
GOING VIRAL

Measuring the
Impact of *Contagion*

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THE USC ANNINGBERG NORMAN LEAR CENTER

MEDIA IMPACT PROJECT

ABOUT



MEDIA IMPACT PROJECT

The Media Impact Project is a hub for collecting, developing and sharing approaches for measuring the impact of media. Based at the USC Annenberg Norman Lear Center, we seek to better understand the role that media plays in changing knowledge, attitudes and behavior among individuals and communities, large and small, around the world. The Media Impact Project brings together a unique team of researchers including social and behavioral scientists, journalists, analytics experts and other specialists to collaborate to test and create new ways to measure the impact of media. Content creators, distributors and media funders can ultimately apply these techniques to improve their work and strengthen engagement. The Lear Center's Media Impact Project is funded by a grant from the Bill & Melinda Gates Foundation, with additional funding from the John S. and James L. Knight Foundation and the Open Society Foundation. For more information, please visit www.mediaimpactproject.org.

THE NORMAN LEAR CENTER

The Norman Lear Center is a nonpartisan research and public policy center that studies the social, political, economic and cultural impact of entertainment on the world. The Lear Center translates its findings into action through testimony, journalism, strategic research and innovative public outreach campaigns. On campus, from its base in the USC Annenberg School for Communication and Journalism, the Lear Center builds bridges between schools and disciplines whose faculty study aspects of entertainment, media and culture. Beyond campus, it helps bridge the gap between the entertainment industry and academia, and between them and the public. Through scholarship and research; through its conferences, public events and publications; through its role in the formulation of the academic field of entertainment studies; and in its attempts to illuminate and repair the world, the Norman Lear Center works to be at the forefront of discussion and practice in the field. For more information, visit www.learcenter.org.

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PARTICIPANT MEDIA

Participant Media (www.participantmedia.com) is a leading media company dedicated to entertainment that inspires and compels social change. Founded in 2004 by Jeff Skoll, Participant combines the power of a good story well told with opportunities for viewers to get involved. Participant's more than 70 films include *Spotlight*, *Contagion*, *Lincoln*, *The Help*, *He Named Me Malala*, *The Look of Silence*, *CITIZENFOUR*, *Food, Inc.*, and *An Inconvenient Truth*. Participant has also launched more than a dozen original series, including "Please Like Me," "Hit Record On TV with Joseph Gordon-Levitt," and "Fortitude," for its television network, Pivot (www.pivot.tv). Participant's digital hub, TakePart (www.TakePart.com), serves millions of socially conscious consumers each month with daily articles, videos and opportunities to take action. Follow Participant Media on Twitter at @Participant and on Facebook.



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INTRODUCTION

CAN MOVIES REALLY CHANGE PEOPLE?

For media researchers, it is really hard to figure out the impact of a TV show, a song, a film, a game. There is a general feeling that representations have an impact on our lives, but it seems like an impossible thing to measure. In this research study we sought to understand which variables influence someone's likelihood of watching a particular film or television show and whether there was any impact on viewers' knowledge, attitudes and behavior that could be attributed to that media exposure.

Participant Media approached the Norman Lear Center to help them answer these questions about their science fiction medical thriller, *Contagion*. Participant Media is a production company whose goal is to make films that change society and they have made dozens of critically acclaimed films, both documentaries and fictional feature films, that deal with serious social issues in entertaining and engaging ways. Participant Media wanted the Lear Center's help figuring out whether their films were having the impact they had hoped for.

Lear Center researchers began to answer these questions by developing an online survey methodology that could evaluate the impact of Participant Media's films and their social action campaigns on the general public. The Center looked at three of Participant Media's films — *Food, Inc.*, *Waiting for 'Superman'* and *Contagion* — and this report is part of a series of impact evaluations of those films.

Our research goals included:

- What did people learn about issues depicted in a film?
- Did a film encourage someone to take action?
- Which elements of Participant Media's social action campaigns are most likely to encourage people to take action?
- Is there a relationship between emotional engagement with a film and taking action?
- Can we associate enjoyment or appreciation of a film with taking action?
- Is there a relationship between people's inclination to take action and their beliefs about the potential impact that a film can have on individuals, the media, public opinion and public policy?
- What do survey respondents believe Participant Media should do to motivate people to take social action?

Each of these three reports provides highlights from our findings. Please contact the Norman Lear Center at enter@usc.edu to inquire about additional results.

WHY STUDY CONTAGION?

Contagion is a feature film directed by Academy Award winner Steven Soderbergh and released in 2011. The film follows the rapid progression of a highly contagious virus that kills within days. As the epidemic grows, medical researchers and public health officials work to contain the disease, introduce a vaccine to halt its spread and calm the panic that spreads as fast as the virus itself. The film highlights the factors that shape the occurrence of a pandemic, the limits and consequences of public health responses and how interpersonal connections can play a role in the spread of disease.

It was especially exciting to measure the social impact of *Contagion* because it is a fictional film. While most audience members recognize that documentary films are often carefully engineered to deliver actionable data to viewers, moviegoers do not immediately assume that a fictional film might teach them something or encourage them to change their attitudes about a particular issue, or take action after the film is over. Whether the topic is history or science, experts are often wary about fictional films that try to grapple with real-life issues and events. *Contagion*, which provides a gripping illustration of what could happen if a global pandemic occurred, caused a flurry of news coverage about its accuracy. Director Steven Soderbergh attracted a bevy of A-list talent — Matt Damon, Gwyneth Paltrow, Kate Winslet, Marion Cotillard, Jude Law and Laurence Fishburne — which increased the odds that this film would be seen by a very broad range of moviegoers, most of whom know very little about global pandemics.



W. Ian Lipkin, one of the consulting experts on the film, published an op-ed in the Sunday edition of *The New York Times*, where he described how he overcame his wariness about using Hollywood glamour to communicate messages about the dangers of a global pandemic:

“Is this fiction? Yes. Is it real? Absolutely. During the SARS outbreak of 2003, the first pandemic of the 21st century, I flew to Beijing at the invitation of the Chinese government to help address the situation there. My memories of deserted streets, food and supply shortages, and political instability are reflected in scenes in Contagion. I hope the public and our lawmakers will see the movie as a cautionary tale. Pandemics have happened before. And they will happen again.”

