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Science vs. fear: the Ebola quarantine debate as a case study that reveals how the public perceives risk

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This study focuses on newspaper coverage of the Hickox quarantine incident, using it as a case study to examine how the media characterized the spread of disease in an ongoing crisis situation characterized by uncertainty. The study builds on Slovic et al.'s research, who argue that risk perception is comprised of both emotional and analytical aspects. We employed a qualitative approach, first examining articles on Hickox's story in *The New York Times* and *New York Daily News* between October 25 and 31, 2014; and second, readers' comments in response to these articles. The findings from the newspaper articles show that in their treatment of the quarantine debate, the media did not address the issue of uncertainty, and thus continued the health authorities' neglect of this issue. Although the media gave expression to various sides of the debate, it emphasized those who objected to the quarantine policy, thus raising the claim that the conflict was between 'science' and the public's 'irrational fears,' and that the governors decided on quarantine in response to the public's panic and fears. From our analysis of readers' comments, it appears that these claims are unjustified. First, we found that the public did not speak in a single unified voice, but rather, was divided into supporters and opponents of quarantine. Both sides used scientific arguments and resorted to similar terminology, and tended to cite and present studies backing their arguments. As for irrational fears, although quarantine supporters expressed emotions, they indicated mainly concerns, not panic or hysteria.

Keywords: Hickox quarantine incident; Ebola; perceived risk; media characterization of spreading disease; qualitative research

1. Introduction

1.1. Hickox quarantine incident

The public's response to four domestic Ebola cases in the US and to different approaches adopted by various authorities regarding precautionary measures that needed be taken were perceived by scholars and journalists as a 'national panic' (Gonsalves and Staley 2014; Viebeck 2014). Mckenna (2014) dubbed this response 'Ebolanoia.' The assertion that the public reacts out of unrealistic fears was raised mainly concerning the issue of quarantine. In October 2014, governors of several states, including New York and New Jersey, imposed 21-day quarantines on health care workers returning from regions of the world where they may have treated Ebola

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patients (Drazen et al. 2014). This policy arose in the wake of the Ebola hospitalization of a New York City doctor who had worked in Guinea for Doctors without Borders (MSF) and tested positive for Ebola (Schnirring 2014). On 23 October 2014, Kaci Hickox, a nurse who returned from treating Ebola patients in Sierra Leone, also through MSF, was quarantined at a New Jersey hospital (Schnirring 2014). In an article published in the *Dallas Morning News*, and in an interview with CNN, Hickox lashed out at New Jersey Governor Chris Christie, who reportedly described her as 'obviously ill.' She spoke out against this treatment and claimed the mandatory quarantine order was a violation of her civil rights, and disputed health officials' claims that she had developed a fever after arriving (Hartocollis and Fitzsimmons 2014). After being held in an isolation tent for three days, and retaining a well-known civil rights lawyer, Hickox was released, and was driven to her home state of Maine, where she was required by an order from the state of Maine to remain in isolation until November 10, the end of a 21-day incubation period. Yet, she publicly defied the order and remained a vocal critic of government policy on Ebola (Pengelly 2014). On 31 October, a Maine judge ruled in her favor, saying local health officials failed to prove the need for a stricter order enforcing quarantine, yet ordered Hickox to submit to daily monitoring of symptoms, to coordinate her travel with public health officials, and to notify them if symptoms reappeared (Sanchez, Shoichet, and Karimi 2014).

The governor's decision to impose quarantine opposed the official stance of the Center for Disease Control and Prevention (CDC), and led to a debate between local and federal authorities. While the White House and CDC officials declared that returning Ebola medical workers should not be quarantined (Wulfhorst and Morgan 2014), the Pentagon issued a 21-day quarantine requirement for all service members who had been in contact with Ebola patients, whether they showed symptoms or not (Zernike and Fitzsimmons 2014). The debate intensified with criticism over the quarantine policy voiced by scholars. In an editorial in the *New England Journal of Medicine*, Drazen et al. (2014) argued that it 'is not scientifically based, is unfair and unwise,' and that 'We should be guided by the science and not the tremendous fear that this virus evokes.' Gonsalves and Staley (2014) were even more blatant, declaring that, 'The toxic mix of scientific ignorance and paranoia on display in the reaction to the return of healthcare workers from the front lines of the fight against Ebola in West Africa, the amplification of these reactions by politicians and the media, and the fear-driven suspicion and shunning of whole classes of people are all reminiscent of the response to the emergence of AIDS in the 1980s.'

1.2. Quarantine debate

At the heart of the quarantine debate are fundamental questions, such as how Ebola is transmitted and how long it incubates. The CDC and World Health Organization (WHO) contend that the virus spreads through direct contact with blood or other body fluids, or with objects and materials contaminated by these fluids, but that it cannot spread through air. They contend that infected people are not contagious until they develop symptoms, and that asymptomatic people rarely if ever transmit Ebola (Centers for Disease Control and Prevention 2014; WHO 2014). Therefore, the CDC does not recommend a quarantining policy. In contrast, Sandman and Lanard (2014), argue that supporters of quarantine also raise scientific arguments. Of these, the most convincing are that people infected with Ebola sometimes hide or misinterpret their symptoms, and that Ebola is often characterized by a sudden onset of

symptoms – as both the CDC and WHO case descriptions specify. The media has highlighted Ebola researchers quoted in the *Washington Post* and the *International Business Times*, who claim that airborne transmission cannot be ruled out (Howell 2014; Ross 2014). Others were cited warning that even if the virus is not presently airborne, it could mutate and become airborne (Charlton and Crossley 2014). In addition to these experts' arguments, some studies (Howell 2014; Ross 2014) suggest that the issue of transmission comprises uncertainty and deserves further research (Dalgard et al. 1992; Jaax et al. 1995; Johnson et al. 1995; Roels et al. 1999; Weingartl et al. 2012). Nevertheless, this uncertainty is not reflected in the health authorities' messages.

1.3. Science, rationalism, decision-making

The bottom line, according to Sandman and Lanard (2014), is that these questions reveal uncertainty, and there are scientific arguments on both sides of the quarantine debate. Nevertheless, the US public health establishment proclaimed Ebola absolutism, relating to scientific evidence against Ebola quarantines as 'the science' instead of just 'science,' and thus, attacking the pro-quarantine opinion with which they disagree, as 'unscientific.'

