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## Abstract

**Purpose:** The aim of this paper is to evaluate the effectiveness of film in communicating issues related to climate change. While previous studies demonstrate an immediate effect of a film post-screening, this study also considered if a film can inspire long-term effects, and if supplemental educational information plays a role on participant understanding.

**Design/methodology/approach:** Using surveys, we assessed undergraduate students' climate change responses pre-, immediately-post, and 9-weeks post watching the climate change documentary *The Human Element* (Prod. Earth Vision Institute, 2018). In the 9-week interim before the final survey, half of the participants received weekly information on climate change via a custom website, while the other half served as a control. Nonparametric statistical tests were completed in SPSS to determine significant changes across all three surveys.

**Findings:** Friedman tests and Wilcoxon Signed Ranks tests demonstrate statistically significant self-reported impacts on climate change responses such as of motivation, concern, and understanding immediately post-screening. At 9-weeks, 3 × 2 Mixed ANOVAs demonstrate that the group that received the website reported statistically significantly higher understanding than those in the control group. However, the website has no statistically significant effect on other responses like motivation and concern.

**Originality/value:** These results highlight the important power of film's visual appeals in framing climate change. We also show that there is a long term effect of film on participant understanding. The study also prompts questions about current models of climate change education, which emphasize objective understanding, often without viable support structures to help students' concern and motivation to act.

## Keywords

climate change, communication, film, audience reception studies, education

## Disciplines

Education | Environmental Education | Environmental Studies | Film and Media Studies

## Comments

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**Examining the impact of climate change film as an educational tool**

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## **Abstract**

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**Keywords:** climate change communication, film, higher education, *The Human Element*

## **1. Introduction**

Since 2018, the Intergovernmental Panel on Climate Change (IPCC) has issued three special reports, which highlight a dire need to limit global warming to 1.5°C (IPCC 2018) and highlight already manifesting effects of climate change on land (IPCC 2019a) and in the oceans (2019b). These recent reports warn that society needs to make drastic changes to current systems if we are to tackle the growing climate change crisis. Given these urgent calls, researchers and educators are faced with the daunting task of ensuring that people understand the science of climate change and express the will to address its social dimensions.

This study explores the following pressing question: how do we encourage greater engagement in response to climate change? To answer this question, we investigate the potential role that film may play in raising awareness and motivation to act. While studies such as Newman (2015), Janpol & Dilts (2016), and Culloty & Brereton (2017) explore how films might shape audiences' responses to environmental concern and action, there is a growing scholarly focus on climate change films. Such studies range from theoretical reviews of how film can be a tool in climate change education (e.g. Sakerelli 2015; Manzo 2017; Cortese 2018) to audience reception case studies on the effectiveness of particular films (e.g. Leiserowitz 2004; Jacobsen 2011; Lin 2013; Howell 2014). Our study fits within the latter category.

Using *The Human Element* (2018), a climate-change documentary that chronicles stories of climate-induced environmental problems in four American communities, we test if, and how, a climate change film affects self-reported environmental responses amongst college students immediately after viewing the film and 9-weeks later. We also test how access to repeated

supplemental information extends the impact of the film. We hypothesize that the film will increase pro-environmental responses immediately after the screening, however, these responses may not be sustained in the longer term, as suggested by Howell (2011). However, because previous climate change education studies (e.g., Corner et al. 2015), suggest that access to repeated supplemental information sustains pro-environmental responses, we explore this by providing half of our participants with regular access to climate change educational materials (the other half serves as a control group). We hypothesize that the group receiving supplemental materials will sustain pro-environmental responses, while the control group will not.

We focus on American college students because 1) the average age of respondents makes them a particularly important demographic to study, and 2) they are also an accessible participant population. As Corner et al. (2015) write, the youth demographic is the generation whose lives will overlap most closely with the expected impacts and policy windows prescribed for climate change mitigation. Knowing how they respond to climate change communication via a film and website provides important insights on the educational potential of such tools.

## **2. Methods**

This study builds upon the methodological procedures used by Howell (2011). To analyze how *The Human Element* impacted viewer's environmental responses, we used a three-tiered survey approach, and 1) screened the film; 2) assessed participant's self-reported environmental responses through one pre- and two post-screening surveys; and 3) created a climate change-focused website to explore how, and if, access to supplemental information impacts the longer-term impacts of the film. The pre-screening survey (Survey 1) collected participants' preconceived perceptions of climate change, and the first post-screening survey (Survey 2), taken immediately after viewing the film, probes the effects of the film on

participants' perceptions. The final survey (Survey 3), administered 9 weeks post-screening, aimed to understand which of these effects, if any, remained with the participants. Survey 3 additionally explored the effects of the website on a randomly selected sub-set of the participants to whom it was sent weekly, comparing their responses with a control group without website access. Survey results were analyzed using SPSS.

### ***2.1 Participants, Survey and Website Design***

We screened *The Human Element* to students at two liberal arts colleges, Gettysburg College (n= 98) in Pennsylvania and Alma College (n= 31) in Michigan. Participation was solicited via college student email, public flyers, and class announcements; participation was optional, and incentives of \$5 dollars and two lottery \$50 gift cards (for Gettysburg College students) and class credit (for Alma College students) were offered, following Institutional Research Board (IRB) protocols. IRB protocols also ensured participant anonymity. Email addresses of participants were collected on each survey to match survey results across time to the same individual, and were deleted after all three surveys were matched with the respective participant and before data analysis was performed.

There were two repeated elements across all three surveys. The first asked participants about their general views on climate change by including four questions on the Yale Program for Climate Change Communication's (YPCCC) Six Americas Super Short survey (SASSY). The survey helps categorize participants based on their overall reactions to and belief in climate change, and ranges from those who are *Alarmed* to those who are *Dismissive* (Leiserowitz et al. 2009). The results of these questions were entered into YPCCC's online Group Scoring Tool. Following the survey design of Howell (2011), the second repeated element featured 7-point Likert scale questions to explore five climate change responses: motivation, concern,

understanding, optimism, and personal confidence in taking action against climate change (Table 1).