Audiences are moved by fictional representations and, if the depictions feel realistic and compelling, people often apply what they learn in fictional settings to their real lives. Popular films like this one can transmit fairly detailed scientific information to a lay audience, and even play a role in romanticizing or denigrating entire professions. TV shows like *LA Law* and *CSI* sparked interest in the legal profession and forensics, but scientists are often concerned about the lack of positive role models in popular media. *The Los Angeles Times* interviewed three experts about how *Contagion* depicted a global viral pandemic and the professionals who would work on the front lines. Alice Huang, a virologist at the California Institute of Technology, said “It’s very nice to see a movie where scientists aren’t the evil ones.”

Two questions guided our study of this film:

- Which variables influenced someone’s likelihood of watching *Contagion*?
- What was the impact of *Contagion* on knowledge, attitudes and behavior?

Funding for this study, which was independently designed, conducted and released by the Norman Lear Center, was provided by Participant Media, who also co-financed the making of *Contagion*.

HOW CAN IMPACT ON VIEWERS BE MEASURED?

Given the star-power of the film, *Contagion* was given a broad theatrical release and it grossed \$75.6 million domestically. Unlike *Food, Inc.* or *Waiting for “Superman,”* *Contagion* is not a niche, social issue documentary film with a niche audience. Most people did not choose to see *Contagion* because they had a strong existing interest in the public health issues around global pandemics. While a typical study

of the social impact of a mainstream film might involve a national representative survey sample, we decided to deploy a survey study that used a comparison group composed of people who were very similar to *Contagion* viewers, but had not seen the film.

We used propensity score matching (PSM) to help determine whether the different results that we see between viewers and non-viewers are associated with viewing *Contagion*, rather than pre-existing differences between these two groups.

The Lear Center developed an innovative survey instrument that could assess the impact of *Contagion* on its viewers by comparing their re-

sponses to those of very similar people who had not seen the film. We used propensity score matching (PSM) to help determine whether the different results that we see between viewers and non-viewers (the control group) are associated with viewing *Contagion*, rather than pre-existing differences between these two groups. This method controls for some of the self-selection bias that leads different people to watch (or not watch) a given film in the first place, thus increasing the validity of subsequent comparison statistics. More details on our approach and explanation of how we used propensity score matching can be found in the Methodology section.

This research began with a link to a survey about Participant Media films that was posted on various Participant Media sites and an email newsletter. We did not mention the survey was specifically for *Contagion* because our goal was to attract respondents who had not seen the film as well as those who had. The survey contained many traditional questions: demographic questions, questions about their political affiliations and their attitudes toward issues that were depicted in the film. However, we also asked survey respondents how likely it

was that they would take specific actions recommended in the film — *whether they had seen the film or not*.

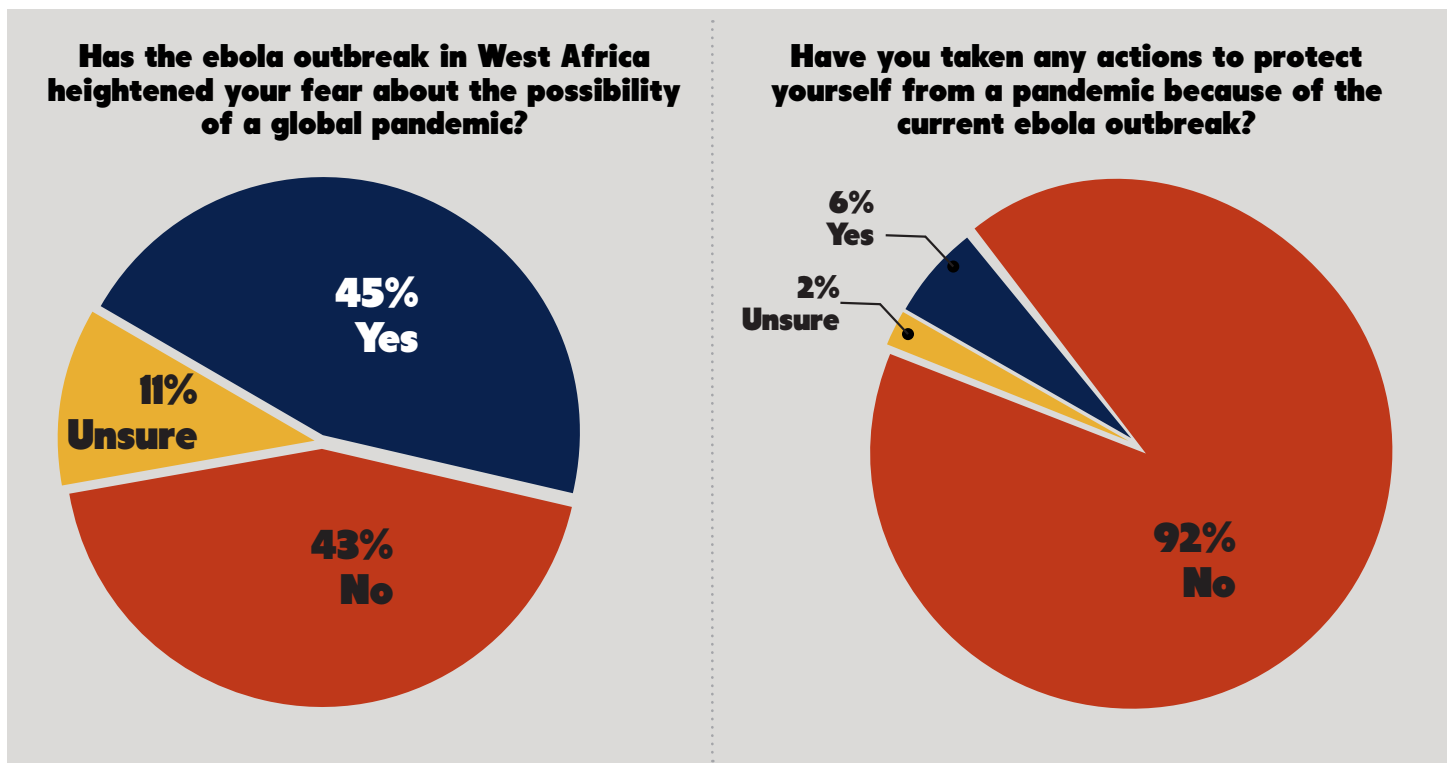
This report describes the findings of this survey. It is our hope that these findings will be useful for filmmakers, funders, activists and media researchers who are eager to more accurately measure the impact of media content on viewers, listeners, readers or players.

