Epidemiology of Fear: Investigating Societal Responses to Pathogenic Invasion

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SUMMARY

Human history is punctuated by numerous deadly epidemics. The social environment associated with epidemics often elicits secondary 'epidemics' of fear, stigmatization, and moralization. If not properly addressed, these secondary epidemics have the potential to threaten public order. Hence, it is vital to develop policy specifically designed to anticipate and quell human responses to epidemics. In order to predict how societies will respond to future epidemics, it is necessary to analyze historical records of disease contained within media discourse. As such, a total of 216 examples of media discourse pertaining to three major historical epidemics—the Second Cholera Epidemic (1831-1833), HIV/AIDS (1981-1983), and the West African Ebola Outbreak (WAEO) (2014-2015)—were collected in the form of newspaper articles and twitter 'tweets'. The type of language used was then categorized by valence. It was noted that media discourse pertaining to the HIV/AIDS pandemic was frequently inflammatory towards marginalized groups and was more associated with negative valence than news discourse for the other two case studies. There was also a stark disparity between valence levels for social media and news discourse; social media discourse was more often associated with negative valence than all other news discourse. In fact, the language used on social media was highly inclined towards sensationalism. In all, fatal disease has—and always will—be part of human society, and it is vital that past responses inform future endeavors to develop effective response policies.

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INTRODUCTION

Humans and disease are inherently intertwined; there has never been one human society that has not experienced disease. When a disease is first introduced into a population, it elicits unique social responses—particularly if it is novel or especially fatal. Ever since the HIV/AIDS pandemic of the 1980's and 1990's, there has been increased interest in studying public reactions to epidemics. From this interest, the field of epidemic psychology has been established. Epidemic psychology attempts to understand the initial public reactions to fatal epidemics (Strong, 1990). Generally, initial public reactions manifest as three smaller psycho-social sub-epidemics: fear/suspicion, stigmatization, and moralization/explanation (Strong, 1990). Individually, each sub-epidemic can be conceptualized as a distinct phenomenon which influences all aspects of public life during an epidemic.

Epidemic psychology is as much of a social phenomenon as it is biological; just as diseases spread from person to person, so do their associated social and psychological consequences. Most societies are slow to acknowledge the presence of an epidemic, and do so only when consequences become explicitly visible (Rosenberg, 1989). Before epidemics are publicly

recognized, there is typically a period of social tension building where people come to realize the serious nature of the disease they are faced with (Rosenberg, 1989). Individuals then tend to act in ways which reaffirm their culture's pre-existing social values and norms (Strong, 1990; Rosenberg, 1989). In essence, this exposes the innate institutional values of a society, which are used to justify the sub-epidemic of stigmatization (Strong, 1990; Rosenberg, 1989). Coupled with the propensity of the general public to be irrational and uncooperative in emergency situations, this poses a potential threat to public order (Glass and Schoch-Spana, 2002; Strong, 1990). Although the threat to public order remains theoretical, it is a consideration which must be taken into consideration when delineating reactive and proactive health policies to combat epidemics (Glass and Schoch-Spana, 2002).

Once an epidemic is acknowledged, the initial public response is typically widespread and drastic—eliciting collective panic and, extremely, fostering a 'culture of fear' (Rosenberg, 1989). Each of the three sub-epidemics of fear/suspicion, stigmatization, and moralization/explanation then become apparent and evoke unique public responses. The psychosocial epidemic of fear, for example, frequently overshadows the reality of the epidemic itself. Individuals tend to be excessively cautious, out of the fear that they will become infected, even if their apprehension is baseless and illogical (Murray, 1991). Simultaneously, the epidemic of stigmatization isolates both victims and perceived 'carriers' of the disease (Strong, 1990). These individuals are then often the subjects of aggression, segregation, and persecution regardless of whether they actually carry the disease (Strong, 1990). The combined effects of the three psychosocial sub-epidemics creates the ideal conditions to facilitate a 'perfect storm' of public unrest.

The goals of the present study are twofold. Firstly, the study attempts to analyze how the initial public response to notable epidemics has changed over the past 200 years. Secondly, this study will also identify how advancements in media, particularly the dawn of the 24-hour news cycle and the epoch of social media, influence initial responses to notable epidemics. To analyze this, three case studies of notable historical epidemics were chosen—the Second Cholera Pandemic (SCP), the HIV/AIDS pandemic, and the West African Ebola Outbreak (WAEO). Those specific case studies were chosen because they represent some of the most notable outbreaks of disease in recent history. Further, each case study also represents a different point in the evolution of public media. Media pertaining to the SCP, for example, is exclusively newspaper-based, as other forms of public communication had not yet been invented. Conversely, the HIV/AIDS pandemic coincided with the introduction of the 24-hour television news cycle and the WAEO occurred during the age of widespread social media usage, which both drastically influenced the way information was disseminated in the media.

