Because many of the questions were related within each of those categories, we decided to combine the related questions into binary variables for socio-political unrest and severe weather. Respondents were to rate their beliefs on a scale of 1-5 with 5 being the belief that the impact would very likely be caused by climate change. With respect to climate change causing severe weather, we decided that if respondents had a total value of 32 or more for that section, meaning they chose very likely for most of the impacts, the variable would be a 1, and if the total value was less than 32, the severe weather variable would be a 0. For the sociopolitical unrest binary variable, if the summation of the respondent's answers were below 15, the variable would be equal to 0, and if it was above 15, the variable would be equal to 1. With these new variables, we formed the following regression:

Equation 1:

$$\text{Responsibility} = \beta_0 + \beta_1 \text{degree_of_familiarity} + \beta_2 \text{is_the_climatechanging} + \beta_3 \text{personal_impact_timeline} + \beta_4 \text{diff_ave_impact_timeline} + \beta_5 \text{severity_world_personal_diff} + \beta_6 \text{severity_US_personal_diff} + \beta_7 \text{severity_community_personal_diff} + \beta_8 \text{bin_socio_political_unrest} + \beta_9 \text{bin_severe_weather} + \beta_{10} \text{belief_causes_cc} + \beta_{11} \text{risk} + \beta_{12} \text{education} + \beta_{13} \text{gender} + \beta_{14} \text{age} + \beta_{15} \text{political_spectrum} + \epsilon$$

The R² for this regression was .331 meaning that 33.1% of the variation in sentiments of responsibility were explained by our regression. The regression produced 6 variables of statistical significance, those being personal_impact_timeline, diff_ave_impact_timeline, bin_severe_weather, belief_causes_cc, risk and age. The following conclusions can be drawn from these results: people take more responsibility if they believe climate change will impact them personally in the near future with an increase in the personal impact timeline variable causing a .52 increase in sentiments of responsibility. This is significant at the 1% level. On average people believe that climate change will affect others (the community, country and world) before they are affected by climate change themselves. This result is statistically significant at the 1% level as well. Respondents who believe that severe weather would likely be an impact of climate change felt more responsible for climate change. This result was drawn from the binary variable for severe weather and is statistically significant at

the 10% level. Respondents took more responsibility for climate change if they felt it was caused primarily by humans. This result was statistically significant at the 10% level of significance. Respondents who labeled themselves as “risk takers” were less likely to take responsibility for climate change which was statistically significant at the 10% level of significance. Finally, the older respondents were, the less likely they were to take personal responsibility for climate change, a result that was statistically significant at the 5% level of significance.

In order to determine the validity of our data and ensure that we did not have any econometric errors, we ran the following tests: Ramsey’s RESET test for omitted variables, the Breusch-Pagan test for heteroskedasticity as well as looking at the variance inflation factors. In the Ramsey’s RESET test we found that we could not reject the null that the model had no omitted variables, meaning that there was no omitted variables bias in our model. From the Breusch-Pagan test we were able to prove that we could not reject the null of constant variance, meaning heteroskedasticity was not a problem. Finally, after analyzing the variance inflation factors, we found that none of the variables had VIFs above 5.5, which is well below the normal threshold of 10 and proved that our variables were likely uncorrelated with one another. With this, we were satisfied with our regression and chose to examine it by education level.

By looking at histograms of respondents’ education levels for our data, we were able to split the dataset into highly educated and less educated respondents. We then reran this regression for each of these categories. The results of our original regression alongside the education breakup can be seen in Table 1 below. The low education sample had an R^2 of .327 and the high education sample had an R^2 of .449.

In the low education sample, respondents take more responsibility if they believe the impacts of climate change will affect them sooner. This is positive and statistically significant at the 5% level. Similarly, they believe that the impacts of climate change will affect others before it affects them. This is positive and statistically significant at the 10% level of significance. Respondents who believed climate change would cause sociopolitical unrest felt less responsible for climate change. This result is negative and statistically significant at the 5% level of significance. Finally, respondents who believed that severe weather will be a likely impact of climate change felt more responsible for

climate change. This result was statistically significant at the 10% level of significance.

In the higher education sample, respondents who identified as more familiar with climate change felt less personally responsible for climate change. This result was statistically significant at the 1% level of significance. Respondents in this group felt more responsibility for climate change the sooner they thought they would feel the impacts and felt that other groups (the community, world and country) would feel the effects of climate change before they would individually. Both of these results were statistically significant at the 1% level of significance. People in this group who identified as “risk takers” felt less responsible for climate change, a result that was significant at the 5% level of significance. Finally, in this group males were more likely to take responsibility for climate change than females were. This result was significant at the 10% level of significance.