Even worse, according to Sandman (2014), is the fact that some public health experts and officials ridicule the public's fears and desires for more protective policies, such as quarantine. Those fears, argues Sandman, are a normal and useful 'adjustment reaction' when facing crisis situations and emergencies, and should never be ridiculed or be treated as 'panic,' especially since panic is rare (Lanard and Sandman 2014; Sandman 2014; Sandman and Lanard 2014). According to Sandman (2003), public risk perception combines both the cognitive aspect of the risk (hazard), and the emotional aspect – the public's concerns and fears (outrage). Therefore organizations communicating risk must address both aspects, i.e. not only the scientific 'technical' aspect, but also the emotions it evokes. If there is a gap between the public's risk perception and the experts' assessment (high hazard and low outrage or low hazard and high outrage), there is a greater chance of controversy.

The above claim continues the line of thought suggested by Irwin (1995) examination of public risk perceptions regarding science. He argues that science is not an objective storehouse of knowledge, but is heterogeneous and flexible. Different social groups and local communities have different and diverse understandings of scientific knowledge. He points to 'a problematic relationship between the formalized language of science and the contextually generated understandings presented by particular social groups' (35). In light of this, he suggests shifting the notion of 'public understanding of science.' Similarly, Wynne (2001) claims contrary to conventional approaches, which maintain that the public is only capable of taking positions based on emotions, publics do have 'intellectual substance,' although it does not necessarily fit institutional expert categories.

Since the Ebola quarantine debate was characterized by uncertainty – both as to how the Ebola virus is transmitted, and as to whether Hickox specifically was infected – it involved a complex process of decision-making. How does the public understand risks and make decisions under conditions of uncertainty? According to Tversky and Kahneman (1974), decision-making under conditions of uncertainty relies not only on statistics and science, but also on intuition and heuristics – simple, efficient principles which serve as mental shortcuts and reduce the complex tasks of

assessing probabilities and predicting values to simpler judgmental operations. They maintained that many decisions people make rely on what they call 'subjective probability' – so that different individuals may have different probabilities for the same event. Tversky and Kahneman (1974) proposed three heuristics – availability, representativeness, and anchoring and adjustment. Subsequent work has identified many more. One of them is 'affect heuristic,' the use of emotions and 'gut responses' to judge benefits or risks (Finucane et al. 2000). The process of 'affect heuristic' suggests that if a general affective view guides perceptions of risk and benefit, then perception regarding risk can be changed (affected) by receiving information about the benefit – and vice versa. Indeed, studies on decision-making in conditions of uncertainty have shown that intuitions and feelings play a significant role (Haidt 2001; Kahneman and Frederick 2002; Klein 1998).

In general, heuristics are considered useful and work well under most circumstances, yet Tversky and Kahneman (1974) claimed that sometimes they lead to severe and systematic errors. Moreover, they claimed that in conditions of uncertainty, even experts use 'subjective probabilities,' and thus are prone to the same biases and errors as laypeople. Although much research has focused on how heuristics may lead to bias and error, they can be seen as rational in an underlying sense. For instance, Gigerenzer, Todd, and ABC Research Group (1999) emphasized the 'fast and frugal' nature of heuristics, as alternatives that can provide answers as good as more complicated decision-making procedures, and do so more quickly and with less information. This implies that people's judgments are based not only on what they think about something, but also on what they feel about it. Slovic et al. (2004) have explored the association between the analytical and emotional aspects of risk perception, specifically the association between analytical risk analysis and experience-based risk perception. The 'analytical system' model was presented as a person's ability to analyze rules and norms and calculate risks and opportunities, whereas the 'experiential system' model was presented as intuitive, quick, automatic, and partially subconscious. They claimed that the rational and the experiential systems operate simultaneously and depend on each other for guidance. Rational decision-making requires proper integration of both modes.

1.4. Conditions of uncertainty

The quarantine case raises many issues under the rubric of risk communication in a crisis situation, especially regarding precautionary measures taken in conditions of uncertainty. This case highlights uses made of science in formulating preventative measures. The decision to enforce a quarantine policy can be perceived by the public as guided by scientific knowledge, or alternatively by other interests, aside from scientifically proven concerns.

Uncertainty refers to any situation where the odds of an unfortunate consequence are unknown – whether because of inadequate data (Einhorn and Hogarth 1985), or because of incomplete scientific understanding or an indeterminate chain of causality (Wynne 1992), which in turn lead to vagueness, from the decision-maker's point of view (Wallsten 1990). According to van Asselt and Vos (2008, 281) 'Dealing with uncertain risks is an important challenge. Uncertain risks need to be sharply distinguished from traditional, simple risks which can be calculated by means of statistics.' They discuss the uncertainty paradox in which uncertainty is acknowledged, but the role of science is framed as one of providing certainty.

Frewer et al. (2003) argued that although among members of the scientific community, there is a belief that the public is unable to conceptualize uncertainties, effective mechanisms for communicating risks that involve uncertainty to the public must be developed. The importance of conveying risk is emphasized by Johnson and Slovic (1995, 485), who argue that 'Some analysts suggest that discussing uncertainties in health risk assessments might reduce citizens' perceptions of risk and increase their respect for the risk-assessing agency.' Maxim, Mansier, and Grabar (2012) have noted that laypeople raise more and different uncertainties than those communicated by researchers. In their study, laypeople had different reactions to different sources of uncertainty. Specifically, uncertainty did not elicit panic. In contrast, recognition of uncertainty was reassuring, except in certain cases.

In general, studies indicate that the public wants full transparency of information. When people become aware of a risk, if they feel they do not have sufficient information regarding it, this might increase the sense of uncertainty and negative feelings (Gesser-Edelsburg, Shir-Raz, and Green 2014; Griffin, Dunwoody, and Neuwirth 1999; Huurne and Gutteling 2008; Kahlor 2010). This is especially true in situations where the risk is perceived as severe and uncontrollable (Witte 1992). Communicating risks and giving enough information does not raise negative reactions among the public in terms of behavior. It can help reduce negative feelings (De Vocht et al. 2014; Lofstedt 2006; Palenchar and Heath 2002; Slovic 1991). In Renn's (2006, 837) words: 'We can deal with dangers better when we are well aware of them and when we can prepare ourselves for them.' Sandman emphasizes the need to 'proclaim uncertainty.' He advises as follows: 'When imperfect, tentative information is all you have, then imperfect, tentative information is what you must give people so they can decide how best to cope' (Sandman and Lanard 2011). Furthermore, the CDC itself states that 'A fair message in the earlier phases of pandemic alert is to simply acknowledge the uncertainty' (Reynolds 2007).