In addition to the repeated elements, Survey 1 included demographic questions. Survey 2 included open-ended questions allowing participants to voice ideas such as the most impactful scene of the film. Survey 3 also featured these open-ended questions, with additional ones addressing the longer-term memorability of the film. There were no specific incentives to ensure that participants within the website-receiving group view the website, however, Survey 3 included an additional segment for participants who received weekly website supplemental information.

## ***2.2 Website Design***

To generate supplemental educational information, we designed a climate change-focused website using *Wordpress*. The website, titled *The Personal Element*, followed the structure of *The Human Element* by framing climate change around the four elements: water, air, fire, and earth. Randomly assigned participants (n=65) received weekly emails for 8 weeks post-film with a link to a different set of information uploaded to the website, organized by elements.

## ***2.3 Statistical and Qualitative Analysis***

We used nonparametric statistical tests to determine significant changes across all three surveys. To observe general trends, the Friedman test was used to determine any statistical differences in responses across all three surveys. When a significant difference was observed, a post-hoc Wilcoxon Signed Ranks test was used to determine where the significant differences lay between each pair of surveys (1 vs. 2; 2 vs. 3; 1 vs. 3). To determine the effects of the website, several 3 (time; Survey 1, Survey 2, and Survey 3) x 2 (website; yes, no) mixed Analyses of Variance (ANOVAs) were conducted on questions featured on all three surveys.

The Mann-Whitney U test was used to assess the difference in responses relative to gender. The Kruskal-Wallis H test enabled observation of the differences in responses relative to political affiliation. Qualitative assessment techniques varied given the nature of the open-ended question analyzed. Responses to some open-ended questions were coded by the element (for example, water or air) associated with the scene. For other open-ended responses, we highlight themes that emerge across the responses.

### **3. Results**

#### ***3.1 Demographics***

Ninety-eight students from Gettysburg College and 31 students from Alma College completed Surveys 1 and 2. Of these students, 76 Gettysburg students and 20 Alma students also completed Survey 3 (Table 2). The majority of participants are female, approximately half identified as Democrats, and most are from the north-east United States. Participants were evenly distributed among areas of academic study. Since the relationship between ethnicity and environmental concern is complex (Medina et. al 2019), we chose not to ask participants to disclose their ethnicity.

#### ***3.2 General Trends in Survey Responses***

*Six America's*—All three surveys included the four questions of the SASSY quiz to adequately place participants into one of the six America audiences. SASSY results across all three surveys show an increase in the *Alarmed* audience. Although some (~4%) participants originally placed in the *Disengaged* or *Doubtful* category in Survey 1, in Survey 2 all participants were either *Alarmed*, *Concerned*, or *Cautious*. This pattern remained through Survey 3 (Fig. 1).

*Responses towards Climate Change*—Friedman tests revealed statistically significant changes occurred across all 5 responses examined. Participants were more motivated immediately post-

film compared to pre-film (Table 3). Although there was no statistically significant difference between Survey 2 and 3, participants were statistically significantly more motivated nine weeks later when they responded to Survey 3 compared to Survey 1. Participants were more concerned about climate change in Surveys 2 and 3 when compared to Survey 1. Understanding increased significantly immediately after watching the film as well as 9-weeks post-film. Optimism, however, significantly decreased amongst participants 9-weeks after watching the film compared to immediately after. Participants were statistically significantly more confident in their own ability to address climate change 9-weeks post-film compared to pre-film.

On Survey 3, open-ended questions asked participants to describe if they feel more or less motivated now (9-weeks post-film) to do something about climate change compared to immediately post-film. More than half of participants felt more motivated, 28% felt about the same and 15% felt less motivated. Of those who felt more motivated, many attributed this increase to exposure to the film and access to other environmental information. While no participant mentioned the website, several mentioned their environmental classes in increasing motivation.

### ***3.3 Effects of the website***

The website served as a resource for participants to receive additional information. While there were no incentives to ensure that participants within the website-receiving group interacted with the website, Survey 3 results reveal that a majority of them did, and they report that the website provided useful information about climate change science (81%), global impact (81%), and/or how to make a positive impact in their community (70%). Overall, the percentage of participants who placed in the *Alarmed* audience increased with time in both the website-receiving and the control group. This increase occurred even though our website participant

sample was unintentionally skewed—those who received the website (Fig. 2) had, in Survey 1, placed in the *Alarmed* audience at a much higher rate than those who did not receive the website (Fig. 3).

In order to analyze how the website affected participants' perceptions towards climate change, a 3 (time) x 2 (website condition) mixed ANOVA was conducted for each response. To account for the threefold time period, a Bonferroni pairwise correction was applied to correct for inflated Type 1 error rates when doing comparisons with more than two means. Although our results were skewed, we used a parametric test to test for the possible statistical interaction that is germane to our primary hypothesis; however, these results need to be interpreted with a certain degree of caution.

Participants reported higher understanding as time went on. These effects were qualified by a statistically significant two-way interaction,  $F(2, 168.34)=6.19, p<0.05, \eta p^2= 0.046$  (Fig. 4). A simple effects analysis was conducted to probe this interaction. Results showed that there was a significant main effect of time for participants who viewed the website,  $F(2, 168.34)=6.19, p<0.05, \eta p^2= 0.046$ , such that understanding increased from Survey 1 (M=8.02, SD= 3.00) to Survey 2 (M=9.25, SD=2.88), and Survey 3 (M=10.84, SD=2.46). The main effect of time was also significant for those who did not receive the website,  $F(2, 168.34)= 28.26, p<0.05, \eta p^2= 0.046$ , such that there was an increase from Survey 1 (M = 7.80, SD = 2.32) to Survey 2 (M = 8.35, SD = 2.37), and Survey 3 (M = 9.09, SD = 2.16). However, the slope of this increase was less compared to those with the website (Fig. 4). No significant interactions occurred with the same 3 x 2 mixed ANOVA for motivation, concern, optimism, and confidence ( $F_s < 1.582$ ).

