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RESEARCH ARTICLE



# Just Turn on the Faucet: A Content Analysis of PSAs About the Global Water Crisis on YouTube

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## ABSTRACT

Water is essential for human life, yet safe drinking water is a limited resource. Critical to fighting the global water crisis are public awareness campaigns, including Public Service Announcements (PSAs). While YouTube has become a popular medium for disseminating prosocial content such as PSAs, environmental communication efforts on this platform remain largely uninvestigated. This study examines the content and characteristics of global water crisis PSAs on YouTube by applying two communication models: the Extended Parallel Process Model, and the Elaboration Likelihood Model. These models are used to evaluate the potential effectiveness of the PSAs. Content analysis reveals that threat messages often outweigh efficacy messages in the videos, central route processing cues are more prevalent than peripheral route cues, and a focus on quality or quantity issues differed by sponsoring organization (non-profit, for-profit, government). Implications and avenues for potential future research are discussed.

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## KEYWORDS

Environmental communication; persuasion; YouTube; public service announcements; content analysis; Extended Parallel Process Model

## Introduction

Human life depends on access to clean, plentiful water. For some, getting a glass of water is as simple as walking to the kitchen and turning on a tap that always provides water safe for consumption. For others, access to safe water is much more complicated. However, water's importance stretches further than its biological functions—gender equality, economic progress, social well-being, and national security are all underpinned by water (Bigas, 2012).

The global water crisis can be conceptualized as two distinct, yet interconnected problems related to water quantity and water quality. Regarding quantity, our global society is using freshwater at two times the population growth rate, resulting in a critical shortage of the supply necessary to meet current needs (Solomen, 2011). Regarding quality, 1000 children die daily from waterborne diseases (WHO, 2015). Nearly 10% of the global disease burden could be prevented by improving sanitation infrastructure and management of water resources (Barry & Hughes, 2008; Prüss-Üstün, Bos, Gore, & Bartram, 2008).

Critical to fighting the global water crisis is increased public awareness of water issues and the promotion of corrective behavioral strategies (Hurlimann & Dolnicar, 2012; Kononova & Yuan, 2015). Research highlights the important role that mass media play in shaping public understanding of environmental issues (Ho, Scheufele, & Corley, 2013; Nisbet & Goidel, 2007; Nisbet & Scheufele, 2009; Wagner, Kronberger, & Seifert, 2002). While there is comprehensive literature on the relationships between media and opinions toward environmental issues (Flora, Maibach, & Maccoby, 1989;

Holbert, Kwak, & Shah, 2003; Nisbet & Goidel, 2007; Shanahan & McCOMAS, 1997), less research has focused on strategic communication messages related to water issues. In order to eventually examine if and how these messages are improving public awareness about the dire global water situation, and/or location specific water issues, it is necessary to explore how water issues are covered in media by analyzing the content of communication products through a theoretical lens. Specifically, as Manganello and Blake (2010) argue in regard to health messaging, it is essential to consider theory when evaluating the contents of social messaging, especially if one hopes to understand the potential impacts of the messaging on attitudes and behaviors. Our study uses the theories of the Extended Parallel Process Model (EPPM) and Elaboration Likelihood Model (ELM) to understand current water crisis messaging and its potential impacts on viewers. These theories together can categorize both contents (threat and efficacy information) and presentation (cues meant to appeal to a cursory or thorough engagement with the message), giving insight into where messaging can be improved to optimize persuasion and ultimately behavior change for this important issue.

While research regarding water-related messaging is relatively rare (a recent exception being Liang, Henderson, & Kee, 2017), several recent studies have examined newspaper coverage of local and regional water issues (Altaweel & Bone, 2012; Hurlimann & Dolnicar, 2012; Wei, Wei, Western, Skinner, & Lyle, 2015; Xiong, Wei, Zhang, & Wei, 2016). Describing a lack of message certainty, viewpoint diversity, and scientific evidence, Hurlimann and Dolnicar (2012) concluded that newspaper reportage of water issues in Australia may “work against public engagement in water issues and undermine the public’s understanding of and confidence in water management measures” (p. 6497). Other studies have criticized the lack of water-related newspaper coverage except during times of severe weather (Altaweel & Bone, 2012), and a shortage of corresponding scientific expert opinion within this coverage (Wei et al., 2015; Xiong et al., 2016). As research indicates that news media coverage of the water crisis is currently inadequate, it is important to expand environmental communication research to investigate how other mass media sources are disseminating information on this globally imperative topic, including evaluating the potential persuasive impact of these messages.