In a health crisis, the major communication challenge is providing timely information that explains to the public how it should protect itself. This study takes the Hickox quarantine incident as a case study in order to examine how the media and the public perceive the precautionary measures taken by the authorities, specifically in an ongoing crisis situation in which there is uncertainty regarding the spread of the disease.

The study focuses on newspaper coverage of the case, and on readers' comments on the articles. The debates sparked by this incident exposed questions at the heart of risk communication studies, namely to what extent the policies adopted by the authorities are based on scientific considerations. Another central issue raised by this case is whether the authorities share doubts and uncertainties with the public.

2. Objectives

This study aims to examine newspapers' coverage of the Hickox quarantine incident, using it as a case study to explore how the media characterized the spread of disease in an ongoing crisis situation characterized by uncertainty, using Slovic et al. (2004)'s notion that risk perception is comprised of both emotional and analytical aspects.

3. Methods

3.1. The research design

This study espouses an innovative research design, combining media analysis with thematic analysis of readers' comments, thus enabling us to present a broader picture of how the issue of quarantine was communicated by the media and perceived by their readers – i.e. the public's perceptions, opinions, and attitudes towards this issue, what is regarded as 'the interplay between frames of health news coverage and resulting public comments' (Holton, Lee, and Coleman 2014). To this end, we examined media articles that focused on the quarantine issue, and also readers' comments to those same articles. We employed a qualitative approach, and additionally, we coded the terms numerically. First, we examined newspaper articles on Hickox's story. To this end, we considered two newspapers – the *New York Times* and the *New York Daily News*. Newspaper articles were identified through time interval – from 25 October 2014 to 31 October 2014 – the time frame during which the story was covered in these newspapers. We found 7 articles on Hickox' story in *The New York Times* and 15 articles in the *New York Daily News*. Both *The New York Times* and the *New York Daily News* are daily newspapers with wide circulation. The *New York Times* is the second newspaper in circulation in the US (Associated Press 2013), and the *New York Daily News* is the fourth (Pompeo 2011).

However, while the *New York Times* is considered an elite newspaper, the *New York Daily News* is considered its 'popular' competitor (Lehman-Wilzig and Seletzky 2012).

Second, we examined readers' comments in response to the articles in both of the newspapers from the same dates – 7213 from the *New York Times*, and 1364 from the *New York Daily News*.

3.2. Analysis of media articles

The articles were analyzed according to the method of inductive content analysis (Elo and Kyngäs 2008). This process of analysis includes open coding, creating categories, and abstraction, and tends to move from very specific to more general to create a picture of the larger whole. This method of analysis was chosen to facilitate the identification of themes surrounding the issue of quarantine. First, we examined the articles in order to identify the various players voiced in Hickox's story. Three central players were identified: (1) Hickox; (2) the CDC and the Federal Government; (3) the Governors. Then, we conducted an inductive detection of the primary themes that emerged in relation to each of these players, using textual analysis of overt discourse to determine themes explicitly stated, and additionally of the latent discourse (Bryman 2001; Clarke and Everest 2006).

Two researchers read and openly coded a random sample of six articles, identifying emerging issues, concepts, and themes for and against quarantines related to each player. The researchers then met and discussed their individual codes and created a list of preliminary codes. Reliability was assessed using Krippendorff's alpha (Krippendorff 1980), yielding adequate reliability (≥0.80), ranging from 0.83 to 0.87. After adequate inter-coder reliability was established, the remaining articles were coded according to the developed coding instrument.

3.3. Analysis of readers' comments

The central theme that emerged from the content analysis of the newspaper articles was 'science vs. public fear.' We examined how the reader responses to the articles in both newspapers expressed both of these issues, exposing their views and attitudes regarding the issue of quarantine. We quantified the number of comments supporting and opposing quarantine. The process of interpretation combined thematic analysis and semantic analysis, guided by specific word combinations, related to the quarantine itself or to the virus infection ability. For instance: comments such as 'the science supports quarantine' or 'the virus is highly contagious' were classified as 'supporting quarantine.' Conversely, comments such as 'quarantine is not evidence based,' or 'Ebola cannot spread through air' were classified as 'opposing quarantine.'

Through a thematic analysis of the comments, we examined if quarantine objectors based their objection on scientific arguments and cited scientific articles more than readers who supported quarantine, and also, whether the supporters of quarantine tended to express more fear than the opponents. Thematic analysis is a qualitative analytic method for 'identifying, analyzing and reporting patterns (themes) within data' (Braun and Clarke 2006, 79). The analysis process included several phases. After dividing the readers' comments into 'supporters' and 'opponents' of the quarantine policy, we searched for keywords and terms that readers from both sides of the debate used to support their arguments. These included the following words and terms: 'science'/'scientific'; 'evidence'/'evidence based'; 'study'/'studies'/'research'; 'experts'; 'common sense'/'logic'/'logical.' We also searched for words that reflect fear, including 'fear'/'concern'/'panic'/'hysteria.' The next phase was to examine how each of the two sides of the debate used these keywords and terms: how words such as 'science' and 'scientific' were used to support their argument that the scientific evidence lies on their side of the debate, and how words that reflect their perceptions of fear, such as 'fear,' 'concern,' and 'panic,' were used.

Finally, since this thematic analysis revealed that some of the comments cited specific studies and official sources, including links or references, we quantified these comments according to those supporting or objecting to quarantine.

4. Results

4.1. The media

The media articles, both in *The New York Times* and in the *New York Daily News*, voiced various central players in Hickox's story. These included Hickox herself, the CDC, and the White House – who all objected to quarantine for health care workers returning to the US from West Africa after treating Ebola patients; and the governors who imposed quarantine on returning Ebola medical workers. The central theme identified in their quotations in the articles is presented in relation to each player.