To accurately identify initial public responses to historical epidemics, a sampling of media discourse was collected for analysis. Scrutinizing media discourse is a common methodology for research of similar caliber, due largely to media's inherent relationship with public opinion (Lupton, 2008; Alvarez Amorós and José Antonìo Álvarez, 1992). Media discourse and public opinion are cyclically related—media discourse educates public opinion, and public opinion educates media discourse (Gamson and Modigliani, 1989). As such, media discourse functions as one of the most reliable indicators of public opinion at various points in history (Gamson and Modigliani, 1989). Further, news discourse can be conceptualized as a carefully constructed version of reality 'packaged' in accordance with governing institutions as well as public opinion (Wall, 1997). Media collected in this study can then function as the basis for which both public opinion as well as institutional values can be surmised.

Rather than analyze news articles in their entirety, the present study only analyzed headlines. Headlines function as an interpretive framework for which an event is conveyed to the public (Fang, 2001). This framework is both consistent with the body text that follows as well as indicative of the social and political predispositions of the publication it appears in (Fang, 2001). Hence, a thematic understanding of news articles can be garnered thorough headline analysis without the need to fully analyze the news article itself. Further, headlines are also comparable in length to Twitter 'tweets' which, up until September of 2017, were restricted to 140 characters. As such, adopting a headline analysis allows for both news discourse and Twitter tweets to be considered on an equal level.

To analyze how initial public response to epidemics has changed over time, the current research gathered a corpus of 150 news articles and 66 tweets. Headlines from news articles and

text from tweets were compiled and analyzed according to the methodology proposed by Kozareva and colleagues that investigates word usage frequency of condensed news headlines (Kozareva, Navarro, Vázquez and Montoyo, 2007). Condensed headlines were both inserted into online 'word cloud' generators as well as randomly presented to supplementary data analyzers to determine valence levels. It was predicted that discourse pertaining to the HIV/AIDS pandemic would have the highest frequency of negative valence ratings and frequently mention marginalized groups, such as gay men and Haitian immigrants, due to the particularly polarizing nature of the disease when it was first introduced. Further, under the assumption that news media headlines were designed to be apathetic, it was also predicted that news discourse would more frequently be rated as neutral valence than other examples of media discourse.

METHODS

To analyze whether primary public responses to epidemics have changed throughout history, a sampling of historical media discourse was collected. All historical discourse pertained to one of three case studies. The case studies chosen—the SCP (1831-1833), the HIV/AIDS pandemic (1981-1983), and the WAEO (2014-2015)—were each assigned subjective time ranges. The time ranges associated with each case study were representative of when the disease was first introduced into Western societies, namely the United States of America and the United Kingdom, to best encapsulate initial public responses.

In all, 150 articles of news discourse and 66 tweets were collected for analysis. News discourse was gathered from online databases—particularly the British Newspaper Archive and ProQuest News & Newspapers. Discourse representing the SCP originated from a wide variety of different newspapers such as The Morning Post, The London Evening Standard, and The Globe.

Conversely, news discourse collected for the HIV/AIDS pandemic and the WAEO originated from either the New York Times, Wall Street