### ***3.4 Differences in Demographics.***

*Gender-* Participants were asked to indicate their gender identity in Survey 1. Because of the small sample size of participants who identified in the categories of “non-binary” (n=5), no statistical tests were run to compare with responses from men or women. Statistically significant differences in responses towards climate change based on men/women were observed across all three surveys. Pre-film, women were more motivated and concerned than men. Immediately after the film, though both men and women were more motivated and concerned, women continued to be more so and women also reported higher understanding than men. 9-weeks later, women were still statistically significantly more concerned than men, however there was no statistical difference observed in terms of motivation or understanding (Table 4).

*Political Affiliation-* A statistically significant difference in climate change responses based on political affiliation was observed in all three surveys. Before watching the film, Democrats reported the highest motivation and concern, while Republicans reported the lowest in both categories. Immediately post-film, Democrats continued to report the highest concern, but Libertarians reported the highest motivation and understanding. Across all three of these reactions, Republicans scored the lowest. Nine weeks later, a significant difference in motivation, concern, and understanding remained, but Libertarians scored the highest for all three of these reactions, and Republicans continued to score the lowest (Table 5). These results should be interpreted with caution, as the sample size of Libertarians (n=10) was smaller than that of other political groups.

### ***3.5 Open Ended Questions***

On Surveys 2 and 3, open-ended questions probed how participants were reacting to the film. Immediately post-film, we asked participants to explain if there was a particular scene in the film that persuaded them to believe that climate change was real. 126 out of 128 participants

indicated in the affirmative (the other two said “Don’t know”), and many (48%) indicated that the section on water contributed to their beliefs.

In describing whose responsibility, it was to fix the issues addressed in the film, of 129 responses in Survey 2, 108 mentioned “everyone,” and of these 108 participants, 27 also mentioned the role of government, businesses, or people in power in general (Table 6). Answers to the same question on Survey 3 show a similar distribution of results.

#### **4. Discussion**

Our hypothesis that film impacts environmental belief immediately post-screening is supported. SASSY results demonstrate that the film successfully shifted participants who were originally in either the *Doubtful* or *Disengaged* categories to the *Cautious*, *Concerned*, or *Alarmed* audiences. In addition, our results reveal positive changes occurred in terms of motivation, concern, understanding, and confidence, though optimism decreased. This study also adds to a small body of scholarship that looks at film impacts over a longer term than immediately post-screening (Lowe et al. 2006; Howell, 2011; 2014). While these studies found that the effects of their respective films decreased over time, our results suggest the opposite. Nine weeks later, participants’ motivation, concern, understanding, and confidence remained high, though optimism was at its lowest.

We attribute these changes to at least two factors. First, in terms of optimism—the film presents the dire consequences of climate change events, but does not provide solutions until the end when it presents a technocratic response. In effect, its overall message is not an optimistic one. In contrast, its stories clearly articulate that climate change is happening, which can explain its positive effect on the other climate change responses we measured, such as understanding and concern. Second, the study time period (Fall 2018) involved a number of climate change stories

(such as of wildfires and hurricanes) in the mainstream media (Boykoff et al. 2019; Beradelli 2019), which could also have affected the study's overall trends.

Although participants demonstrate an increase in understanding, those receiving the website saw a significantly greater increase. Interestingly, the website only had a statistically significant effect on understanding, and does not affect the other climate change responses measured. We attribute this result to at least two complicating factors. First, we know that half (50%) of our participants were also receiving education material through their classes, which could be confounding our results. Second, Survey 3 asked participants to estimate how many minutes per week they spent on the site. Responses averaged around 12 minutes a week, which might explain why it might be easier to self-report a sense of understanding while other responses like concern, motivation etc. that require deeper engagement are less evident (Howell, 2014).

#### ***4.1 Demographics***

*Gender-* Results suggest that this particular environmental film is, in the longer term, effective in tackling some gendered discrepancies in climate change responses. The pre-film and immediately post-film results reflect past studies suggesting men are generally less concerned about climate change than women (Leiserowitz et al. 2009; McCright & Dunlap 2011; Monani et al. 2018). Concern amongst men and women remained statistically significantly different throughout all three surveys, suggesting that the film's ability to reconcile gendered differences in concern is limited. However, the film was able to bridge the gendered gap in motivation.

*Political Affiliation-* Significant differences in motivation and concern remained throughout all surveys. Previous studies reveal a political divide in climate change belief and concern among partisan American political groups, with Republicans typically less concerned

about climate change compared to Democrats (Leiserowitz 2009; Mills et al. 2016; Pew Research Center 2017). To address this gap, Feldman and Hart (2018) suggest that Republican audiences respond more positively to communication strategies that do not overtly discuss climate change. We chose *The Human Element* because it not only sparsely used words like “global warming”, but also because it uses visual appeals to frame climate change within core conservative values (e.g., economic stability). However, our results show that such appeals were not enough to mitigate climate change perception differences between different political groups.

## ***4.2 Limitations & Future Studies***

### *4.2.1 Demographics*

We focused our study on college-age participants deliberately, recognizing that the impact for this audience are high (Corner et al. 2015). Our participants are also from private liberal arts college in the USA. While their educational privilege suggests they will be in positions of power as they move into the larger world, making them particularly important audiences to study, we recognize that they are a small sub-group audience. Future studies should consider other types of colleges both in the USA and elsewhere to compare if our results are consistent across institutions. We also welcome studies that explore older demographics and that look beyond the United States context. As Medina et al. 2019 states, the relationship between ethnicity and environmental concern is an understudied one, shifting between different scales, cultural orientations, and local and individual contexts. Tong (2013) discusses the varying effects of environmental film on different cultures and countries, and this relationship can be further probed.