4.1.1. Hickox: violation of her human rights

The message Hickox sought to deliver was that her imposed quarantine was a violation of her human rights. This message is reflected in the following quotes by Hickox and her boyfriend:

> Ms. Hickox said in a brief statement on Sunday night: 'My human rights have been violated and we must react in order to ensure that other health care workers do not endure such injustice'. (Fitzsimmons 2014)

> 'If you … care about civil liberties … help me liberate Kaci Hickox from Chris Christie's private prison,' her boyfriend, Theodore Wilbur, 39, wrote on Facebook Saturday. (Sandoval et al. 2014)

Moreover, Hickox's message was that her story was in fact a 'case study' that exposed the violation of human rights of all Ebola medical workers subjected to quarantine according to the governors' new policy.

As the above examples demonstrate, the rhetoric used by Hickox and her supporters described the quarantine as a 'prison,' and Hickox as a victim of the government, which made her feel like a criminal:

> In a first-person account, Kaci Hickox, 33, described how she was made to feel like a criminal after she told airport officials she was returning from Ebola-ravaged Sierra Leone. (Schapiro 2014)

Hickox's 'call for freedom' was also reflected by her choice to hire a well-known civil rights lawyer to extricate her from the quarantine and enable her to return home: 'Civil rights attorney Norman Siegel has signed on to help Hickox sue for her freedom …' (Blau, Goldstein, and Durkin 2014).

4.1.2. The CDC and the federal government: science-based policy

The CDC and the federal government's central message was that contrary to the CDC's policy, which is based on 'science,' the quarantine policy is based on irrational fears:

> 'We have concerns with the unintended consequences of policies not grounded in science …' a senior administration official told The News. De Blasio also questioned the policy Sunday … You can't have a policy based on fear. It's got to be based on medical fact. (Sandoval et al. 2014)

This message also was voiced by President Obama himself: '"I know that, with all the headlines and all the news, that people are scared," Mr Obama added. "America has never been defined by fear"' (Zernike and Fitzsimmons 2014). CDC officials also claimed that the governors who supported the quarantine policy had motives other than science and protecting the public.

4.1.3. The governors: protect the public

While the CDC and the federal government criticized the quarantine policy, the governors who presented this policy defended it, claiming that their only goal was to protect the public:

> 'My duty to protect the health of the individual, as well as the health and safety of 1.3 million Mainers, is my highest priority,' said Mr. LePage, a Republican in a tight re-election race. (Bidgood and Philipps 2014)

> 'But Christie doubled down on the move. "The government's job is to protect the safety and health of our citizens," he said on Fox News Sunday. "I have no second thoughts about it … I think the CDC will come around on our point of view on this."' (Sandoval et al. 2014. *New York Daily News*)

At the same time, the governors also responded to Hickox's claim about the violation of her civil rights, arguing that they are responsible for the civil rights of *all* of the people in Maine. For example:

> 'While we certainly respect the rights of one individual, we must be vigilant in protecting 1.3 million Mainers, as well as anyone who visits our great state,' Gov. Paul LePage, a Republican, said in a statement issued earlier in the day. (Zernike and Fitzsimmons 2014)

> But she needs to understand that the obligation of elected officials is to protect the public health of all the people, and if that inconvenienced her for a period of time, that's what we need to do to protect the public. That's what we'll continue to do. (Robbins, Barbaro, and Santora 2014)

4.1.4. The overall media narrative: siding with Hickox

Although presenting a various range of voices in the quarantine debate, eventually the media sided with Hickox. The nurse defying her quarantine order is presented as a compassionate selfless heroine, and her voice received a central place in the journalistic coverage of the story:

> The only problem with this is that Kaci Hickox, **a hero humanitarian nurse** who had just returned from working with Ebola patients in Sierra Leone, wasn't ill. (Lupica 2014b)

Hickox is cast as the voice of science, while the governors are ridiculed and portrayed as driven by other – political – considerations, leading them to succumb to public pressure.

> Ms. Hickox's friends and family were not surprised that she decided to speak up. 'She's not a loudmouth activist', said Dr. Nora Rowley, a classmate at Johns Hopkins in Baltimore. 'But **she understands the contagiousness of the virus**, and now she has to come back and be subjected to a policy that's **not based on anything other than fear**'. (Fitzsimmons 2014)

'Despite efforts by the Centers for Disease Control and local authorities, most Americans either fail to understand or refuse to believe how Ebola is spread. The solution is not to tailor medical and epidemiologic decision-making to the opinions of laypeople and cable news consumers, but to reaffirm and re-enforce surveillance and intervention measures that actually work, including carefully isolating end-stage Ebola patients, as the CDC has mandated' (Faust 2014). As this last example above demonstrates, the public was presented by the media as motivated by fear and panic. This representation of the public is repeated in the articles in both newspapers, and reinforced by displaying a poll conducted by CBS News.

'Recent polls show that 80% of Americans support mandatory 21-day quarantines for providers such as nurse Hickox upon their return to the United States after working in Ebola-endemic areas. However, 85–90% also believe that if an Ebola infected patient sneezes on them, they will get the virus. This is false. Fortunately, the manner in which Ebola is spread is not subject to a vote, but to facts' (Faust 2014). On the other hand, the media exhibited overt and covert criticism of the federal authorities and the CDC, asserting that the CDC guidelines were confusing and unclear – a problem which to a large extent led the governors to take action themselves and to impose the quarantine policy.

> This is what happens when the President offers no real leadership on Ebola, and the Centers for Disease Control & Prevention continues to look like a clown college: New rules have to be written on the fly and then a nurse gets held in Jersey and treated like an enemy of the state instead of one of the good guys. (Lupica 2014a)

Another interesting finding that emerges from the media analysis, as the examples above demonstrate, concerns the representation of the public in the media articles. Ostensibly, it seems as if the media voices not only the three players listed – i.e. Hickox, the CDC and the federal government, and the governors – but also the public. In fact, this is at best an implicit and superficial representation, which does not reflect the public's true voice. While the other three players (and/or their representatives) were interviewed, no real discourse with the public took place in the media articles. Instead of conducting a dialog with the public through interviews with ordinary citizens and addressing the readers' comments – what the media actually does is present their own interpretations of the public's views, cited a single survey and interview with Hikcox's relatives and friends. The next paragraph will therefore focus on the public, through an examination of the readers' comments on the articles analyzed above.