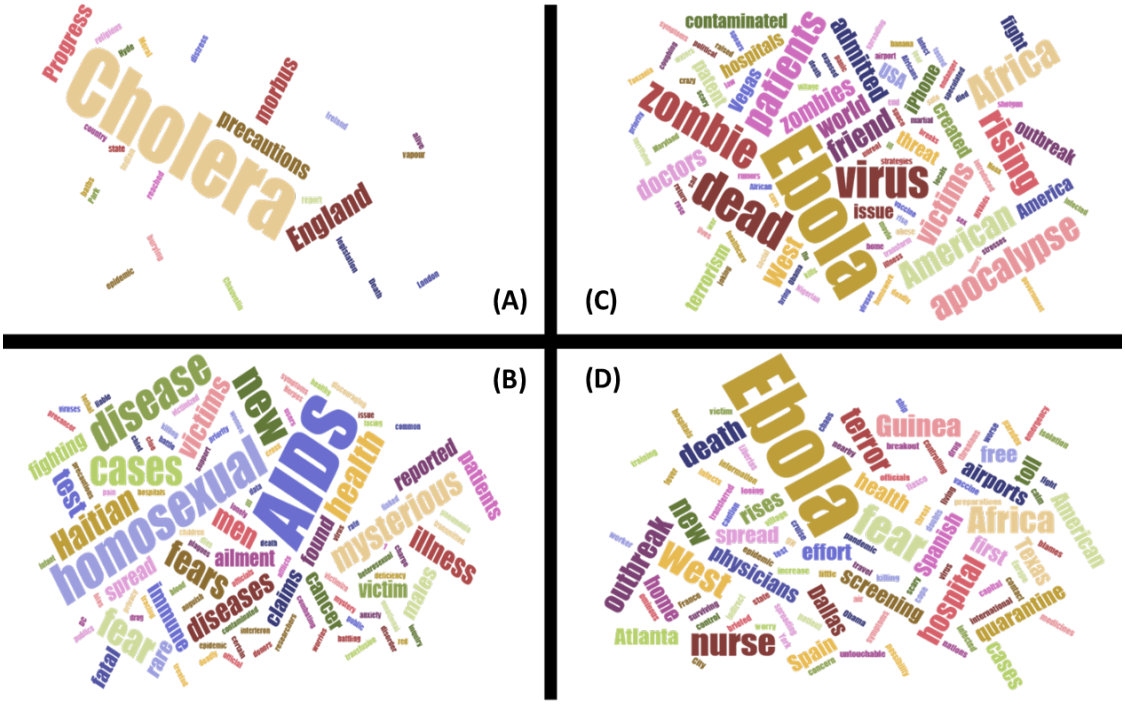

Figure 1: Word cloud results from: (A) 50 headlines from the Second Cholera Pandemic (1831-1833), (B) 50 headlines from the HIV/AIDS pandemic (1981-1983), (C) 50 headlines from the West African Ebola Outbreak (2014-2015), and (D) 66 tweets from the West African Ebola Outbreak (2014-2015).

Journal, or Washington Post. In addition, tweets pertaining to the WAEO were collected using Twitter's advanced search. Only tweets which met four specific criteria were included in this analysis: tweets had to be written in English, be comprehensible, mention Ebola in the body text or hashtag, and not originate or link to an existing news article. Further, only media discourse published within the delineated time periods were compiled.

After collection, headlines and tweets were prepared for analysis. Each headline and tweet was condensed to eliminate superfluous words and punctuation, and minor grammatical and spelling adjustments were made for consistency. Headlines associated with each case study were then inserted separately into an online word cloud generator to produce three word clouds (Figure 1). In addition, one supplementary word cloud was constructed using condensed tweets as well (Figure 1). The top five most frequently mentioned words, for all three case studies and tweets, were also recorded separately (Table 1).

To identify the valence associated with different samples of media, seven individuals were recruited as supplementary data analyzers. Respondents were presented with 40 randomly selected headlines—ten from each of the three case studies (30 in total) as well as ten tweets about the WAEO—and were asked to classify the type of emotion they felt the random headlines conveyed. Individuals indicated their emotional response towards specific headlines as: joy, happiness, humor, surprise, apathy, sarcasm, anger, fear, or sadness. Importantly, respondents were not made aware of the source of the headline they were presented with—they were only informed of what disease the headlines pertained to. Respondents were also unaware of which emotions were associated with each category of valence at the time of data analysis.

After responses were collected, they were compiled into one table (Table 2). Emotions were then broadly classified into four categories of valence: positive (joy, happiness, and humor), neutral (surprise, apathy, sarcasm), negative (anger, fear, or sadness), and no emotion. These four separate categories were graphed separately as per case study (Figure 2), as well as per type of discourse (Figure 3).

RESULTS

WORD CLOUD ANALYSIS

Frequency of word usage starkly differed across case studies (Table 1). Specifically, the word "fear" was popular in both HIV/AIDS as well as WAEO headlines. Overall, "fear" was the third and second most frequently mentioned word for all headlines concerning the HIV/AIDS pandemic and the WAEO respectively. Notwithstanding, the frequency that "fear" was mentioned was numerically low; "fear" was only mentioned a total of 9 times in HIV/AIDS headlines, and 6 times in WAEO headlines.

Table 1: Top five most frequently mentioned words of each case study and type of discourse.