For nearly half a century, strategic campaigns have brought awareness to important societal issues through Public Service Announcements (PSAs) (Bator & Cialdini, 2000; Lister et al., 2013; Searles, 2010). More recently, PSA producers have utilized video sharing websites such as YouTube as a substitute and complement to traditional television and radio mass media broadcasting (Waters & Jones, 2011). Emerging health communication research has focused on exploring these online videos and examining their content, sponsors, characteristics, effectiveness, and use of health and behavioral theories (Briones, Nan, Madden, & Waks, 2012; Kononova & Yuan, 2015; Lister et al., 2013; Paek, Kim, & Hove, 2010; West, Lister, Perry, Church, & Vance, 2014; Yoo & Kim, 2012). As with the field of health communication, environmental communication is strengthened by its inclusion of social science theory, specifically theoretical knowledge related to persuasion. Previous research has used theoretical frameworks such as the EPPM and framing to highlight weaknesses in mediated environmental communication products, using these theoretical frameworks to provide feedback for future research and practice (Choi & Lin, 2008; Trumbo, 1996). Attention to the guidance of theory in message creation and evaluation is essential as research demonstrates the utility of theory in understanding audience responses to environmental messaging (Bator & Cialdini, 2000; Liang et al., 2017; Verplanken, 1991). Correspondingly, research on YouTube videos has demonstrated that presence of theoretical constructs within online videos is positively associated with view counts (Lister et al., 2013).

In light of these important considerations, it is significant to highlight the lack of research examining PSAs focused on the context of the global water crisis within both traditional and social media platforms. Given the popularity of PSAs as a method of communication for promoters of social issues, understanding how the water crisis is currently addressed will give future video creators necessary guidance regarding strategies to avoid and strengths to draw on from prior efforts. Thus, we address this paucity by examining the content, characteristics, and presence of theoretical

strategic communication constructs in global water crisis PSAs on YouTube. We begin with a brief review of the literature on environmental and prosocial communication campaigns, specifically highlighting the integral role of PSAs and the emerging use of new online media sources.

## Literature review

### *Environmental PSAs*

PSAs are short (30-second to 2-minute) televised advertisements sponsored or produced by governmental agencies and nongovernmental organizations “to draw attention to important social issues and promote socially desirable attitudes and behaviors” (Kononova & Yuan, 2015, p. 3; Waters & Jones, 2011). Promoting prosocial behaviors through PSAs are especially advantageous because of their ability to efficiently disseminate messages to widespread audiences (Bator & Cialdini, 2000). For example, one of the most well-known environmental PSAs, “The Crying Indian” advocated against littering (Searles, 2010; The Ad Council, 2015) and has been viewed by an estimated 50 million Americans since it originally aired in 1971 (Bator & Cialdini, 2000).

Scholarship on environmental PSAs is limited; the few studies that do exist rely on frameworks from social psychology to examine the attitudinal impact of the PSAs on viewers (Kononova & Yuan, 2015; Searles, 2010). Searles (2010) found that emotional appeals significantly influence the environmental attitudes of PSA viewers. Bator and Cialdini (2000) offer suggestions for using norms more effectively in subsequent environmental PSAs. Only one study was found addressing environmental PSAs on YouTube; this study concluded that congruence of PSA messages with surrounding advertisements was associated positively with video recall but negatively with attitudes toward the videos (Kononova & Yuan, 2015).

### *PSAs on YouTube*

Social media and other video sharing websites provide organizations the opportunity for independence from the restrictions of donated airtime and budget limitations associated with traditional television media (Meek, 2012; Waters & Jones, 2011). YouTube, the most popular online video sharing platform since its launch in 2005, is the preferred video resource for people ages 18–34 and streams more than six billion hours of video content each month (YouTube, 2015). PSAs posted on YouTube have the added advantage of the “sharing” function of the site, which allows for greater dissemination (Freeman & Chapman, 2007). Various organizations around the world are using the YouTube platform to spread their messages every day (Kononova & Yuan, 2015; Meek, 2012). Demonstrating the powerful potential for PSAs on YouTube to engage viewers, Melbourne Metro Train’s 2012 train safety PSA entitled “Dumb Ways to Die” accumulated over 70 million views around the world (Kononova & Yuan, 2015; Russell, 2012).