4.2. Readers' comments

As Table 1 demonstrates, there was almost the same amount of comments for and against the quarantine policy in *The New York Times*: Out of 7213 comments total accompanying the articles on Hickox's story, 3483 comments supported the quarantine policy, while 3422 opposed it. Another 308 comments were unclear. In the *New York Daily News* (see also Table 1), more readers supported the quarantine policy: Out of 1364 total, 752 supported the policy and 442 opposed it. Another 170 were unclear.

These are the central themes found in the readers' comments: (1) Science Says; (2) It's Common Sense; (3) Concerns vs. Unrealistic fears, panic, and hysteria.

4.2.1. Science says

As Table 2 demonstrates, although making opposing claims, readers from both sides – supporting and opposing quarantine policy – used similar themes, including extensive use of science-related words: 'science'/'scientific,' 'evidence'/'evidence based'; 'study'/'studies'/'research'; and 'experts'.

In the *New York Daily News*, more comments supporting quarantine used science-related words relative to opponents. Fifty two comments supporting quarantine used the words 'science'/'scientific,' vs. 30 comments opposing it; 8 comments supporting the quarantine policy used the words 'evidence'/'evidence based' vs. 2

Table 1. Talkbacks supporting/against Quarantine (*n*, %).

Newspaper	Support the quarantine	Against the quarantine	Unclear	Total
New York Times	3483 (48.3%)	3422 (47.4%)	308 (4.3%)	7213 (100.0%)
New York Daily News	752 (55.1%)	442 (30.9%)	170 (12.5%)	1364 (100.0%)

Table 2. Thematic analysis (*n*, %).

Terms and rhetoric used	New York Times		New York Daily News	
	Support the quarantine	Against the quarantine	Support the quarantine	Against the quarantine
Science/scientific	570 (46.1%)	793 (55.0%)	52 (38.2%)	30 (41.7%)
Evidence/evidence based	71 (5.7%)	163 (11.3%)	8 (5.9%)	2 (2.8%)
Studies/research	156 (12.6%)	78 (5,4%)	18 (13.2%)	12 (16.7%)
Experts	232 (18.8%)	241 (16.7%)	40 (29.4%)	16 (22.2%)
Common sense/logic/logical	207 (16.7%)	167 (11.6%)	18 (13.2%)	12 (16.7%)
Total	1236 (100.0%)	1442 (100.0%)	136 (100.0%)	72 (100.0%)

comments opposing it; and 40 comments supporting the quarantine policy used the word 'experts,' vs. 16 opposing it.

In *The New York Times*, the opposite was the case. Five hundred and seventy comments supporting the quarantine policy used the words 'science'/'scientific' vs. 793 comments opposing it; 71 comments supporting the quarantine policy used the words 'evidence'/'evidence-based' vs. 163 comments opposing it; and 232 comments supporting the quarantine policy used the word 'experts' vs. 241 comments opposing it.

Nevertheless, regarding the use of the words 'study'/'studies'/'research,' it was the quarantine supporters in both newspapers who prevailed: In the *New York Daily News*, 18 comments supporting quarantine used the words 'study'/'studies'/'research' vs. 12 comments opposing it. In *The New York Times*, the gap was more prominent: 156 comments supporting the quarantine policy used the words 'study'/'studies'/'research' vs. 78 opposing it.

Furthermore, as Table 3 demonstrates, 47 of the readers supporting quarantine (29 in *The New York Times* and 18 in the *New York Daily News*) vs. only 2 of the opponents (both in *The New York Times*) actually presented studies and/or official sources to back their arguments, including references and/or links to the study/-source.

Some examples include:

> There have been numerous statements that the desire to implement quarantines 'is not based on science or evidence'. Well, here is the science and evidence: **The largest study on the current Ebola outbreak, which was sponsored by the World Health Organization,** found that 13% of those infected with Ebola never had a fever. A study in the prestigious journal *Lancet* published in 2000 found that some people can carry

Table 3. Citing studies and official sources (*n*, %).

New York Times		New York Daily News	
Support the quarantine	Against the quarantine	Support the quarantine	Against the quarantine
29 (93.5%)	2 (6.5%)	18 (100.0%)	0 (0.0%)

> Ebola without showing any symptoms. (TVinLA, Los Angeles, *The New York Times*, October 30, 2014)

> 'All the published data'? A review of literature will turn up more than a few papers, published in scientific journals that refute the position you defend. **Two examples: From the International Journal of Experimental Pathology: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1997182/pdf/ijexpath00004-00** … **From the Journal of Applied Microbiology: http://onlinelibrary.wiley.com/store/10.1111/j.1365-2672.2010.04778.x/as** … (B. Dawson, the Furry Herbalist, *The New York Times*, October 30, 2014)

Some supporters also cite leading infectious disease specialists who support the quarantine policy, such as Nobel Prize laureate Dr Bruce Beutler, Director of the Center for the Genetics of Host Defense in Dallas, where the first US cases of Ebola were contracted.

> **Dr. Beutler, a Nobel Prize winner (who specializes in researching the body's immune system in fighting diseases such as Ebola), believes that the 21-day quarantine is NOT adequate** … I personally would trust the opinion of a Nobel Prize winner over the opinions of an everyday nurse … (Anne, *The New York Times*, October 30, 2014)

The textual analysis shows that the theme of 'science' can be divided into several subthemes, frequently found in comments from both supporters and opponents of the quarantine policy (Table 4).

Central subthemes related to science found in opponents' comments:

(1) *Science vs. ignorance*: A frequent assertion raised by opponents was that while they themselves base their arguments against the quarantine policy on 'pure science,' 'facts,' and 'experts,' supporters are guided by ignorance and 'unscientific' opinions. For example:

> I'm sorry but the smug ignorance of so many of these posts is incredible. **The science is confirmed and verified**. You don't get Ebola except by direct contact with anyone who actually has the symptoms. (Bill Kerr, *New York Daily News*, October 30, 2014)

In the above example, opponents describe scientific evidence against Ebola quarantines not just as 'science,' but as '**the** science.' Moreover, as the following quotes illustrate, they claim that pro-quarantine governors are guided by ignorance, 'voodoo' and politics:

> Chris Christie should stop promoting voodoo health care. **He seems to be familiar with voodoo but not with healthcare or science**. (BarbaraB, *The New York Times*, October 27, 2014)

> Not only has Christie led an uniformed medical policy … but he backtracked because he looked unpresidential in his adamant defense of a **policy based on ignorance of the science.** (Michael Thomas, *New York Daily News*, October 27, 2014)

(2) *Ebola is not contagious until symptoms appear*: A second prominent subtheme that emerges from quarantine opponents' thematic analysis is that Ebola is not contagious until symptoms appear:

Table 4. Central subthemes related to science found in the readers' comments.