### *4.2.2. Study Design*

Our results indicate that motivation, concern, understanding, and confidence all increased over the nine-weeks, while optimism declined. However, we cannot fully attribute these changes to the film or website. Participants were continuously interacting with the world around them through other forms of media, classwork, and in their own personal lives. While survey 3 asks participants questions such if they feel more or less motivated to act now than before and why/why not, these questions do not *explicitly* ask participants to explain *how* the film and website contributes to their changed responses. Future surveys can more explicitly request this information.

We advocate for future research that better parses out the influence of the film and website by including control groups of students who do not watch the film but are taking environment-focused courses and/or control groups of students who receive the website but do not watch the film. In our study, because participants were randomly solicited, both control and website-viewing groups included some students simultaneously enrolled in environment-focused classes. This fact did confound our results.

Future studies can mandate longer participant interaction to reassess the website's potential impacts because the website builds on the film's message to direct participants to tools for collective action. Both the film and the website are educational tools that a participant interacts with individually. The film focuses on individual stories and does not provide tools or collective action; the website points participants to these spaces (e.g., environmental organizations), but is not a social forum where participants collectively interact. However, if framed as such a forum, could the website reveal not just greater understanding but also greater motivation, concern, and confidence to act? Such a study would benefit by engaging with the emerging field of empirical ecocriticism to probe the effects of narrative strategies and

techniques (Malecki et al. 2018), which can help reveal the specific influences of our film and website. Further studies should also pursue efforts to identify more effective means of changing and sustaining pro-environmental attitudes after interacting with such narratives.

## **5. Conclusions**

The results of our study confirm what previous scholarship indicates (Leiserowitz 2004; Jacobsen 2011; Lin 2013 Howell 2014): immediately post-screening, climate change film inspires a range of affirmative climate change responses—from understanding to concern and motivation to act to stop climate change. Equally importantly, it demonstrates that these responses can remain in the longer-term. Participants continued to be more concerned and motivated 9-weeks later. Access to additional educational supplemental information via the website increased understanding of what actions one could take to mitigate one's effect on climate change. We conclude that, while environmental film cannot address climate change on its own, it is one of many tools used to inspire climate-friendly responses. Film should be used in conjunction with several other education strategies, specifically those that provide explicit strategies and forums for collective action.

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## Tables with captions

Table 1. Statements present on all three surveys from which participants responded on a Likert scale of 1- Strongly Disagree to 7- Strongly Agree. These statements were factored into responses highlighting climate change responses.

<b>Response</b>	<b>Likert Statements</b>
<i>Concern</i>	I am worried/concerned about climate change/global warming.
	I fear humanity will not do enough to prevent catastrophic climate change/global warming.
<i>Motivation (to act)</i>	I feel motivated to try to do something about climate change/global warming.
	I feel motivated to try to reduce my environmental impact.
	I feel motivated to lobby politicians about climate change/global warming.
<i>Understanding (of how to make climate-friendly actions)</i>	I understand how I can lobby politicians about climate change/global warming.
	I know what I can do to reduce my environmental impact.
<i>Optimism (the ability of humans to combat climate change)</i>	Cutting my carbon emissions won't make a difference to the problem of climate change/global warming.*
	I feel optimistic about addressing climate change
<i>Confidence (in personally acting against climate change)</i>	I currently do as much as I can about climate change/global warming.
	I can do something to protect my own community from facing climate change-related problems

\*Reverse coded

Table 2. Demographic data of participants in the study, reported as percentages.

		Gettysburg (%)	Alma (%)	Total (%)
<b>Gender</b>	<i>Female</i>	64.3	71.0	65.9
	<i>Male</i>	30.6	29.0	30.2
	<i>Non-binary</i>	5.1	0.0	3.9
<b>Political Affiliation</b>	<i>Democrat</i>	60.6	13.8	49.6
	<i>Republican</i>	14.9	27.6	17.9
	<i>Libertarian</i>	3.2	24.1	8.2
	<i>Independent/ Unaffiliated</i>	21.2	34.4	24.4
<b>Region</b>	<i>North-east USA</i>	79.6	0.0	60.5
	<i>South-east USA</i>	4.1	0.0	3.1
	<i>Central USA</i>	4.1	80.6	22.5
	<i>South-Central USA</i>	2.0	3.2	2.3
	<i>Western USA</i>	5.1	3.2	4.7
	<i>Asia</i>	5.1	6.5	5.4
	<i>South America</i>	0.0	6.5	1.6
<b>Major</b>	<i>STEM</i>	19.4	25.8	20.9
	<i>Social Science</i>	19.4	32.2	22.5
	<i>Humanities</i>	19.4	25.8	20.9
	<i>Interdisciplinary</i>	29.6	12.9	25.6
	<i>Undecided</i>	12.2	3.2	10.0
<b>Class Year</b>	<i>First-year</i>	32.7	22.6	24.8
	<i>Sophomore</i>	33.7	29.0	13.2
	<i>Junior</i>	8.2	45.2	36.4
	<i>Senior</i>	25.6	3.2	25.6

Table 3. Changes in mean responses to climate change over time. Significance determined by Friedman and Wilcoxon Signed Ranks tests. \*p<0.05; \*\*p<0.01. S1 = Survey 1, S2 = Survey 2, and S3 = Survey 3.