DID THE EBOLA OUTBREAK AFFECT OUR RESULTS?

In late July 2014, the Ebola outbreak in West Africa became a top news story in the United States. On August 10th, we included two additional questions about the outbreak since we suspected it might affect people's responses to a survey about viral pandemics. Eighteen percent of our total sample of 1,007 respondents answered these two additional questions.

- When asked whether the Ebola outbreak heightened their fear about the possibility of a global pandemic, 45% of respondents said “yes.”
- However, very few (6%) reported taking any actions to protect themselves from a pandemic because of the current Ebola outbreak.

Because so few people said that they had taken any type of action, we concluded that the Ebola outbreak did not have a significant effect on behavior outcomes in this study. However, since almost half of respondents indicated that they were more frightened, we believe we may see the effects of this in our analysis of perceptions about the importance of quarantine centers and vaccine research (please see Comparing Outcomes section).

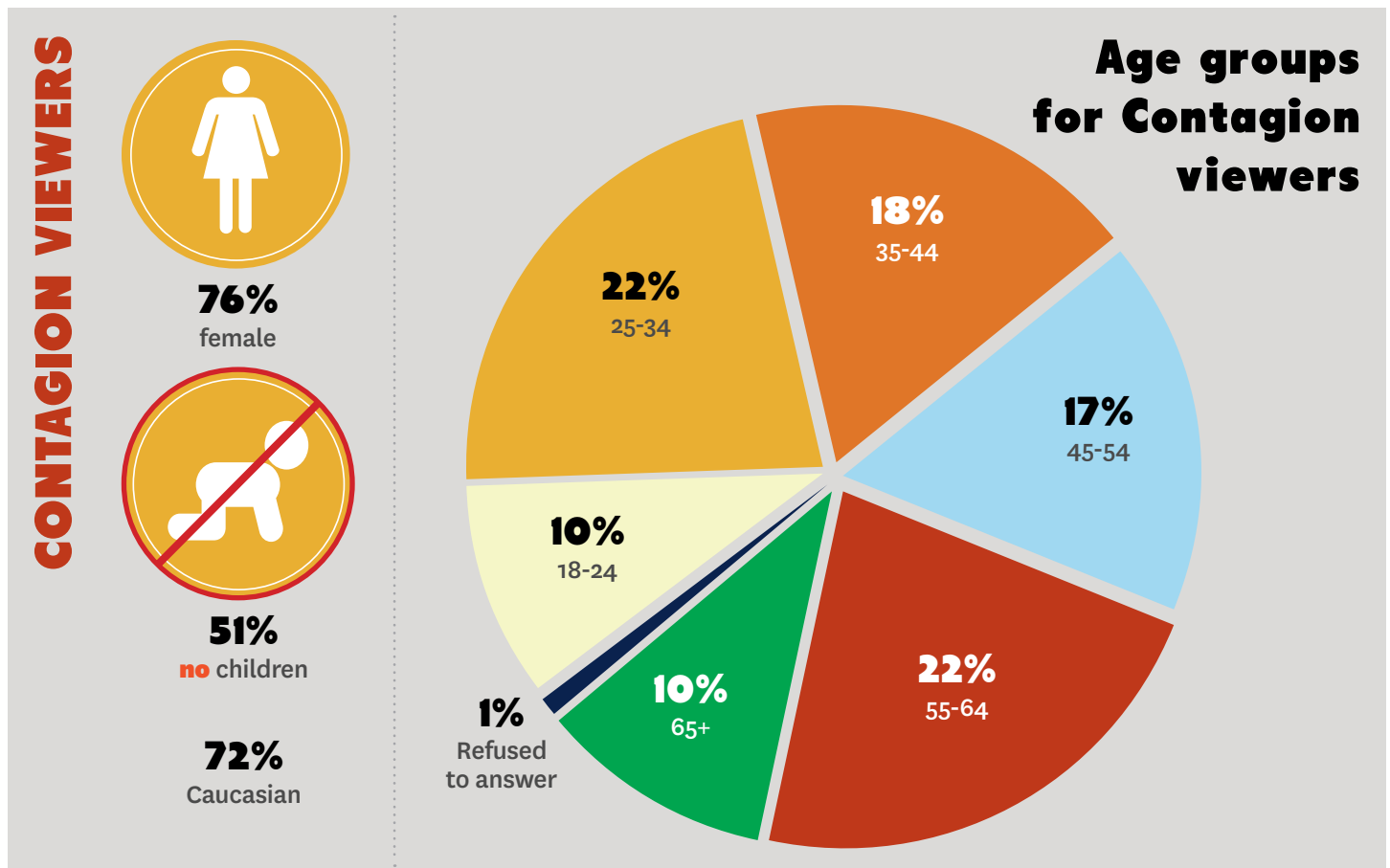


KEY FINDINGS

PROFILING CONTAGION VIEWERS

Demographics

- The overwhelming majority of *Contagion* viewers were female (76%) and Caucasian (72%.) Half did not have children (51%).
- Viewers were highly educated: 26% completed some college; 37% were college graduates and 26% attended graduate school.
- Viewers worked in a range of professions, with a large proportion in education (16%) and health (13%).
- 43% of viewers reported an annual income of less than \$50k.
- The survey was administered through existing Participant Media sites, social media channels and an email list, which made it unnecessary to pay for access to a survey panel.



CONTAGION VIEWERS

Do you work in any of the following?*



16%
education



13%
health



11%
non-profit



10%
media/advertising



7%
government



4%
food industry

What is your highest level of education completed?

2% | some high school or less

8% | completed high school

26% | some college/trade school

37% | college graduate

26% | graduate school

1% | declined to answer

What is your approximate household income?