### *Prosocial video content on YouTube*

Many social science and media scholars have investigated the content of prosocial videos on YouTube. These early studies were exploratory in nature and examined a variety of video characteristics. Freeman and Chapman (2007) analyzed the content of smoking imagery on YouTube, finding that corporations shared videos that appear to be amateur yet advance a corporate agenda. Paek et al. (2010) found that pro-smoking videos were more prevalent than antismoking videos on YouTube. However, certain antismoking videos had many more views than the pro-smoking videos, potentially due to their higher sensation value. Yoo et al. (2012) studied obesity-related videos on YouTube and concluded that these videos potentially worked to reinforce stigmatization of obese people.

Following this line of inquiry, this study will explore the characteristics of water-related PSAs on YouTube. We will do so by recording the following items related to both characteristics (e.g. views) and content (e.g. behaviors advocated).

RQ1: What are the characteristics and content of global water crisis PSAs on YouTube?

## Theoretical framework

The importance of theoretical integration within communication campaign messaging is well documented and is foundational to this study, yet little empirical work currently exists examining theoretical incorporation in pro-environmental YouTube videos. However, several analyses of public health messages on YouTube have investigated video content through a theoretical lens. Briones et al. (2012) examined the content of HPV vaccine-related videos on YouTube using the health belief model. Examining anti-bullying and prescription drug abuse (PDA) videos, respectively, Lister et al. (2013) and West et al. (2014) also applied theory in this way. Both concluded that the lack of theory-informed content within YouTube videos was likely due to a lack of awareness of theory among the creators of the videos. Such theory-based content is important, as research has shown that presence of theoretical constructs within YouTube videos is positively associated with view counts (Lister et al., 2013). As there is limited scholarship on the application of theory constructs in environmental PSAs on YouTube, this analysis will apply two communication theories to water PSAs on YouTube: the EPPM and the ELM.

### EPPM

The EPPM was developed to explain conflicting findings in the literature on fear appeals (Witte, 1992). According to the EPPM, a message using fear needs to have information addressing four components: severity, susceptibility, self-efficacy, and response efficacy. Susceptibility is the likelihood of being at risk for a negative consequence (Witte, 1992), for example, the number of people in an area being affected by water restrictions. The second component is severity, which is the seriousness of the potential negative consequences (Witte, 1992), such as the danger of waterborne diseases. Information about susceptibility to and severity of a risk influences the viewer's perceived threat of that risk. How a viewer responds to this threat, and the fear it inspires, depends on the efficacy components of the message. The third component is response efficacy, which is information about how the suggested behavior for avoiding the risk will prevent or alleviate the threat (Witte, 1992), for example, that boiling one's water will kill waterborne illness. The fourth component is self-efficacy, which is information provided to increase the viewer's confidence that they can perform the recommended behavior (Witte, 1992), for example, the simplicity of boiling water.

Research shows that people are most likely to adopt recommended behaviors to protect themselves against a threat when perceptions of both threat and efficacy are high (Witte & Allen, 2000). If a message elicits a higher perceived threat than perceived efficacy, message rejection can occur (Witte, 1992). While we did not expect global water crisis PSAs to exclusively contain fear appeals, these constructs are valuable when considering a variety of emotional appeals (Lewis, Watson, & White, 2013).

### Studying EPPM messaging

Several studies have used the EPPM to analyze media messages. Investigations of breast cancer (Kline & Mattson, 2000) and cervical cancer (Brown & Lewis, 2003) messages found a lack of efficacy for the level of threat portrayed, potentially prompting message rejection. In a study of climate change messages, O'Neill and Nicholson-Cole (2009) found that messages captured attention and generated a sense of issue importance by using dramatic, shocking, or scary images of climate change but likely resulted in feelings of helplessness due to a lack of efficacy components. However, Lee

(2011) found that efficacy messages were more prevalent than threat messages in news clips about the human papillomavirus vaccine on YouTube, running the risk of losing attention. The lack of balance between efficacy and threat found in the literature reinforces the need to examine these concepts in relation to global water crisis PSAs.

No study to date has explored the presence of EPPM constructs within PSAs on YouTube. Using the EPPM to evaluate video content in the context of the global water crisis will illuminate whether most PSAs are pushing audiences towards message avoidance or message acceptance.