	<i>Mean Score</i>			<b>Friedman</b>		<b>Wilcoxon</b>		
						<i>S1 vs. S2</i>	<i>S2 vs. S3</i>	<i>S1 vs. S3</i>
<b>Response</b>	<b>S1</b>	<b>S2</b>	<b>S3</b>	<i>X<sup>2</sup></i>	<i>df</i>	<i>Z-Value</i>	<i>Z-Value</i>	<i>Z-Value</i>
<i>Motivation</i> ** (Total possible: 21)	14.53	16.16	16.51	53.527 p=0.000	2	-6.177** p= 0.000	-0.835 p= 0.404	-4.803** p= 0.000
<i>Concern</i> ** (Total possible: 14)	11.39	11.99	12.26	21.992 p=0.000	2	-3.685** p=0.000	-3.685** p=0.000	-3.290** p= 0.001
<i>Understanding</i> ** (Total possible: 14)	7.98	8.89	9.91	45.981 p=0.000	2	-3.957** p=0.000	-4.236** p=0.000	-5.937** p=0.000
<i>Optimism</i> * (Total possible: 14)	9.49	9.49	9.10	8.968 p=0.011	2	-0.619 p=0.536	-2.223* p=0.026	-1.556 p=0.120
<i>Confidence</i> * (Total possible: 14)	8.34	8.87	8.96	6.767 p=0.034	2	-1.948* p=0.051	-0.426 p=0.670	-2.039* p=0.041

Table 4. Comparisons of climate change response between genders. Significance determined by Mann Whitney U Test. \*p<0.05; \*\*p<0.01. S1 = Survey 1, S2 = Survey 2, and S3 = Survey 3.

		<i>Mean score</i>			
	<b><u>Response</u></b>	<b><u>Male</u></b>	<b><u>Female</u></b>	<b><u>Mann-Whitney U</u></b>	<b><u>p-value</u></b>
<b>S1</b>	<i>Motivation*</i>	13.21	15.12	1241	0.025
	<i>Concern**</i>	10.31	11.78	1070.5	0.001
	<i>Understanding</i>	7.56	8.09	1458.5	0.281
	<i>Optimism</i>	9.21	9.62	1376.5	0.150
	<i>Confidence</i>	7.67	8.63	1345.5	0.109
<b>S2</b>	<i>Motivation**</i>	14.55	16.82	1118	0.06
	<i>Concern**</i>	11.03	12.35	1066.5	0.002
	<i>Understanding*</i>	8.21	9.19	1237.5	0.037
	<i>Optimism</i>	9.08	9.66	1303	0.084
	<i>Confidence</i>	8.29	9.12	1278.5	0.063
<b>S3</b>	<i>Motivation</i>	15.22	16.85	611	0.082
	<i>Concern*</i>	11.39	12.47	571.5	0.031
	<i>Understanding</i>	9.74	9.89	767	0.733
	<i>Optimism</i>	8.77	9.27	623	0.172
	<i>Confidence</i>	8.29	8.90	774.5	0.784

Table 5. Comparisons of reactions to climate change between different political affiliations. Significance determined by Kruskal-Wallis H test. \*p<0.05; \*\*p<0.01. S1 = Survey 1, S2 = Survey 2, and S3 = Survey 3.

		<i>Mean Score</i>						
	<b><u>Response</u></b>	<b><u>Democrat</u></b>	<b><u>Republican</u></b>	<b><u>Libertarian</u></b>	<b><u>Independent</u></b>	<b><u>X<sup>2</sup></u></b>	<b><u>df</u></b>	<b><u>p-value</u></b>
S1	<i>Motivation</i> **	<b>16.00</b>	11.95	14.20	13.63	19.108	3	0.000
	<i>Concern</i> **	<b>12.35</b>	9.14	11.40	11.09	24.382	3	0.000
	<i>Understanding</i>	<b>8.24</b>	7.45	8.10	7.83	2.358	3	0.501
	<i>Optimism</i>	<b>9.69</b>	9.00	8.60	9.71	4.42	3	0.220
	<i>Confidence</i>	<b>8.85</b>	7.27	7.20	8.46	5.148	3	0.161
S2	<i>Motivation</i> **	17.14	14.05	<b>17.80</b>	15.29	15.165	3	0.002
	<i>Concern</i> **	<b>12.76</b>	10.05	12.90	11.54	24.925	3	0.000
	<i>Understanding</i> *	8.91	8.38	<b>11.50</b>	8.43	10.217	3	0.017
	<i>Optimism</i>	<b>9.73</b>	8.95	8.20	9.77	7.496	3	0.058
	<i>Confidence</i>	9.15	7.76	<b>10.30</b>	8.63	6.252	3	0.100
S3	<i>Motivation</i> *	16.71	14.87	<b>19.29</b>	16.35	9.494	3	0.023
	<i>Concern</i> *	12.50	10.73	<b>12.71</b>	12.58	10.822	3	0.013
	<i>Understanding</i> *	10.06	8.53	<b>11.71</b>	9.96	9.587	3	0.022
	<i>Optimism</i>	9.19	<b>9.33</b>	8.29	9.04	0.892	3	0.827
	<i>Confidence</i>	8.90	7.93	9.29	<b>9.58</b>	6.104	3	0.107

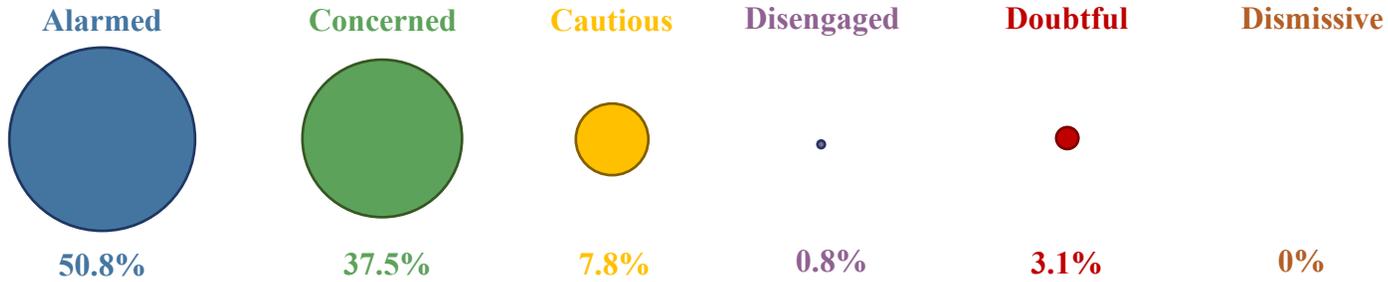
Table 6. Distribution of who participants believed were responsible to fixing the issues addressed in the film.