Less than \$25,000 **19%**

\$25,000 — \$49,999 **24%**

\$50,000 — \$74,999 **14%**

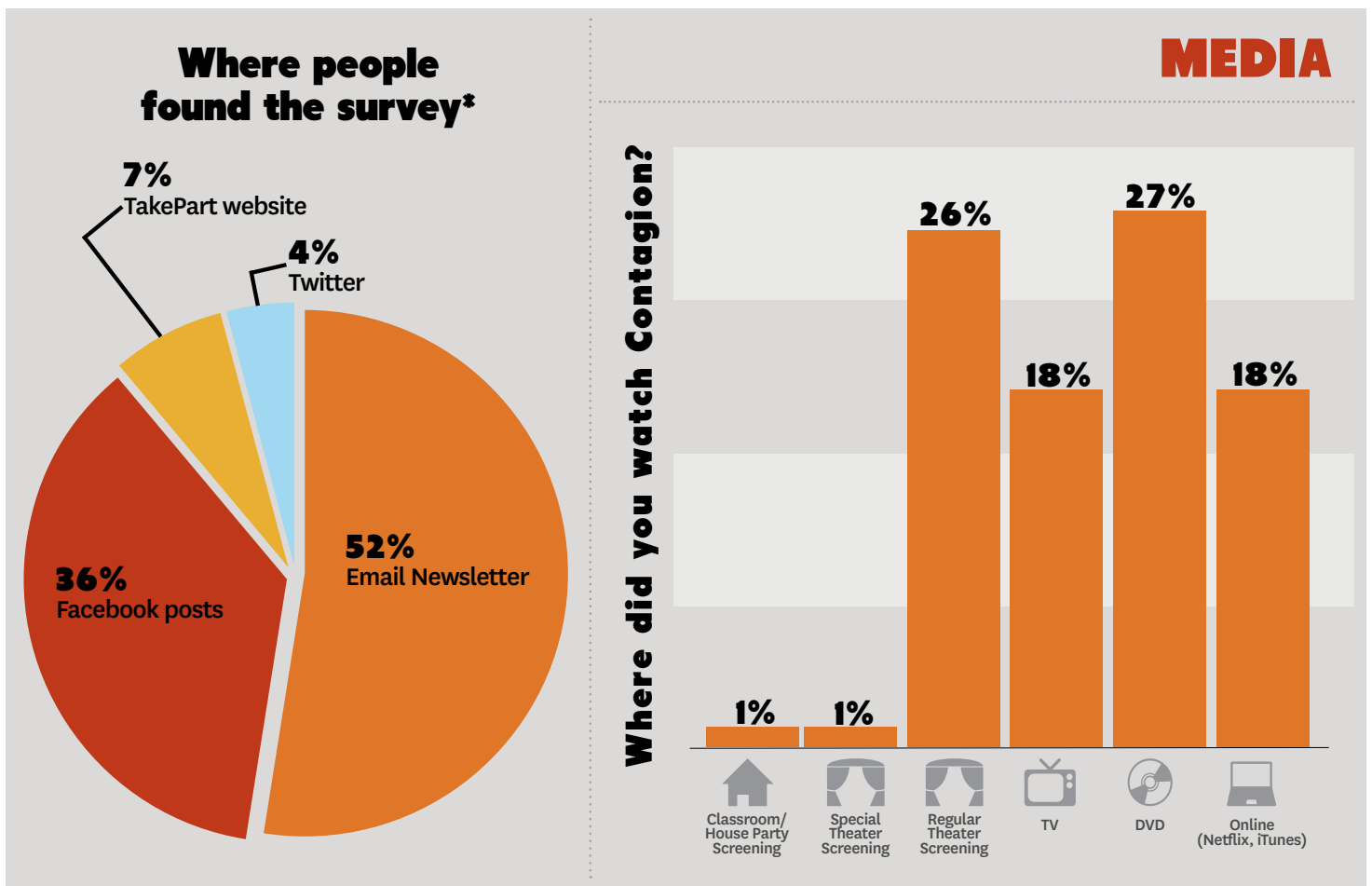
\$75,000 or more **26%**

Declined to answer **17%**

*Does not equal 100% because respondents were only asked about the industries listed.

Media Exposure & Preferences

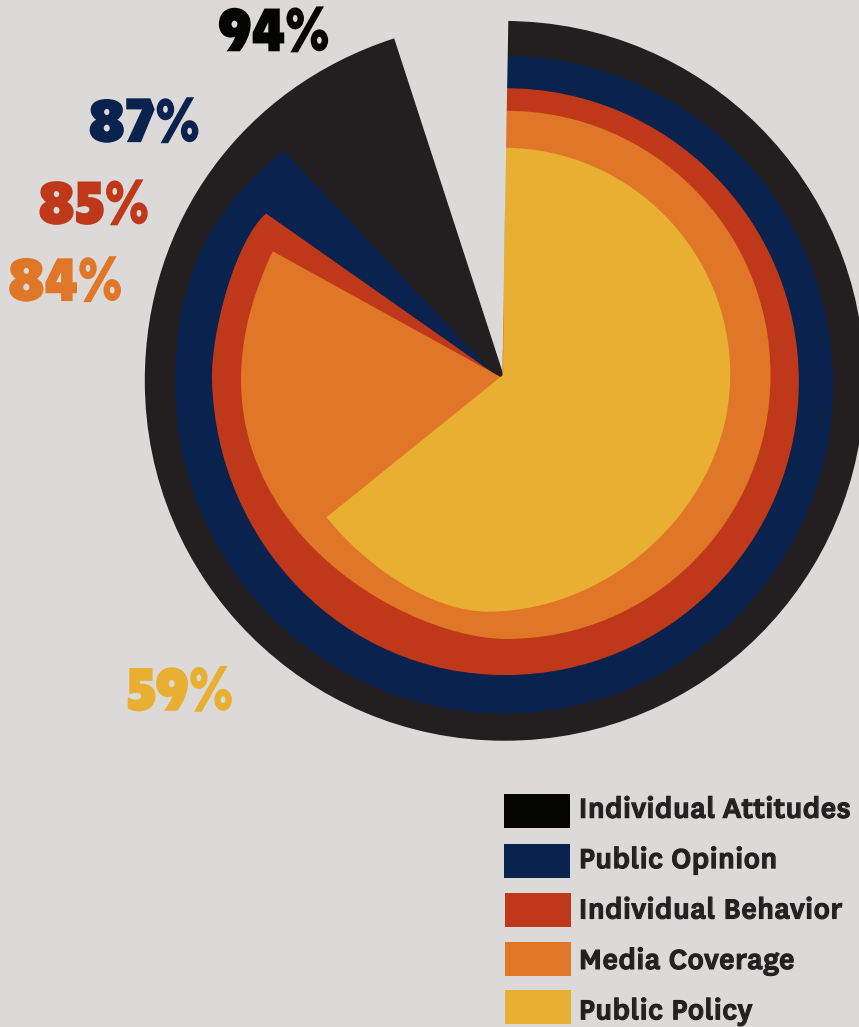
- Only two viewers had NOT seen at least one other Participant Media film; 75% had watched *The Help*, 74% watched *An Inconvenient Truth* and 65% watched *Lincoln*.
- *Contagion* viewers frequently watched social issue documentaries and feature films:
 - 74% watch social issue documentaries at least three times a year — only 57% of non-viewers said the same.
 - 82% of viewers watch social issue scripted films at least three times a year, compared to 62% of non-viewers.
- Viewers were exposed to the film’s outreach primarily through film previews (79%) and media coverage (46%).
- About a quarter (26%) saw the film in theaters; another 27% saw it on DVD/Blu-Ray and 18% saw it online.
- The vast majority of viewers believe that films are capable of producing social impact:
 - 94% said a film can impact individual attitudes.
 - Over 84% said a film can impact media coverage, public opinion and individual behavior.