DISEASE	WORD	FREQUENCY
Second Cholera Pandemic	Cholera	47
	England	3
	Progress	2
	Precautions	2
	Morbus	2
HIV/AIDS Pandemic	AIDS	39
	Homosexual	10
	Fear	9
	Disease	8
	New	7
West African Ebola Outbreak (News)	Ebola	50
	Fear	6
	West	4
	Nurse	4
	Africa	4
West African Ebola Outbreak (Twitter)	Ebola	74
	Dead	15
	Virus	12
	Zombie	10
	Africa	8

Headlines pertaining to the HIV/AIDS pandemic frequently proclaimed the novel nature of the disease—a sentiment which was not shared among the other case studies. Collectively, the word "new" was the fifth most frequently mentioned word among all 50 HIV/AIDS headlines. However, similarly to the word "fear", the numerical frequency itself was quite low—only 7 headlines specifically mentioned the word "new".

Headlines pertaining to the SCP were noticeably more conservative than other case studies. Specifically, words such as "fear", "death", or "new", which were common among other case studies, were seldom mentioned in SCP headlines. Rather, word choice remained relatively constrained; most news articles had headlines such as "The Cholera" or "Cholera Morbus".

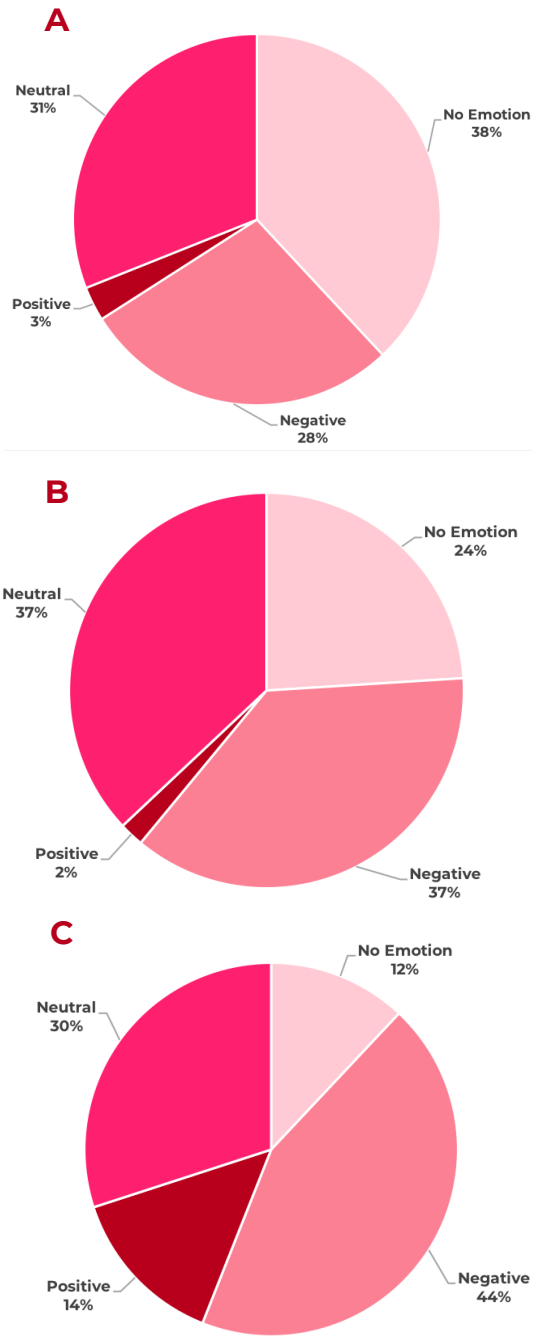

Figure 2: Valence levels associated with 10 randomly selected news headlines pertaining to: (A) the Second Cholera Pandemic (1831-1833) (n=7), (B) the HIV/AIDS Pandemic (1981-1983) (n=7), and (C) the West African Ebola Outbreak (2014-2015) (n=7).