	<b>S2 (n=128)</b>		<b>S3 (n=96)</b>	
<b><u>Response</u></b>	<b><u>No. of instances</u></b>	<b><u>% of responses</u></b>	<b><u>No. of instances</u></b>	<b><u>% of responses</u></b>
<i>Mine</i>	3	2.34	2	2.08
<i>Everyone's</i>	108	84.37	77	80.21
<i>Everyone's but also government and/or business</i>	27	21.09	16	16.67
<i>Government</i>	29	22.66	23	23.96
<i>Business</i>	12	9.37	12	12.50
<i>Academics</i>	0	0	2	2.08

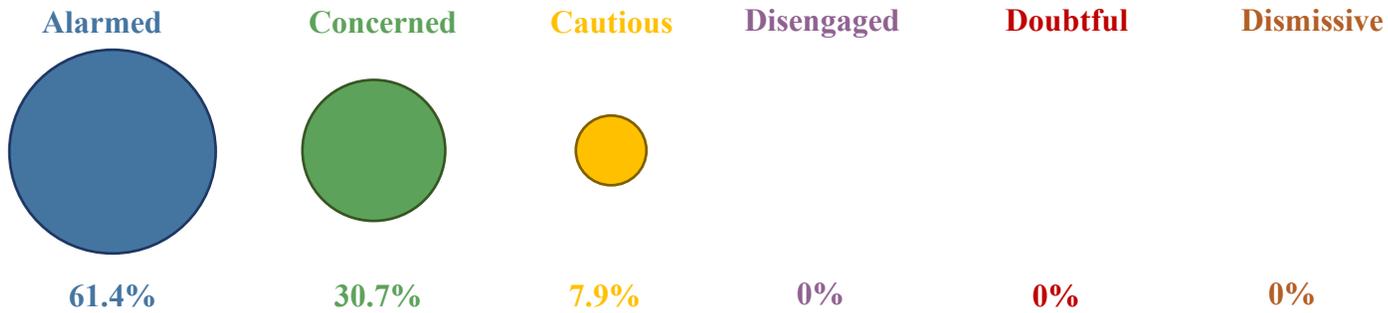
## Figures

### Figure 1

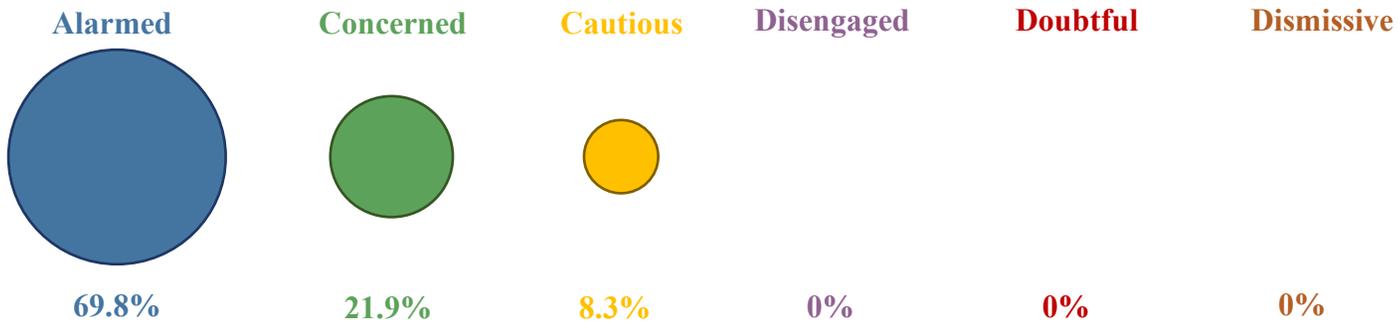
A) Survey 1;  $n = 128$



B) Survey 2;  $n = 127$

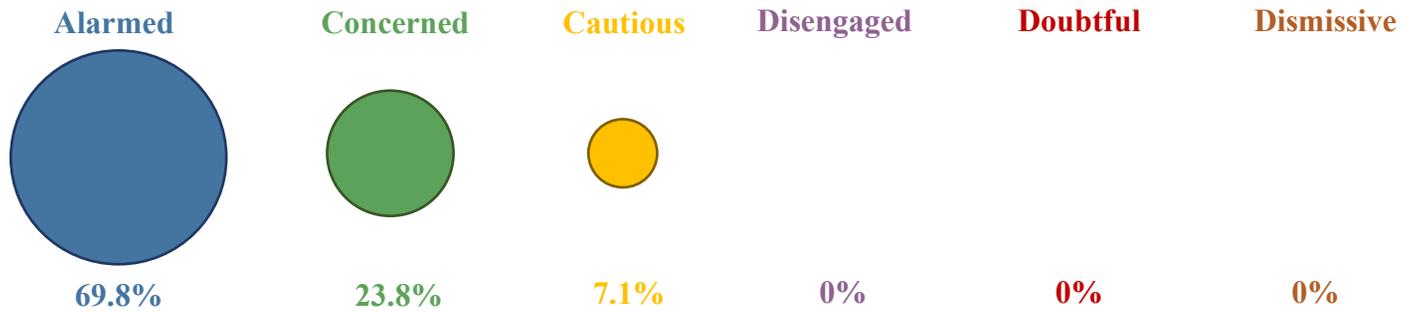


C) Survey 3;  $n = 96$