		Selected responses		
Opponents' comments	Science vs. ignorance	'Feudi, … Stop having an opinion because yours is not relevant to anyone, and adopt the one held by 97% of scientists' (Adam Leggett, *New York Daily News*, October 26, 2014)	'They are the definition of "reacting", knee-jerk reacting at that. Their actions aren't based on anything but fear, **there's no science or logic involved**' (Karen, *The New York Times*, October 27, 2014)	'**There is no science to this** … People cannot get Ebola if the person next to them is not symptomatic. **That is why this edict is nonsensical**. It only panders to the weak minded individuals' (Poetic Justice, 2014, *New York Daily News*, October 26)
	Ebola is not contagious until symptoms appear	'**The science says Ebola is NOT CONTAGIOUS unless symptoms appear** … when symptoms appear the patient is diagnosed AND if it is Ebola the patient is isolated and treated' (Michael, *New York Daily News*, October 29, 2014)	LE ROY you're wrong on this one. We SHOULD be following THE SCIENCE … Ebola is not CONTAGIOUS until symptoms appear … that is the science (Tommy, *The New York Times*, October 30, 2014)	
Supporters' comments	Science as a field in which uncertainty is 'built-in'	'**And "science" is 100% infallible?** And humans are infallible as well? What about all the viruses and infections people die from while in the hospital each year, when the only went in for a minor medical procedure …' (MD Cooks, *The New York Times*, October 30, 2014)		
	Science regarding the Ebola and its transmission is uncertain	'**I think that the "scientific" evidence regarding Ebola is weak at best**… Does anyone know the "solid" medical		

(*Continued*)

Table 4. (*Continued*).

		Selected responses		
		evidence on this? **How many cases have actually been studied?**…' (Richard Ebstein, *The New York Times*, October 30, 2014)		
	You can't always trust what the authorities present as 'science'	'Ebola is still an epidemic with unknown positive treatment **in spite of all the assurances given to us by most politicians … Political correctness rather than trying to apply caution and measures to protect our citizens**. A quarantine is needed. What is not needed is political correctness' (JP, The New York Times, October 30, 2014)	'… I think most people viewing this feel the same, **to science being hijacked to serve special interests**' (skeptical1, *New York Daily News*, October 28, 2014)	
	No symptoms does not necessarily equal no infection	'FYI to those who do not believe in quarantine, 17% of Ebola patients did not have a fever before other symptoms. **That's the science. Google it**' (Chris, *The New York Times*, October 30, 2014)	'Yes there is a logical reason. She may have Ebola, just like the recent case of the doctor who had it and was not symptomatic' (BOB KAHN, *New York Daily News*, October 29, 2014)	'How do you know she was a zero risk if it can take 21 days for symptoms to emerge. I am so happy you never agree with me cause you're probably always wrong like you are here' (Andrew Peekster, *New York Daily News*, October 29, 2014)

Someone who is asymptomatic is not contagious. End of story. Someone who is asymptomatic (even if infected!) is not contagious and is therefore putting no one at risk. (Thomas, *The New York Times*, October 30, 2014)

Central subtheme related to science found in the supporters' comments:

(1) *Science as a field in which uncertainty is 'built-in'*: While the opponents widely used 'the science' to back to their arguments, supporters stressed

that science is a field in which uncertainty is 'built-in,' and that there are no '100% truths' in it: 'Everyone keeps talking about the "science" and respect for the "science," but it's worth pointing out that the science is very uncertain.' (J. Andrew, *The New York Times*, October 31, 2014).

(2) *Science regarding Ebola and its transmission is uncertain*: Specifically, supporters stressed that science regarding Ebola and its transmission is uncertain:

> **I understand the science of Ebola and how it's transmitted, and there is a gray area regarding transmission of this disease** that the CDC protocols do not address … **There is no science supporting the idea that there is one definable moment when a patient suddenly becomes infectious with Ebola**. (Anne, *The New York Times*, October 27, 2014)

Some of the supporters also stress that science regarding the Ebola is constantly evolving, so that instead of 'the science,' knowledge regarding the disease should be framed as 'the current science':

> **For all those claiming 'Science' one should remember that Ebola, like all viruses, is constantly evolving.** Even the CDC is evolving its recommendations. Per the AP on 10/27/2014 The CDC recommended restrictions on commercial travel or attendance at public gatherings for those people who are at highest risk and asymptomatic. The guidelines were not specific about where a person should stay, but officials said they meant home or hospital isolation. (nkda2000, *The New York Times*, October 31, 2014)

(3) *You can't always trust what the authorities present as 'science'*: Another claim frequently raised by quarantine supporters regarding 'science' was that what authorities present as 'science' cannot always be trusted, and that their statements reflect political interests. For example:

> … And before you say that the NEJM editorial and the CDC have said that quarantine is an overreaction, **know that those TOO are political statements and not science driven** or else they would say that quarantine is not needed for ANYONE returning and would not limit it to doctors and nurses. Also DWBs, that HUMANITARIAN organization, TELLS its volunteers to STAY HOME FROM WORK for 21 days after their return and pays them to do so. Why might that be? (Kathy, *New York Daily News*, October 28, 2014)

To back this assertion, some of the supporters mention examples, such as the AIDS epidemic, the anthrax incident in a CDC lab, and regarding Ebola, the problematic way the CDC treated patient 'Zero' in Dallas. Past experience, they claim, proves that what is presented by the authorities as 'science' cannot always be trusted. For example:

> There are a lot of people on this discussion thread poo-pooing the idea that any sort of quarantine could ever be justified and instead insisting that the CDC somehow has the foresight to know exactly how all of this is going to play out. Trust me, they don't. **Recall that this is the CDC that also allowed an Anthrax exposure earlier this year. Recall that this is the CDC that did not send a team to Dallas when patient zero was hospitalized and let that novice team at Presby twist in the wind so that**

> **two of their nurses contracted the disease**. (MSPWEHO, *The New York Times*, October 27, 2014)

> In the 80's at the beginning of the AIDS epidemic, the CDC (and I believe Dr. Fauci) recommended against directly questioning blood donors whether they were one of the high risk groups. The rationale being that it might induce individuals to lie. A number of people contracted AIDS through blood transfusions. The science wasn't clear then and it's not clear that the science is clear now with Ebola. (Cathy, *The New York Times*, October 27, 2014)

(4) *Lack of symptoms does not necessarily mean no infection*: – Another prominent argument raised by the quarantine supporters was that the logic 'There is no evidence that a person who does not present symptoms is sick' means 'he is not sick' – is flawed. Hickox, they claim, could have been sick without exhibiting symptoms. To back this claim, some supporters use the case of Dr Craig Spencer, who exhibited no symptoms until several days after he returned to the US.

> Health care protocols are based on the principle of 'abundance of caution'. So yes, sometimes, they seem unreasonable, and overly cautious. Go to any hospital and emergency rooms. It's not about 'personal freedom' and arguments along the lines of **'there is no evidence she is sick' is equivalent to 'there is no evidence I have made anyone sick in all my life – so I don't need to wash my hands.** (KK, *The New York Times*, October 27, 2014)

4.2.2. It's common sense

Another finding was that although many comments used the words 'science'/'scientific,' the expressions 'common sense' or 'logical'/'logic' were also repeated by both quarantine supporters and opponents. In *The New York Times*, 207 comments supporting quarantine used these terms vs. 167 opposing it. In the *New York Daily News*, 18 comments supporting the quarantine policy used them, vs. 12 opposing it.

As the following example illustrates, the opponents claimed that releasing Hickox because she does not exhibit symptoms is 'common sense':

> Christie reversed himself because the optics of the tent were too much for him to bluster his way through. Sending this asymptomatic young woman on her way to Maine was **simple common sense** …. (W. Julie, *The New York Times*, October 27, 2014)

In contrast, supporters argued that since no one really knows when a person begins to be contagious, it is important to take precautions:

> Since nobody knows at what exact moment the patient is contagious, it would seem **logical** to take precautions, in this case quarantine. (S.L., *The New York Times*, October 27, 2014)

4.2.3. Concerns vs. unrealistic fears, panic, and hysteria

Regarding fear and panic – as Table 2 demonstrates, more comments opposing quarantine used words related to these feelings compared to the supporters: In *The New*

York Times, 399 comments opposing quarantine used the words 'hysteria'/'panic' vs. 100 comments supporting it; and 726 comments opposing the quarantine policy used the word 'fear' vs. 100 comments supporting it. In the *New York Daily News*, 19 comments opposing quarantine used the words 'hysteria'/ 'panic' vs. 8 comments supporting it; and 69 opposing quarantine used the word 'fear' vs. 15 comments supporting it. However, when examining more moderate terminology – 'concerns' – the picture was reversed: In *The New York Times*, 12 comments opposing quarantine used the words 'concern'/'concerns' vs. 185 comments supporting it. In the *New York Daily News*, 11 comments opposing quarantine used them vs. 8 supporting it.

Those who supported quarantine also used the words 'hysteria' and 'panic' – but in order to say that there was no occasion for hysteria or panic. For example, they argued that taking preventative measures did not indicate panic. As the following example demonstrates, opponents claimed that those supporting this policy are motivated not only by ignorance, but also by unrealistic fears, panic, and hysteria:

> Kaci Hickock is the Rosa Parks of the 21st. Century. She is standing up to injustice and **is standing up to the public's hysteria.** (EdwardBranca, *New York Daily News*, October 27, 2014)

Furthermore, as the following quotes demonstrate, opponents of the pro-quarantine governors claim that not only are they guided by ignorance and politics, but they are *fearmongers*. For example:

> Yes, **the fear-mongers have won and science has lost**. The media is strong. (Tom Fibi, *New York Daily News*, October 30, 2014)

In contrast, when the supporters mentioned the words 'hysteria' and 'panic,' it was only in order to say that there is no panic or hysteria, but rather cautiousness:

> **… But I guess this is what to expect from people that are attempting to sooth public concern (not hysteria) with an irrational confidence when 'science' has also already shown us how infectious and deadly Ebola has been.** (MD Cooks, *The New York Times*, October 30, 2014)

5. Discussion

The debate between supporters and opponents of the quarantine policy raises issues connected to human rights, security, and ethics; however, the current study focuses on how science is portrayed by the media and perceived by the public. The findings from the newspaper articles show that although the media gave expression to various sides of the debates and diverse voices (Hickox, the local governments, and the CDC), it nevertheless gave pride of place to Hickox. In other words, it emphasized those who objected to the policy of quarantining. Voicing quarantine opponents raised the claim that the conflict was in fact between science and the 'irrational fears' of the public. The governors who decided on quarantine were criticized for doing so in response to the public's unscientific and irrational fears.

From our analysis of readers' comments to newspaper articles in the *New York Times* and the *New York Daily News*, it appears that these are unjustified claims. First, the public did not speak in a single unified voice, but was rather divided into supporters and opponents of quarantine policy. Our analysis shows that both sides of the debate used scientific arguments, and that those who objected resorted to similar terminology, including 'scientific evidence' and 'science' to illustrate their

arguments. This contradicts the claim presented in the media, that quarantine supporters are motivated by 'unscientific' concerns. Moreover, one finding shows that comments supporting quarantine in fact exhibited a greater tendency than opponents to use the words 'study,' 'studies,' and 'research.' In *The New York Times*, the gap was more prominent: 156 comments supporting the quarantine policy used the words 'study,' 'studies,' and 'research' vs. 78 opposing it.

Another finding reflecting this trend is that the readers' comments supporting quarantine exhibited a greater tendency to cite and present studies and/or official sources to back their arguments, including references and links. This finding can be understood in light of the fact that they went against the grain of the official CDC statements, and therefore they had to use more scientific evidence.