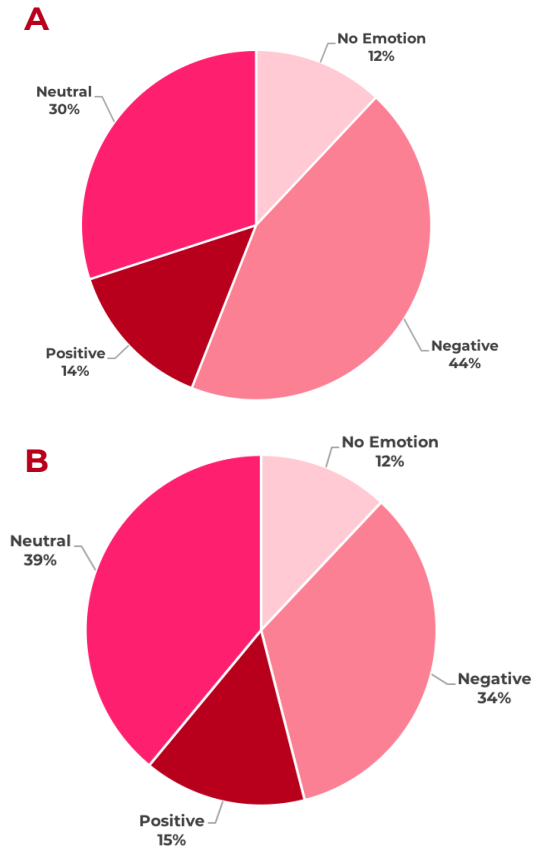

Figure 3: Valence levels associated with emotions indicated by respondents for: (A) all news discourse collectively (n=21) and (B) social media discourse (Twitter 'tweets') pertaining to the West African Ebola Outbreak (2014-2015) (n=7).

Table 2: All ratings of emotional value collected, along with the associated valence levels of each emotion (n=7).

	POSITIVE VALENCE			NEUTRAL VALENCE			NEGATIVE VALENCE			NO EMOTION
	Joy	Happiness	Humor	Surprise	Apathy	Sarcasm	Anger	Fear	Sadness	No Emotion
CHOLERA	0	1	0	5	4	0	0	8	0	11
HIV/AIDS	0	1	0	11	11	0	9	8	5	14
EBOLA (NEWS)	1	7	0	5	10	3	0	19	7	7
EBOLA (TWEETS)	0	0	9	10	5	8	8	12	0	7

Further, the word "precautions" was both popular as well as unique to headlines pertaining to the SCP. On a similar note, however, the popularity of the word "precautions" is numerically small; only 2 out of the 50 news articles collected mentioned it in their headlines.

There was a noticeable difference across the two different types of WAEO discourse—tweets and news. For example, the word "dead" was the second most frequently mentioned word among all curated tweets and was mentioned a total of 15 separate times. News headlines for the WAEO were less inclined to mention "dead", and it was not at all present within the top five most frequently used words. Further, "zombie" was frequently mentioned in tweets about the WAEO—it was the fourth most frequently mentioned word, stated 10 separate times. Understandably, "zombie" was not present whatsoever in any news headlines pertaining to the WAEO. The one similarity in word usage between tweets and news headlines for the WAEO was in the use of the word "Africa". In both news headlines and tweets, it was the fifth most frequently used word, appearing 4 and 8 times respectively.

VALENCE RATINGS

Valence ratings were subject to stark fluctuation across case studies (Figure 2). The SCP, for example, had the highest instances of headlines rated as conveying 'no emotion' (38% of total responses). Valence ratings of "no emotion" for headlines concerning the HIV/AIDS pandemic (24%) as well as the WAEO (12%) were much less frequent. Conversely, headlines pertaining to the WAEO had starkly more instances of positive valence ratings (14% of total responses) when compared to the HIV/AIDS pandemic (2%) and the SCP (3%) whose ratings of positive valence were approximately similar. The frequency of neutral valence ratings remained relatively similar across all case studies, albeit HIV/AIDS news discourse entertained a slightly higher frequency of neutral valence ratings (37%) than SCP or WAEO discourse (31% and 30%, respectively). The most prevalent difference in valence levels across case studies arose when negative valence levels were considered. By far, the WAEO had the highest proportion of negative valence ratings (44% of total ratings assigned). The HIV/AIDS pandemic had the next highest ratings of negative valence (37%) followed by the SCP (28%).

When both news and social media discourse pertaining to the WAEO were compared, there were several clear differences in valence frequencies. The most notable differences in valence arose when negative and neutral valence ratings were considered. Headlines from WAEO news discourse were more frequently rated as representing negative valence (44% of total headlines) than tweets about the WAEO (34% negative valence ratings). Further, ratings of neutral valence were more frequently granted to tweets (39%) than news discourse (30%). The frequencies of positive and 'no emotion' ratings remained generally static irrespective of whether the sample originated from tweets or news headlines. Both types of discourse were described as representative of no emotion 12% of the time, whereas ratings of positive valence were assigned at approximately the same frequency for news discourse (14%) and tweets (15%).

Collectively, there were noticeable variations in valence between the two different types of discourse that were analyzed (Figure 3). News discourse headlines, irrespective of time period, tended to be 10% more frequently rated as conveying 'no emotion' than WAEO tweets. Further, frequencies of positive valence ratings were more apparent in tweets (15%) than all collected news discourse (7%). Rating of neutral valence, although slightly different across discourse methods, remained relatively similar (33% for news and 39% for tweets). Similarly, the frequency of negative valence ratings was relatively similar between tweets (34%) and news discourse (38%).