*Due to rounding, does not equal 100%.

MEDIA

Do you think a film could have a moderate or large impact on any of the following?



- Individual Attitudes
- Public Opinion
- Individual Behavior
- Media Coverage
- Public Policy



Preview



Media Coverage



Contagion Facebook Page



Virus Online Video



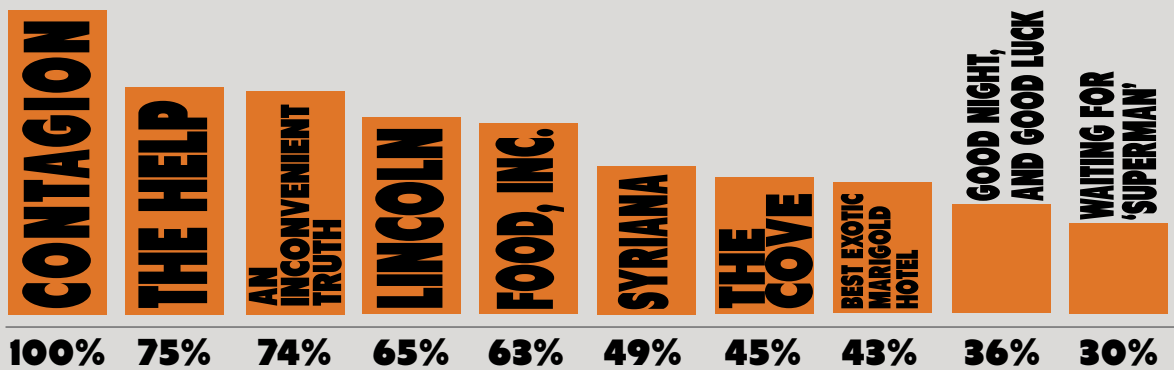
Interactive Preview



Screening Invite



Patient X Facebook App



Which of the following films have you seen?