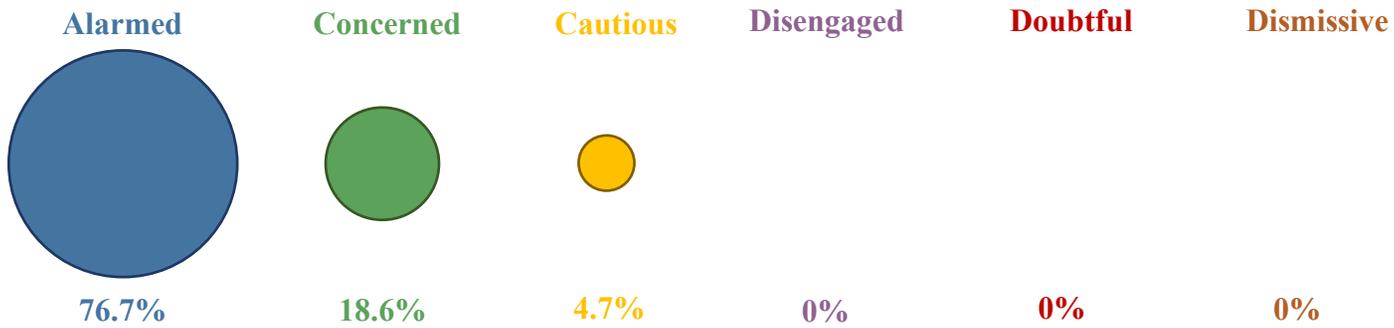


**Figure 2**

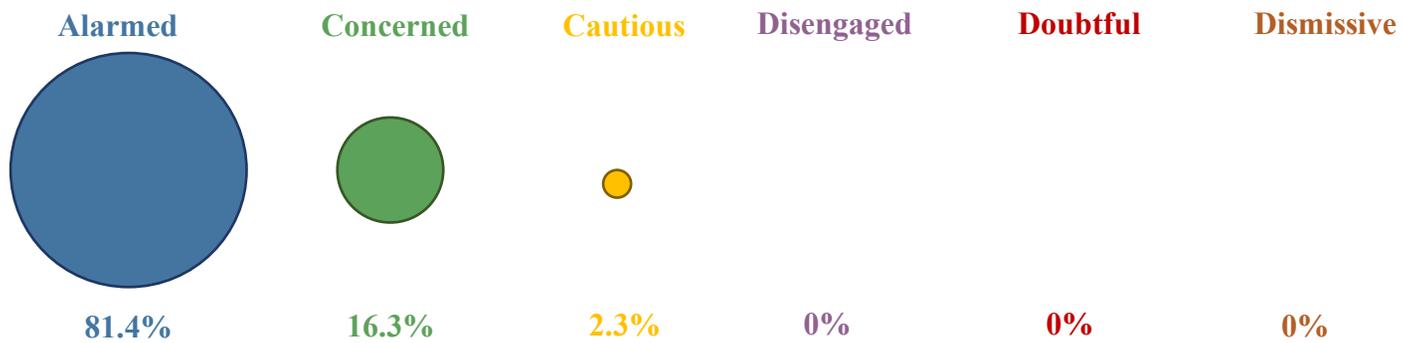
*A) Survey 1; n = 42*



*B) Survey 2; n = 43*

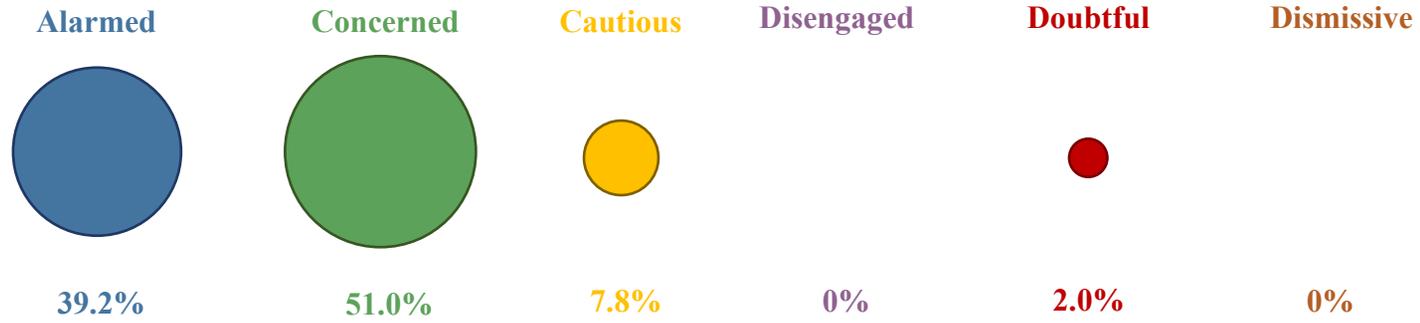


*C) Survey 3; n = 43*

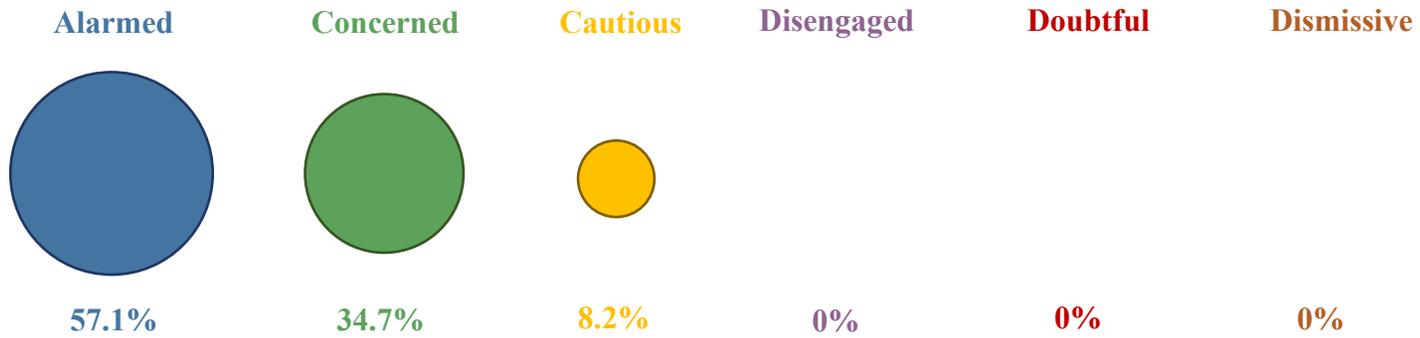


**Figure 3**

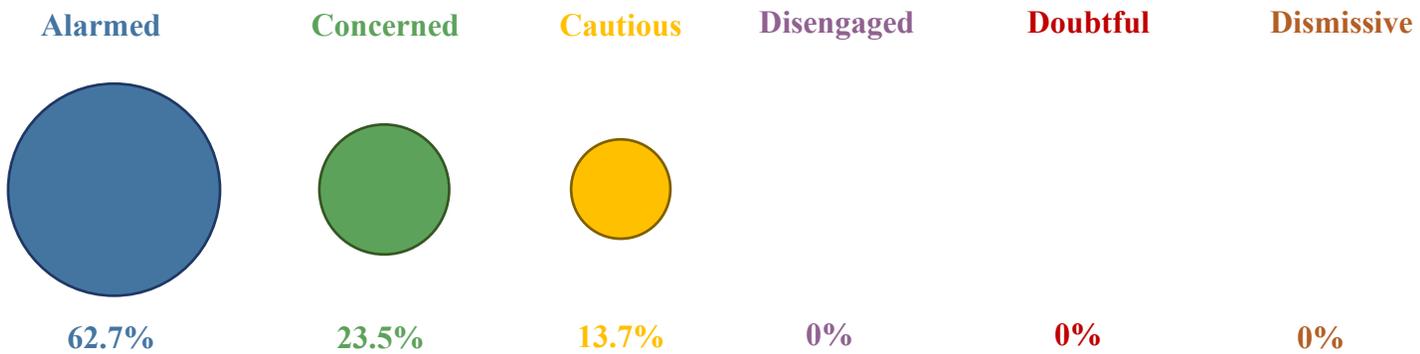
*A) Survey 1; n = 51*



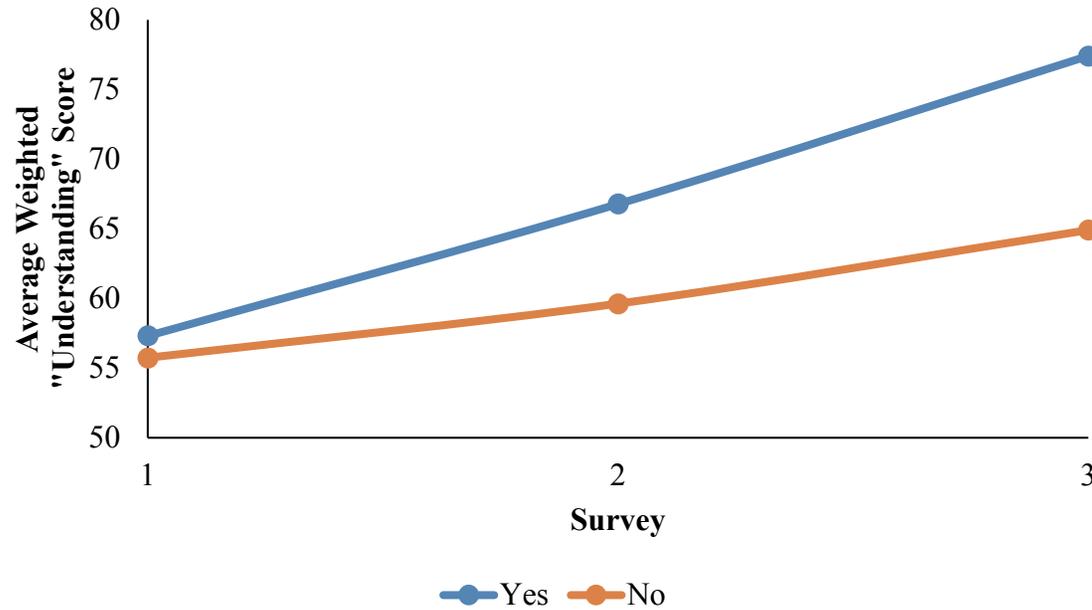
*B) Survey 2; n = 49*



*C) Survey 3; n = 51*



**Figure 4**



**Figure Captions**

1. SASSY scale ranges from alarmed to dismissive (Leiserowitz et al. 2009. Results for entire dataset. A) Survey 1, before the film. B) Survey 2, immediately after viewing the film. C) Survey 3, responses from 9 weeks after viewing the film.
2. SASSY results for participants who received the supplemental information via the website. (A = Survey 1, B = Survey 2, and C = Survey 3)
3. SASSY results for participants who did not receive supplemental information (A = Survey 1, B = Survey 2, and C = Survey 3)

4. Mixed ANOVA demonstrate the significant interaction for time and website condition for “understanding of what one can do to mitigate their effect on climate change.”  $F(2, 168.34)=6.19, p<0.05, \eta p^2= 0.046$ . Blue indicates participants who received the website; orange indicates participants who did not receive the website.