DISCUSSION

Media discourse is often the most popular source of information used by the public when educating themselves on pertinent societal issues. The media itself is subject to constant evolution, which greatly influences the means by which it is consumed by the masses. The evolution of media may also affect the way in which individuals conceptualize different global events—namely epidemics. In accordance with epidemic psychology, the initial public response to epidemics is often associated with secondary psychosocial epidemics of fear/suspicion, stigmatization, and moralization/explanation. Changes in public media, coupled with alterations in the ways that individuals initially conceptualize different epidemics, could potentially exacerbate the severity of the secondary psychosocial epidemics. In accordance, this study attempted to analyze historical representations of three notable epidemics—the SCP, HIV/AIDS, and the WAEO—through performing a headline analysis. Both word usage and overall emotional valence were found to vary across both the three case studies of disease as well as the different types of media analyzed (newspaper vs twitter).

DISCOURSE WORD CHOICE

One of the most notable results was the sheer frequency that the word "zombie" was mentioned in Twitter tweets (Table 1). At the time of the tweets, online news outlets were promoting stories claiming deceased Ebola victims were reanimating and terrorizing local villagers (Doloquee, 2014). Although the story was first publicized by the Liberian newspaper The New Dawn and subsequently shared by the obscure online news outlet Big American News, it quickly gained traction in more well-known news outlets such as The Mirror and Newsweek in the following days (Dovey, 2014; Bond, 2014). The article shared by Big American News featured a picture from the 2013 science fiction film "World War Z", as well as a Good Morning America news segment which featured footage of an Ebola victim that was mistakenly believed to be dead (Goodman, 2014). While the initial story was quite obviously a hoax, it went viral on both Twitter and Facebook and remained a topic of discussion for several days after its initial posting. Although it was obvious some twitter users were aware of the fraudulent nature of the 'Ebola zombies" story when tweeting, others appeared to express genuine fears and some even linked to the original posting from Big American News. It was quite clear that the fallacious nature of the 'Ebola zombie apocalypse' was lost on some Twitter users.

Misinformation in the media, for which the fraudulent Ebola zombie fiasco is a prime example of, exerts a very large influence over perceptions of information validity. Overall, two-thirds of all adults in America used social media as a primary source of news in 2017—an increase of 5% since 2016, and compliant with a decade-long trend (Shearer and Gottfried, 2017). Hence, the presence of "Ebola zombies" and other instances of fallacious news reporting possess an ever-increasing influence over the collective public consciousness. When making judgments of truth, individuals rely on two separate measures—recollection and familiarity—which supplement any previous information about the topic that they may possess (Begg, Anas and Farinacci, 1992). Familiarity increases automatically when individuals are exposed to repeated statements, ultimately resulting in the illusory truth effect (Hasher, Goldstein and Toppino, 1977). According to the illusory truth effect, individuals are more likely to believe statements which they have heard before, over other novel statements (Begg, Anas and Farinacci, 1992; Hasher, Goldstein and Toppino, 1977). Even when individuals are aware that repetition does not imply truthfulness, the illusory truth effect remains present (Bacon, 1979). Hence, when individuals stumble across several tweets affirming the presence of an "Ebola zombie apocalypse" they become increasingly familiar with that same notion regardless of how outrageous the claim may seem. Further, recollection also influences judgments of information validity. Individuals are more likely to

rate novel information as true if it corroborates other previously known information (Begg, Anas and Farinacci, 1992). Although the first claims of an "Ebola zombie apocalypse" originated from Big American News—an outlet neither respectable nor well-known—its subsequent promotion in Newsweek and other more eminent news outlets helped to validate the claim. In accordance, despite the obvious implausibility of an Ebola zombie apocalypse, some individuals genuinely believed the claim to be truthful due to the familiarity and repetition fostered by the viral nature of the story.