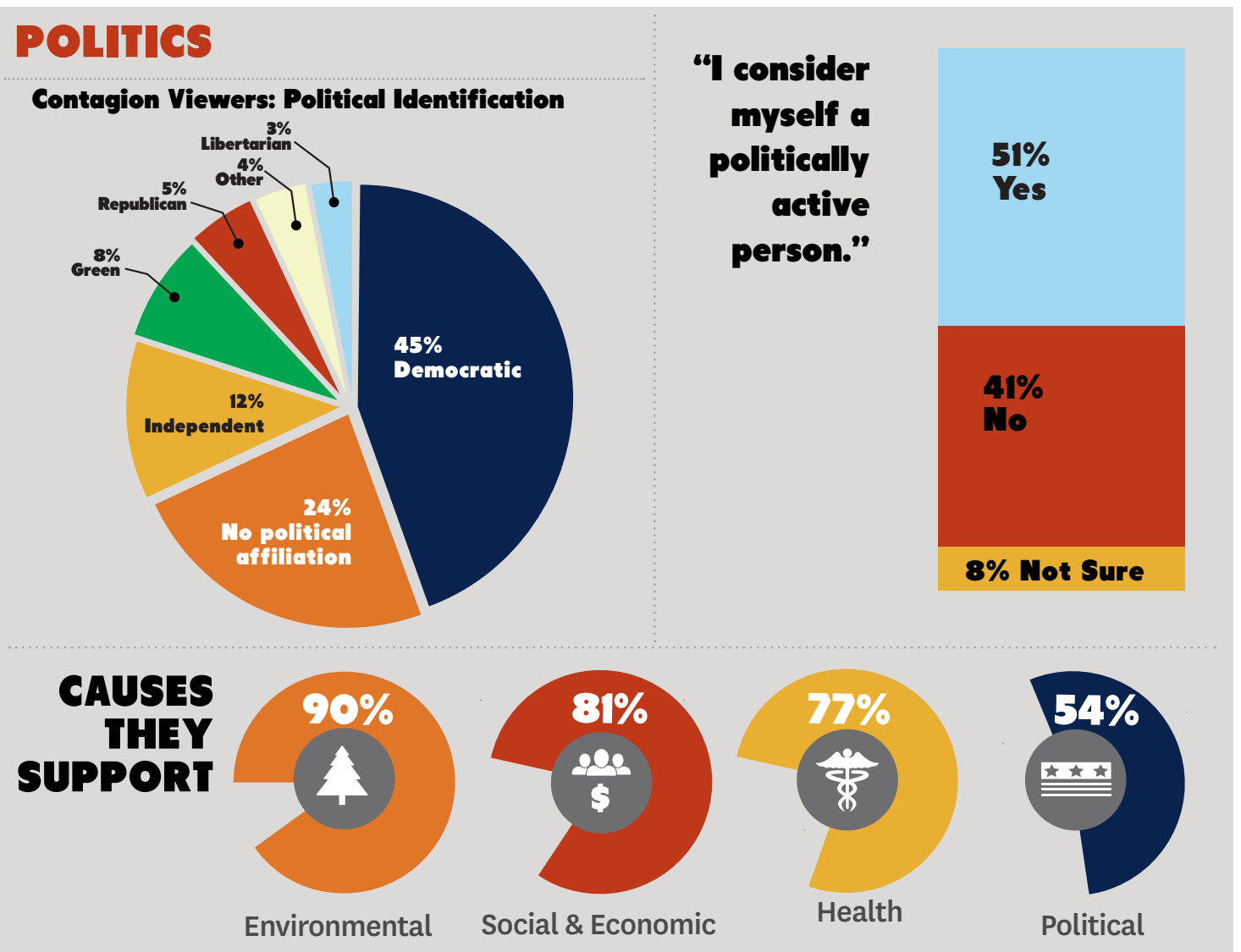
Politics

In our previous studies of *Food, Inc.* and *Waiting for "Superman,"* we discovered a surprising degree of skepticism about politics among viewers. Since both of those documentary films dealt with very contentious political topics, food safety and education, we expected that viewers would be politically engaged. However, we found that over half of *Waiting for "Superman"* viewers said they were "sick of politics" and only 37% of *Food, Inc.* viewers said, "I consider myself a politically active person."

We were curious to see whether the same disdain for politics appeared among viewers of *Contagion*, and the results were, indeed, very similar. This suggests that the Participant Media/TakePart audience might be quite consistent in political orientation, regardless of whether we focus on documentary film or fictional film viewers.

- Over half (59%) said they were "sick of politics" and 24% claimed no political affiliation.
- 41% said they were not politically active and another 8% said they were "not sure."
- 90% of viewers support environmental causes, 81% support social and economic causes and 77% support health causes. By contrast, only 54% support political causes.

A meager 1% of viewers believed that "serious problems are best addressed through the political system." Seventy-six percent said that grassroots activism must be a part of the political process in order to get results.



SOCIAL IMPACT: USING MATCHED PAIRS TO MEASURE CHANGES IN KNOWLEDGE, ATTITUDES & BEHAVIOR

Creating the Matched Pairs

To measure changes in knowledge, attitudes and behavior we created a survey about Participant Media films and posted it to a number of their web and social media sites, as well as distributing a link in their TakePart newsletter. Fifty-one percent of all survey respondents had watched the film *Contagion*.

Given that people choose which films they will see based on their personal taste and interests, it is difficult for media researchers to determine a film's impact without dealing with some degree of bias. In this study, propensity score matching (PSM) techniques were used to control for self-selection bias among survey respondents. PSM helped identify factors that predict the likelihood of a person seeing *Contagion*. The Lear Center's research team performed a statistical analysis of survey responses from all the respondents who watched *Contagion* and determined what personal characteristics increased their likelihood — or propensity — to see the film.

The Propensity Model

We discovered that viewers with a high propensity to watch *Contagion* shared *eight characteristics*:

Demographics: | 1 Female

Media Exposure:

Heard about viral pandemics through:

2 news

3 conversations

4 Saw "How A Virus Changes The World"

Attitudes:

5 Worried about the threat of a viral pandemic

Film Viewing:

Watch social films because:

6 they are compelling

7 they want to find out what they can do to help

8 Recommend fictional films so that people can learn about social issues

We used these characteristics to generate a propensity score for survey respondents who had seen the film, and those who had not. People with all 8 of these characteristics received the highest score and those with the fewest received the lowest. However, just because someone has a high score does not mean that they have seen the film — it just makes it more likely that they have seen it. Therefore, a person with a very high score may not have seen the film yet, and a person with a very low score may have seen it despite themselves (for instance, someone who never watches social issue films may have seen it because Matt Damon was in it).

Once scores were assigned, we created two groups: people who had watched *Contagion* and those who had not. Next, we compared the range of scores in each group and then performed "one-to-one matching," which allowed us to use a statistical method to remove people from each group until both groups were composed of the same number of respondents with the same range of propensity scores (e.g., each person who saw the film was paired with a person who did not see the film, but was equally likely to see the film based on their propensity scores). The salient difference between the two groups was whether or not they had viewed *Contagion*.

This method allowed us to create something similar to a classic study design where subjects are randomly assigned to a control group (those who had not seen *Contagion* but were equally likely to) and a treatment group (those who had seen *Contagion*). By making these groups completely parallel, we were able to examine differences in knowledge, attitudes and behavior based upon exposure to the film.

Comparing Outcomes

We were interested in seeing whether *Contagion* increased people's knowledge about viral pandemics, affected their attitudes towards public health agencies and infrastructure, and whether it encouraged people to change any behaviors around their health and preparation for a viral pandemic. We asked: **did the *Contagion* viewer change somehow, due to exposure to this film?**

Knowledge

- The film increased knowledge about viruses. Viewers of the film were significantly more likely to know that viruses mutate and to answer more quiz questions about viral pandemics correctly, compared to the comparison group.
- Both viewers and non-viewers were equally familiar with the Centers for Disease Control and Prevention (CDC), and there was no significant difference in their attitudes toward the agency.

Attitudes

We were also curious whether watching *Contagion* impacted perceptions about viral pandemics and access to medical care.

- We found that *Contagion* viewers were no more likely than non-viewers to think it was important that everyone has equal access to vaccines. Respondents were asked to rate the importance of equal access on a 10-point scale and the mean rating for all respondents was 8.8, indicating that the bar was set extremely high.
- Watching *Contagion* actually decreased the odds of thinking that funding for quarantine and treatment centers and vaccine research is important. Once again, the bar was set extremely high: the mean ratings were 8.8 for quarantine and treatment centers and 8.9 for vaccine research.

In short, the entire sample — viewers and very similar non-viewers — placed a premium on public health research and infrastructure around viral pandemics. While the results from our questions about Ebola suggested that the crisis did not instigate behavior change in our survey population, these attitudinal findings imply that it may have affected perceptions of the importance of public health research and infrastructure.

Behavior

In addition to increasing knowledge and affecting attitudes, Participant Media's social action campaign hoped the film could positively affect viewers' behavior by encouraging them to take a range of actions. These actions fell into three categories: (1) preparedness, (2) preventing the spread of viruses and (3) getting the flu shot vaccination.

THE BOTTOM LINE: HOW DID CONTAGION AFFECT PEOPLE?