Table 1:

	Responsibility	Responsibility Low Education	Responsibility High Education
degree_of_familiarity	-0.0664 (-0.76)	0.0594 (0.48)	-0.277** (-2.05)
is_climate_changing	0.0906 (0.65)	-0.0647 (-0.35)	0.375 (1.65)
personal_impact_timeline	0.520*** (5.12)	0.307** (2.15)	0.856*** (5.67)
diff_ave_impact_timeline	0.469*** (4.70)	0.278* (1.85)	0.752*** (5.20)
severity_world_personal_diff	0.0806 (0.85)	0.0880 (0.63)	0.0807 (0.59)
severity_US_personal_diff	-0.161 (-1.56)	-0.117 (-0.84)	-0.258 (-1.60)
severity_community_personal_diff	-0.0608 (-0.73)	-0.0853 (-0.65)	-0.0862 (-0.77)
bin_sociopolitical_unrest	-0.524 (-0.95)	-1.800** (-2.23)	0.434 (0.55)
bin_severe_weather	0.220* (1.74)	0.357* (1.88)	0.105 (0.59)
belief_causes_cc	0.156* (1.94)	0.105 (0.88)	0.130 (1.14)
risk	-0.0477* (-1.73)	0.0111 (0.28)	-0.0923** (-2.35)
education	0.0902 (1.60)		
gender	0.110 (0.98)	-0.0608 (-0.37)	0.274* (1.71)
age	-0.0108** (-2.24)	-0.00358 (-0.39)	-0.00821 (-1.59)
political_spectrum	-0.0329 (-1.27)	-0.0387 (-1.00)	-0.0367 (-1.03)
_cons	0.825 (1.48)	1.270* (1.73)	0.552 (0.72)
N	222	112	112
R ²	0.331	0.327	0.449
t statistics in parentheses			
* p < .1, ** p < .05, *** p < .01			

V. Discussion

While there were differences when looking at our survey sample as a whole and broken down between high and low education groups, we found many variables in each sample that were consistent with results from prior studies that we reviewed. Across all three samples, the personal impact timeline and the difference between respondents personal impact timeline and the average impact timeline for others (the world, country and community) were positive and statistically significant. This is very similar to the literature in that normally, studies show that climate change is considered an issue that is not personal but one that affects other people, and that will not occur in the near future. Our results show that individuals believe the impacts of climate change will accrue to others before themselves. We also find that the sooner respondents think the impacts of climate change will affect them, the more responsible they will feel for the issue. While those were the only two variables consistent across all three samples, many of the statistically significant variables found across all of the samples mirrored findings from other similar studies as well. As expected, in our main effects model, we found that respondents feel more responsible for climate change when they believe humans cause it. Respondents also took less responsibility for climate change as age increase and as their self-perceived riskiness increased. If respondents felt that climate change would likely cause severe weather, they took more responsibility for the matter. All of these findings were expected and of the correct sign. Ultimately, given that many of our results mirror the results of prior studies and research such as those conducted by Leiserowitz (2005, 2006) and Kellstedt (2008), we can conclude that despite our skewed sample demographics, our survey did produce meaningful and sensible results for our sample.

VI. Conclusion

Our findings support and build on previous literature, demonstrating that not enough Americans feel responsible for the effects of climate change, despite unequivocal scientific evidence. Despite having an imperfect and non-random sample as evidenced in the initial findings section, our study does provide results worthy for continued pursuit. Based on our results that our sample does not feel personally responsible for climate change, a next question to explore could be centered on the methods that would change those sentiments. Perhaps another survey modeled after this one could determine why Americans do not feel

personally responsible and could be used in conjunction with our study to support policy action in a certain direction.

Since our study does find that our highly affluent and educated sample is very aware of climate change, another application off of our study could be to determine respondents' willingness to pay to stop the effects of climate change through a choice experiment. Although our study finds respondents believing climate change's effects will accrue in the future, being able to measure specific monetary amounts could aid policy makers in determining how they could price conservation efforts.

In summary, although our study does provide interesting and thought provoking results, more work must be done in a study with more resources available in order to provide results that may be applied broadly and produce information that could lead to durable and lasting change.

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