These findings reinforce Sandman and Lanard's (2014) claims that these questions reveal uncertainty, and that there are scientific arguments on both sides of the quarantine debate. Nevertheless, the US public health establishment proclaimed Ebola absolutism, referring to scientific evidence against Ebola quarantines as '"the science" instead of just "science,"' and thus attacking the pro-quarantine opinion with which they disagree, as 'unscientific.'

Irwin's concept of 'Citizen Science' (Irwin 1995) shows that there has been considerable progress from the dualistic perspective of an ignorant public verses knowledgeable experts. In the modern technological reality, there are diverse voices and perspectives on knowledge, rather than one monolithic knowledge. People understand science differently based on diverse contexts and different social groups. This concept is illustrated by the fact that both supporters and objectors of the quarantining policy resorted to scientific arguments, showing that each side understands scientific evidence differently. Moreover, those who opposed quarantine cannot be represented as 'scientifically based' as opposed to 'irrational' quarantine supporters. Significantly, both sides employ scientific evidence and analyze the situation according to risk perceptions based on knowledge and common sense. The combination of logic and 'simple logic' reinforces Slovic et al. (2004)'s study, as well as those of Klein (1998) and Haidt (2001), who claim that risk perception is comprised of emotionality and rationality. Slovic et al. (2004) oppose the claim that if the public disagrees with government authorities, then it is acting irrationally. According to Slovic et al. (2004), the rational and experiential systems operate separately, yet each seems to depend on the other for guidance. Both models, demonstrated in the studies, exist simultaneously and interdependently. A rational decision, according to Slovic et al. (2004), relies on both emotions and thoughts. The findings of the current study reinforce this line of reasoning. The textual analysis of the readers' comments reveals that contrary to the way quarantine policy supporters were characterized in the media and by readers opposing quarantine – as driven mainly by unfounded fear, panic, and hysteria – although the quarantine supporters do express emotions, they use words that indicate mainly concerns, not panic or hysteria. This finding supports Sandman & Lanard's assertions that panic is comparatively rare, and shows that concerns, that are a normal and even a useful 'adjustment reaction' when facing crisis situations (Lanard and Sandman 2014; Sandman 2014; Sandman and Lanard 2014), are actually the prominent responses.

In addition, our findings show the complexity of risk perceptions in conditions of uncertainty. Given that contracting Ebola is still enshrouded in uncertainty, quarantine supporters were motivated to reinforce their claims with scientific evidence. A prominent claim concerned the fact that authorities who opposed quarantine did

not raise issues of uncertainty. This criticism reinforces the claims of van Asselt and Vos (2008), who discuss the uncertainty paradox in conditions wherein uncertainty is acknowledged, but the role of science is framed as providing certainty.

Studies indicate that in light of risks, the public wants full transparency of information (Griffin, Dunwoody, and Neuwirth 1999; Huurne and Gutteling 2008; Kahlor 2010), especially when the risk is perceived as severe (Witte 1992). According to quarantine supporters in the current study, authorities did not provide full transparency of information. Giving enough information and communicating risks has not been found elsewhere to raise negative reactions among the public. On the contrary, it can reduce the uncertainty, and also lead to more positive perceptions of authorities (De Vocht et al. 2014; Lofstedt 2006; Palenchar and Heath 2002; Slovic 1991). Thus, Sandman and Lanard (2011) emphasize the need to 'proclaim uncertainty,' advising authorities to share tentative information if that is all they have. Similarly, regarding Ebola, Rosenbaum (2015) claims that although health authorities cannot know everything, they should share information. Furthermore, treating the public as ignorant of science and refraining from providing full transparency of information might backfire at the authorities. As Wynne (2001) warns, institutional science attempts to exaggerate its intellectual control and use knowledge as justification of policy commitments, while ignoring its limits only alienate the public and increase its mistrust.

Our findings show that in their treatment of the quarantine issue, the media did not address uncertainty, and thus continued the health authorities' neglect of this issue. The media's lack of treatment of scientific issues in the context of the Ebola quarantine raises the question why journalists who covered the story did not address it. As Sandman (2006) and Sjoberg (1998) point out, governments and organizations sometimes refrain from communicating risks and discussing questions of uncertainty out of fear to arouse negative feelings among the public. But the very fact that the public *chose* to discuss this matter indicates a need for a deeper discussion of questions of uncertainty and public health decisions.

Regarding the research limitations, the study examined only the public who reads online newspapers and comments on articles, and thus might not represent the general public. Yet, the large number of comments examined increases the study's external validity. In addition, we examined the media through only two newspapers. Nevertheless, these are daily newspapers with wide circulation, and each of them targets a different audience.

Another limitation is the sample size of the articles included in the media analysis. The sample size includes 22 articles from two newspapers, yet given that the approach employed is a qualitative one, this amount is considered acceptable. Furthermore, this sample size was actually dictated by the newspapers themselves. The study looked at all the articles that covered the Ebola quarantine debate during the relevant time frame in *The New York Times* and *New York Daily News* – the two leading and central newspapers chosen. Therefore, the sample, although not big, is representative, since it represents the context in which the articles were written. In order to increase the sample size of media articles, the study could have thus examined additional newspapers. Nevertheless, since we wanted to examine all of the readers' comments to these same articles, this would have made the task impossible, given the fact that each article generated many hundreds of comments, and the articles in the two newspapers chosen alone included more than 8500 comments. Another option would have been to concentrate solely on the readers' comments,

and leave out the media analysis, yet, the research design employed in this study, which combines media analysis with thematic analysis of reader's comments on *the same articles*, provides a unique examination of how a risk that involves uncertainty is communicated by the media and perceived by their recipients – the public.

6. Conclusions

Our study indicates that despite risk communication studies on the complexity of risk perceptions, those who do not support health authorities' official line are still portrayed by the media as 'irrational.' This study contributes to refuting that view by presenting different voices of the public from the new media.

The recommendations that arise from this study indicate the importance of follow-up studies on the social media, to expose the public's different voices. Furthermore, it is important to initiate an inclusive dialog between authorities and the public about matters of uncertainty and deliberations in the decision-making process. The absence of such discourse undermines the possibility of a meaningful dialog between authorities and the public.

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