RQ2: How are the concepts of self-efficacy, response efficacy, severity, and susceptibility represented in YouTube PSAs on the global water crisis?

RQ2a: How balanced are the presence of threat messages and efficacy messages in YouTube PSAs on global water crisis?

## ELM

While the EPPM focuses on the informational content of the message, the ELM focuses on mechanisms to persuasion cued by message elements. Developed by Petty and Cacioppo (1986), the ELM states persuasion can happen by two qualitatively different routes: the central and the peripheral routes. Persuasion in the central route is determined by message-relevant thinking about the persuasive arguments in the message and occurs when the receiver of the message is motivated and able to do such thinking. Motivation can come from the relevance of the message to the receiver or through message characteristics that attract attention. Peripheral route persuasion often occurs through cues such as source attractiveness/expertise or the number of arguments and occurs when the receiver is not highly motivated or not able to cognitively elaborate regarding the message. Persuasion through the central route is likely to have a more permanent impact on attitudes and behaviors than persuasion through the peripheral route (Eagly & Chaiken, 1993).

However, messages targeting peripheral processing can find success. A review of studies on celebrity-endorsed PSAs found that celebrity inclusion can be helpful in changing risky adolescent attitudes or behaviors such as drunk driving, unprotected sex, smoking, and drug use (Shead, Walsh, Taylor, Derevensky, & Gupta, 2011). Paek, Hove, Ju Jeong, and Kim (2011) found that among an audience of college-aged people, perceived similarity seemed to be a stronger attribute than perceived expertise in the pro-social message context; this effect was even stronger for those who had low issue involvement (Paek et al., 2011).

However, recent research demonstrates that traditional ELM distinctions between central and peripheral processing cues may not be as clearly defined as previously conceptualized (Lazard & Atkinson, 2015; Wansink & Robbins, 2016). In fact, Lazard and Atkinson's (2015) work showed that visual representations of data, when integrated with text through infographics, attain significantly increased elaboration. Their work calls into question conceptualizations of ELM which relegate visual cues to facilitating peripheral processing only and is important to consider for this study due to the inherently visual nature of YouTube videos. While this study does not investigate how audiences of YouTube PSAs process video elements, video characteristics posited to promote central or peripheral processing are examined. Thus, our third research question seeks to document and evaluate the use of central and peripheral route cues present within YouTube PSAs about the global water crisis.

RQ3: Are peripheral or central route cues more dominant within YouTube PSAs regarding the global water crisis?

RQ3a. How are celebrities, children, and spokespeople used in these videos?

## Youtube video sponsor/producer

The final factor we examine is how the type of organization (governmental, non-profit, or for-profit) may influence video content. Several studies of YouTube videos have investigated the effects of video



producers on video characteristics. Lister et al. (2013) and West et al. (2014) both found no correlation between the theoretical content of videos and the entity who created the videos (e.g. high-school student or trained health professional).

West et al. (2014) stated that a “low level of theory incorporation in organization-made PSAs highlights the need for collaboration between health behavior-change experts [...] and organizational PSA creators” (p. 1260). Investigating whether the use of theory within YouTube PSAs differs based on sponsoring organization may help guide recommendations for future water-related campaigns.

RQ4: How do video characteristics, video themes, and correspondence of video content to theoretical constructs differ based on the sponsoring organization of the video?

## Methods

### Sample

YouTube ([www.youtube.com](http://www.youtube.com)) was searched between 23 April 2015 and 26 April 2015 to identify videos related to the global water crisis. The terms “PSA” and “public service announcement” formed Boolean search strings to which each of the following terms were added individually: “water” ( $n = 11,400$ ), “water crisis” ( $n = 253$ ), “water problems” ( $n = 23$ ), “water issues” ( $n = 20$ ), “water scarcity” ( $n = 77$ ), “water conservation” ( $n = 1080$ ), and “water quality” ( $n = 219$ ). The water-related search terms were selected based on previous content analysis research of water-issue news coverage (Alta-weel & Bone, 2012; Xiong et al., 2016), and were refined to better reflect this study’s research questions. The final selection of search string terms was compiled following several rounds of preliminary YouTube searches using slight modifications of the terms by Alta-weel and Bone (2012) and Xiong et al. (2016), combined with the two PSA terms. This type of sampling design, based on the author’s selection of several key search terms, has been utilized in many previous content analysis studies of YouTube videos (Athanasopoulou et al., 2016; Briones et al., 2012; Keelan, Pavri-Garcia, Tomlinson, & Wilson, 2007; Kim, Paek, & Lynn, 2010; Paek et al., 2010; Yoo & Kim, 2012). The “short (<4 minute)” filter was applied and the search results were sorted by relevance. Following the sampling procedure of several previous YouTube-based content analyses (Briones et al., 2012; Keelan et al., 2007; Kim et al., 2010), the first 200 videos (excluding duplicates) from each search were screened for inclusion. To be included in the final sample, videos had to be two minutes or less (as per the definition of a PSA by Waters and Jones (2011)), in English, produced by an organizational entity (no school projects or personal creations), and related to the water crisis. No news clips, presentations, televised pre-recorded analogue PSAs, or water safety (e.g. boating, swimming) videos were included. Of 920 videos screened, 106 videos met all criteria.