After watching *Contagion*,
people were:

**MORE
KNOWLEDGEABLE**
about viruses, and more
likely to know viruses
mutate



MORE ENGAGED
in actions that could help
them prepare for a viral
pandemic, like preparing
an emergency kit and talking
to friends & family



MORE COMMITTED
to washing their
hands frequently



Preparedness

● Watching *Contagion* increased the odds of viewers engaging in two actions that could help them prepare for a viral pandemic: preparing an emergency kit and talking to friends, family and neighbors about viruses

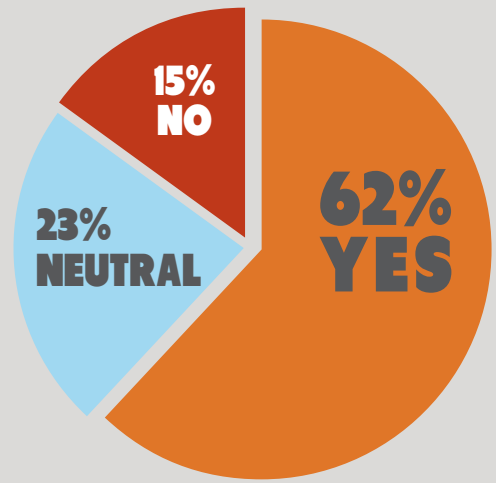
Preventing the spread of viruses

- Watching *Contagion* also increased the odds that viewers would be more careful about washing their hands frequently. This was the only action around prevention that was statistically significant.
- Viewers were no more likely than non-viewers to
 - Cover their faces when coughing or sneezing
 - Stay home when they are sick
 - Avoid touching their faces

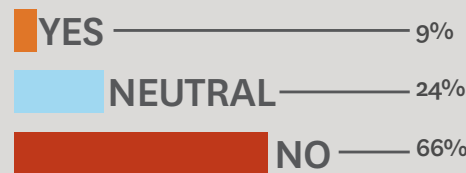
Flu shot

Although it was not featured in the *Contagion* social action campaign, we wanted to know whether it was more likely that viewers of *Contagion* received a flu shot in the three years following the release of the film. Although we observed a steady increase in the number of people in our sample who got flu shots for the first time after the film was released (from 7% in 2011 to 31% in 2013), we found no differences between viewers and non-viewers.

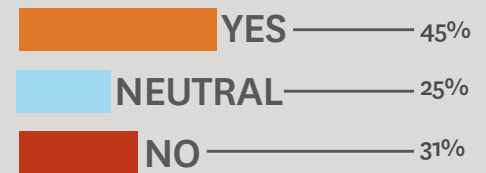
Contagion affected me emotionally



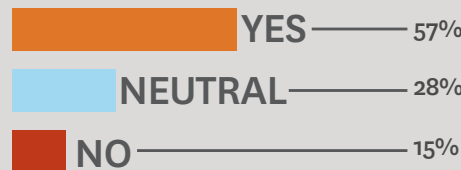
When the film ended, I found it easy to put it out of my mind*



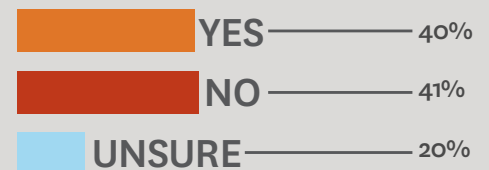
I was provided with information about how to survive a viral pandemic?*



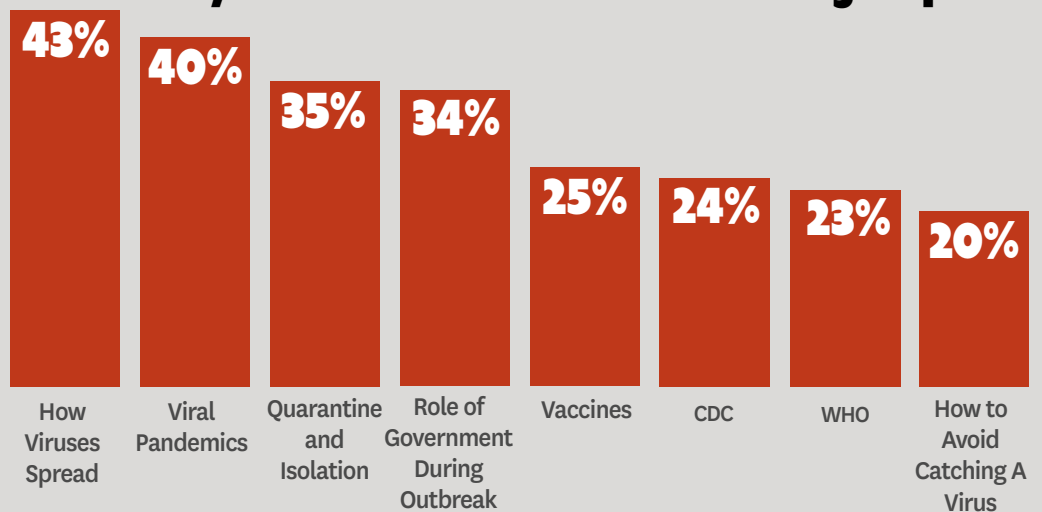
I could picture myself in the scenario depicted in the film



I think I am more careful about these things after seeing Contagion*



Viewers who said they learned 'a lot' or 'very much' about the following topics:



*Due to rounding, total does not equal 100% .

SOCIAL IMPACT: SELF-REPORTED CHANGES IN KNOWLEDGE, ATTITUDES & BEHAVIOR

Some questions in the survey could only be asked of people who had seen the film. Therefore, these findings did not involve the use of the comparison group, which means there is no correction for self-selection bias.

Knowledge

- At least 40% of viewers said they learned ‘a lot’ or ‘very much’ about viral pandemics and how viruses spread.
- 45% said that *Contagion* provided them with information about how to survive a viral pandemic.

Attitudes

Contagion viewers reported a high level of engagement with the film, which is often associated with shifts in attitudes:

- 66% said that when the film ended they could not put it out of their minds.
- 62% said that the film affected them emotionally.
- 57% said they could picture themselves in the scenario depicted in the film. Viewers reported that they were more prepared for a viral pandemic after viewing the film.
- Viewers reported that they were more prepared for a viral pandemic after viewing the film. On a 10-point scale, viewers rated their preparedness level at 4.05 before the film and 5.3 after watching the film.