Word choice in news headlines, especially those pertaining to the HIV/AIDS pandemic and WAEO, tended to resemble each other—particularly through their frequent use of the word "fear"—which alludes to similarities in the way that both diseases were initially framed in the media. All news headlines generally adhere to one of four reference frames when reporting an event. Some reflect a *conflict frame*, and focus on a disagreement between two clashing groups (Pan and Kosicki, 1993). Similarly, other headlines may adopt a *crisis frame*, and subtly single out a particular group as the party responsible for the situation at hand (Pan and Kosicki, 1993). Others may adopt more of a *human interest perspective* to emphasize sentimental aspects of the story, while some headlines may neglect the human experience altogether and focus purely on the *economic repercussions* related to a particular event (Pan and Kosicki, 1993). Headlines pertaining to the HIV/AIDS pandemic and the WAEO, which strongly featured the word "fear", adhered mostly to the human-interest perspective. Through their liberal use of the word "fear", headlines emphasized the emotional nature of the disease and the repercussions it brought to specific groups of people. Further, given the fact that that headlines are often the only information individuals may see, they are often used to educate public opinion concerning a particular subject (Smith, 1999). These perspectives help to subtly influence the reader's own opinions about the subject at hand, and even shape the way they respond to the disease in the future (Stewart, 2005). Through assuming a human-interest perspective, and liberally using the word "fear", headlines for the HIV/AIDS pandemic and WAEO catalyzed individuals to initially conceptualize the disease similarly—as a formidable entity worthy of fear.

Headlines from both the HIV/AIDS pandemic as well as the WAEO tended to isolate groups of people perceived to be of highest risk of contracting the diseases. As such, HIV/AIDS headlines specifically adhered to a crisis reference frame. The word "homosexual" was the second most commonly mentioned word across all HIV/AIDS headlines, and "nurse" and "Africa" were tied as the fourth most frequently mentioned word among WAEO headlines (Table 1). Those individuals, along with others who were not as frequently mentioned in headlines, were initially believed to be of highest risk of contracting HIV or Ebola. Broadly, this represents the repercussions of the epidemic of stigmatization and the marginalization of already denounced groups (Strong, 1990). Although the isolation of vulnerable groups is a well-studied theme among HIV/AIDS discourse (Lupton, 2008; St. Lawrence et al., 1990; Devine, Plant and Harrison, 1999), stigmatization during the WAEO is a topic of notably less research (Davtyan, Brown and Folayan, 2014). Theoretically, both diseases presented to Western society in similar manners—both were life threatening, without recognized cures, and had initially unidentified modes of transmission. Although sources of stigma differed, similarities lie in the fact that the disease was predominately attributed to groups whom society had already marginalized. The early years of the HIV/AIDS pandemic saw the disease being attributed to gay men and Haitian-American immigrants, while the WAEO was initially accredited to poverty-stricken Africans and African-American immigrants (Davtyan, Brown and Folayan, 2014). Due to the stark parallels between initial HIV and WAEO discourse, it can be inferred that the initial presentation of novel disease has remained relatively similar. Even in modern societies, marginalized group are still blamed, at least initially, as the cause for novel outbreaks of disease.

VALENCE RATINGS

Valence levels for media discourse pertaining specifically to the WAEO differed across the two types of discourse—news and social media—present within this analysis. Specifically, ratings of negative valence were more common among news discourse than tweets, and ratings of neutral valence were more common among tweets than news discourse. Although many tweets were blatantly sarcastic, there were just as many which could have been interpreted as both sarcastic and non-sarcastic, which introduced a contextual ambiguity. This ambiguity in contextual

perception could have been due to the difference in literary construction between news headlines and tweets. Twitter carries its own unique 'language'—specific abbreviations, references, and literary connotations—conveyed in tweets that is not present in other, more traditional forms of discourse (Rajadesingan, Zafarani and Liu, 2015). As such, the language of Twitter is subject to constant fluctuation in accordance with short-lived pop culture trends (Rajadesingan, Zafarani and Liu, 2015). Due to the changing nature of twitter 'language' conventions, individuals could be led to erroneously perceive sarcasm, even when it is absent from the tweet itself (Rajadesingan, Zafarani and Liu, 2015). Further, sarcasm can also be conceptualized as a linguistic phenomenon as well as a literary phenomenon. In order to perceive sarcasm, individuals rely on tonal and contextual cues, which are absent from tweets (Kunneman, Liebrecht, van Mulken and van den Bosch, 2015). In the absence of such cues, judgments of sarcasm exclusively fall to constructional cues which, due to the fluid language of Twitter, can be vague and uninformative for many (Kunneman et al., 2015; Rajadesingan, Zafarani and Liu, 2015). Individuals were more apt to judge tweets as sarcastic, due to the unique 'language' of Twitter being unhelpful towards sarcasm detection, which fostered a perceptual ambiguity.