### Coding scheme

#### Video characteristics

Building upon previous content analyses of YouTube videos (Freeman & Chapman, 2007; Paek et al., 2010; Yoo et al., 2012), we coded for URL, length, views, date, production entity, country of production, main water topic (either quantity or quality), additional themes, general purpose (awareness promotion or behavior change), and behavioral recommendations. See Table 1 for Krippendorff’s alpha, Cohen’s kappa, and definitions of all characteristic and theme variables coded.

Production entity was classified by type of organization into the following seven categories based in part on Briones et al. (2011) and Waters and Jones (2011) distinctions: government agency (including local, state, and national levels), non-profit organizations (including non-governmental organizations and advocacy groups), and for-profit organizations (including utility companies and business entities). To improve reliability, only the three main organization types (government, non-profit, and for-profit) were used in data analysis.

**Table 1.** Video characteristics.

Variable	Reliability: Krippendorff (Kappa)
Website URL	N/A
Title	N/A
Production company	N/A
Producing Entity Type <i>Government agency (local, state, and national levels), non-profit organizations (non-governmental organizations and advocacy groups), and for-profit organizations (utility companies and business entities)</i>	0.749
Producing country <i>USA, other, unclear</i>	0.878
Other Production Country	N/A
Length of video	N/A
Views	N/A
Central Topic of PSA <i>Quantity (overuse of water, ex: water conservation, save water), quality (ex: lack of safe drinking water, protect our water from pollution), both, neither</i>	0.724
Theme of PSA	
Health: Health or diarrheal disease mentioned, images of sick or dying people	1
Pollution: Water quality affected by factors such as toxic chemicals, contaminated water shown	0.799
Policy	0.787
Economic: water as related to income or poverty, need for donations	0.893
Climate change: changing weather, severe weather, storms	1
Ecosystem: impacts on other plants animals, beauty of nature	0.768
Drought: water is running out, mentions of drought	0.88
Water Source	0.799
Other	N/A
Latent theme	N/A
Communication purpose	
Awareness: provides information and refers to website	0.787
Behavioural: specific behaviours listed, including reduce water use or donate money	0.745
Dominant purpose <i>Equal, awareness, behaviour, cannot determine, neither</i>	0.856
Additional information	0.892
<i>None, website of entity, other website</i>	
Instructions/recommendations	0.799
<i>Individual conservation (You can save water), societal conservation (Californians must save water), individual drinking water quality (treat your water before drinking for your family's safety), societal drinking water quality (keep our lakes clean), donations (contribute to building wells), political action (sign petition), other</i>	

N/A: variable item was open-coded.

The videos were assessed and categorized as either water quantity focused or water quality focused. Quantity focused included videos primarily related to the need to conserve water and anything related to flooding; quality focused included videos related to the impacts of pollution or water-borne bacteria on environmental and public health. Coding categories for additional themes included Altaweel and Bone's (2012) categories and themes present in a preliminary viewing of global water crisis YouTube videos. Two themes were selected per video.

Video purpose was assessed as awareness, behavior, or both. For example, if the PSA concluded by suggesting people visit a website "for more information," the video was coded as being awareness based. If the PSA-listed behaviors people could take to reduce their water use or suggested people donate, the video was coded for behavior change. The behavior change-based videos were further coded to list the behavior being recommended.