Behavior

- After watching *Contagion*, viewers reported talking to their friends, family and colleagues about the following: viral pandemics (61%), how viruses spread (54%) and vaccines (47%).
- After watching the film, 40% of viewers said they were more careful about the following:
 - Washing their hands frequently
 - Covering their face when they cough or sneeze
 - Staying home when they are sick
 - Avoiding touching their face

RECOMMENDATIONS FROM RESPONDENTS

Almost 400 respondents answered the following open-ended question:

Do you have any suggestions about what Participant Media or TakePart could do to help people become better prepared for a viral pandemic?

Many respondents felt that Participant Media or TakePart could help people become better prepared for a viral pandemic by using factual information in their public awareness campaigns and avoiding scare tactics:

“Continue to educate — especially about contagion myths — to overcome mass hysteria.”

“Accurate information must be dispensed to inform and tamp down the fear.”

“Disease can be spread just as easily and fast as ignorant rumor; stick with facts.”

*“Mechanisms of reliable factual communication that would be accessible to everyone is most important in emergencies. The internet is full of absolute bullsh**!”*

Similarly, respondents wanted more information on the science behind viruses, how they spread and how they could be prevented:

“Educate more on flu shots and how they work.”

“Summarize a variety of current scientific research and historical context.”

“I know so little about dangerous viruses or diseases, until they become issues. More education about those that could potentially become pandemic, along with Ebola education (symptoms, preventions, transmission, etc.) would be welcome.”

Respondents also thought it would be helpful to provide lists or fact sheets on prevention and preparedness:

“Send out fact sheets and ways to seek help.”

“Simple, step by step instructions to those at risk. Clear, concise information is vital.”

“A clear list of the topmost important, essential things to do or items to have like bullet points with links for people who like to be better prepared. Direct, simple, straight-forward information — something even a child could remember.”

Additionally, respondents stressed the importance of the media — both traditional and online — to spread the word about preparing for a viral pandemic:

“Use social media and other forms of advertising for vulnerable people and those who may not have internet access (hospital signage, outdoor advertising, billboards, bus shelters, pharmacy advertising, etc.)”

“Continue issuing current stories that affect TakePart’s readers, ... using social media as a foundation.”

METHODOLOGY

OVERVIEW

The Lear Center's impact evaluation of *Contagion* and its campaign began in 2014, over two years after its release — beginning in April 2014 and concluding in September 2014. The time between the release of the film and data collection allowed for the population of viewers to grow well beyond moviegoers to those who were exposed to the film through television, video/DVD rental, or online media in their homes and communities. Additionally, waiting over two years made it possible to capture sustained changes in knowledge, attitudes and behavior, as opposed to the short-lived or aspirational changes that might register in a survey taken immediately after a screening of a film.

The research began with a 5-10-minute online survey that was disseminated through a link placed in a Participant Media email blast. The survey was also posted on the Participant Media website, the TakePart website, and their Facebook and Twitter accounts. All surveys were completed online; participation was voluntary and all survey items were in English.

NOTES ON PROPENSITY SCORE MATCHING

The survey methodology in this study of *Contagion* adapts propensity score matching (PSM) techniques used in clinical research as well as communication studies. PSM specifically addresses the key problem of “selection bias” among movie viewers: only certain people choose to see certain films, making it very difficult for researchers to expose people randomly to a movie and to determine the actual impact of the film.

Propensity score matching is a method of statistical analysis that controls for simple selection bias in studying the effect of exposure to a treatment or intervention. In the case of a media campaign, the “intervention” may be a feature film, a song, a TV episode, a billboard, a game, a pamphlet, a PSA or a news report.

In this research, the first phase of PSM entailed finding the factors that would predict the likelihood of a subject being exposed to the film, *Contagion*. These factors might include some combination of personal taste, ideology, media preferences, past behavior patterns and demographics. Using logistical regression, we created a model based upon those predictors which included eight variables.

In the second phase, subjects are assigned propensity scores: subjects who did not view *Contagion* were matched and compared with subjects with the nearest propensity score who did view *Contagion*. In studies of this type, we are typically looking for differences in awareness, knowledge, attitudes and behavior based upon exposure to the film.

Using this methodology allowed the Lear Center's researchers to create a detailed profile of likely viewers of the film and to compare

Using this methodology allowed the Lear Center's researchers to create a detailed profile of likely viewers of the film and to compare viewers who saw the film with very similar people who did not.

viewers who saw the film with very similar people who did not. Unlike typical survey research, this method allows researchers to construct something similar to a classic study design where individuals are randomly assigned to a treatment group and a control group.

- Total survey respondents: 1,007
- *Contagion* viewers (exposed/treatment group): 342
- Did not see *Contagion* (control group): 329

The PSM results are based on a subset of 489 respondents who answered all of the propensity questions. All of these survey respondents were assigned a propensity score indicating the likelihood that they would view *Contagion*. The scores were based on 30 variables such as demographics, prior viewership of social issue films and exposure to *Contagion* promotional materials. After performing one-to-one matching, both the exposed and the control groups were composed of respondents with the same range of propensity scores. There were 163 people in each of these groups and their scores were relatively normally distributed. The salient difference between the two groups was whether or not they had viewed *Contagion*.

Advantages of PSM

- It reduces bias in comparing treatment to non-treatment groups when random assignment is not possible by creating two statistically equivalent groups from a self-selected survey sample.
- In multimedia evaluations, there are often many variables influencing outcomes, making simple weighting schemes difficult to determine. PSM allows for control of multiple variables so that the impact of the campaign can be examined more specifically.
- Pre-post testing can be problematic in that the survey is administered in two different time periods. Subjects will inevitably be exposed to a variety of other media messages between the pre- and post-test, which could contribute to altered outcomes in the post-test. PSM is an alternative to a pre-test/post-test design that avoids these pitfalls.

Unexposed PSM respondents = pre-intervention respondents
Exposed PSM respondents = post-intervention respondents

Disadvantages of PSM

- It is still a correlation method, thus does not allow for causal inferences.
- It relies on a relatively large sample size that contains enough variety for an exposed cohort to have a comparable non-exposed cohort. This is the smallest sample size we have ever used for a PSM analysis.

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