There was distinct cross-case study variation in valence determinations. Namely, the SCP was more frequently rated as conveying no emotion than the HIV/AIDS pandemic and the WAEO. This was likely due to the non-descriptive nature of SCP headlines with respect to HIV/AIDS and WAEO headlines. Generally, headlines at the time of the SCP were relatively undescriptive—often detailing the news-worthy situation in only 5 words or less (Cohen and Vandello, 1998). As newspapers evolved, so did their associated headlines; headlines became gradually more sensationalistic, meaningful, and moralizing the closer to the mid-19th century they were published (Cohen and Vandello, 1998). As such, headlines at the time of the SCP were not as indicative of the interpretational framework unique to its associated newspaper—this quality arose when headlines increased in descriptiveness (Fang, 2001; Cohen and Vandello, 1998). As such, the concise nature of headlines at the time restricted the ability of news outlets to convey emotional meaning through headlines.

This research, through analyzing headline word usage patterns and valence ratings, provides preliminary insight into the complex interplay between disease and the mass media. By understanding how past diseases have been framed by the media, it provides a unique opportunity to inform future disease responses. Given that media is the foremost means by which the general public informs themselves about outbreaks of disease, it is imperative that it does so realistically, without sensationalizing (Glass and Schoch-Spana, 2002). The current research used case studies of some of the most notable outbreaks of disease in modern human history and identified that contemporary media tends to follow a specific interpretational framework when initially presenting outbreaks of disease. Specifically, this framework adheres to the innate principles of epidemic psychology—namely the sub-epidemics of stigmatization and fear—which has theoretical repercussions on public order (Strong, 1990). By knowing *how* the public is presented with disease-related information, governmental institutions can surmise how the public will conceptualize—and later react to—disease. Anticipating how individuals react to disease is invaluable towards forming effective disease-response policies whose explicit goal is to preemptively quell the theoretical panic and fear characteristic of epidemic psychology.

STUDY LIMITATIONS

Regardless of the reliability of media as an indicator of public opinions, there is no way to conclusively identify public opinion at different points in history. Hence, there could be minor inconsistencies between how some diseases were conceptualized by the public and the ways in which they were presented in the media. Although this limitation is negated in the WAEO case study, since public tweets from personal accounts were analyzed, it remains present for both the SCP and the HIV/AIDS pandemic. Specifically, the non-descriptiveness of SCP headlines presents the largest obstacle to identifying public opinion. Public opinion regarding the SCP likely differed from the relatively constrained headlines—whose emotional value was virtually nonexistent. To negate this limitation, future research could include samples of personal discourse, such as journals and letters, to garner individual thoughts regarding the SCP and obtain a more accurate representation of public opinion. However, in the scope of the current media discourse analysis, this limitation was unavoidable.

There were also several other limitations innate to the methodology of the current study. One of the most apparent limitations of this research concerns the limited scope of discourse collection. Due to both time and resource constraints, the current study limited discourse collection to 150 news articles and 66 tweets. Future research should consider amassing a larger corpus of discourse to uncover trends that were not apparent in the current study's limited analysis. Secondly, at the time of data analysis, all supplementary data analyzers had received, or were in the process of receiving, a post-secondary education. Previous research has identified education as a factor that greatly influences news consumption. Specifically, higher education is associated with increased voluntary news exposure, differential news source engagement, and a better ability to discern factual information from invalid information (Ksiazek, Malthouse and Webster, 2010; Baum, 2003; Allcott and Gentzkow, 2017). Accordingly, level of education could also influence headline valence ratings—which future research should consider analyzing. Lastly, news articles possess a wealth of subliminal meanings in a multitude of different areas which were neglected in the current study—namely the body text, picture selection, and story placement respective to the overall newspaper (Lupton, 2008). Hence, future research into initial public responses to epidemics should undertake a more comprehensive analysis of news discourse.

CONCLUSION

Given the inevitable presence of disease in society, anticipating how humans will react to epidemics is a topic of great importance. This analysis has attempted to understand how past responses to notable case studies of disease have changed across both time as well as type of media. As such, a total of 66 tweets and 150 examples of news discourse were collected from online databases, whose headlines were analyzed with respect to word choice and valence. The analysis yielded instances of the illusory truth effect, stigmatization of already marginalized groups, and time-dependent changes in valence level across both media sources as well as case studies. Comprehensively, this research identifies preliminary trends indicative of how mass media initially frames deadly disease—which can be used by governmental institutions to anticipate and quell the mass public fear that often accompanies disease. Future research should consider broadening the scope of analysis to include both more instances of discourse as well as a more comprehensive analysis of all aspects of news discourse to offer further insight.

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