### EPPM

Each video was coded for the four main components of the EPPM model: severity, susceptibility, self-efficacy, and response efficacy. Following the general procedure by Dudo, Dahlstrom, and



Brossard (2007) and Briones et al. (2011), each of these items was coded as present or absent within the PSA. Theoretical codes are available in Table 2.

Criterion for coding each of the EPPM constructs was based in part on the content analysis conducted by Lee (2011). Severity was coded as present when video content included messages or visuals depicting the seriousness of consequences related to the water crisis, such as statistics related to morbidity. Images related to these indicators of severity included depictions of drought or water loss in an area. Susceptibility was coded as present when videos included messages about the likelihood of suffering from a water-related disease or the likelihood of running out of freshwater resources.

Self-efficacy was coded as present when the video addressed people's ability to perform the recommended behavior to mitigate the threat. This included suggestions for reduction of water consumption, changing disposal habits of potential contaminants, or taking policy-related action. Response efficacy was coded as present when messages promoted the effectiveness of a recommended behavior or addressed when and how often people should perform a behavior.

### ELM

Central route cues were coded as present when the video used statistics, facts, or clearly articulated arguments, including graphical displays of such data (such as infographics). Peripheral route cues were coded as present when the video relied on elements such as the presence of celebrities or dramatic visuals or music (without any accompanying text or graphical displays of data). Peripheral cues were further classified by type of actors/spokespeople utilized. Celebrity presence and demographic variables (age and gender) of video spokespeople, including children, were also noted. Videos with celebrity narrators were coded as N/A for other spokespeople.

### Coding procedure

The unit of analysis was the individual video. Two coders pretested and refined the codebook. Inter-coder reliability was assessed using Krippendorff's alpha and Cohen's kappa on a sub-sample of 35

**Table 2.** Theoretical variables.

Variable	Reliability: Krippendorff (Kappa)
Extended Parallel Process Model	
Severity: audio or visuals depicts seriousness of consequences of water crisis	0.881
Susceptibility: messages involve likelihood of suffering from issues of quantity or quality	0.82
Self-efficacy: suggestions for actions that people are able to perform	0.745
Response efficacy: reassurance that recommended behaviour will help avoid threat	0.82
Elaboration Likelihood Model	
Central: clearly articulated arguments, persuasive and concrete explanation, statistics	0.678 (0.678)
Peripheral: reliance on source, presentation quality, catchy slogan, not argument	0.745
Celebrity	
Celebrity present	1
<i>As voiceover, more than one, present, no celebrity</i>	
Gender	1
<i>Both genders, all male, all female</i>	
Level of fame	1
<i>International, national, local</i>	
Children	
Children	0.955
<i>Present, not present</i>	
Gender	0.907
<i>Both genders, all male, all female</i>	
Age	1
<i>Infant, toddler, child older than 5, teenager or tween</i>	
Race/ethnicity	0.809
<i>Multiple race, Caucasian, non-Caucasian, unclear</i>	
Children have speaking role	0.708
<i>Yes, no</i>	

N/A: Variable item was open-coded.

videos. Due to the binary nature of many variables, it was sometimes necessary to consider percentage agreement as a supplement to these two measures (Lombard, Snyder-Duch, & Bracken, 2004). Only one item, central-route cues, achieved Krippendorff's alpha and Cohen's kappa below 0.7. However, this variable achieved percent agreement of 0.91, which is considered an acceptable degree of reliability (Hayes & Krippendorff, 2007; Lombard et al., 2004).

## Analysis

Data were entered into Excel and analyzed using SAS Version 9.4. Organization type was recoded into three primary categories: governmental, non-profit, and for-profit. All non-profit organizations, non-governmental organizations, and non-profit partnerships were categorized as "non-profit." All utility companies, for-profit companies, and for-profit partnerships were categorized as "for-profit." Governmental entities from each level (local, state, and national) were categorized as "governmental." The number of themes (0, 1, or 2) expressed in the PSA was calculated, and month was extracted from the upload date. For the EPPM constructs, variables were created by summing severity and susceptibility presence to form threat and summing self-efficacy and response efficacy presence to form efficacy. The range for both of these variables was zero to two. The final EPPM variable was the difference between threat and efficacy scores for videos that contained any threat or efficacy. This variable ranged from negative two to positive two, with higher numbers indicating a focus on threat.

RQ1 was answered with descriptive statistics of characteristics of the videos. For RQ2, the proportion of videos including each EPPM variable was examined. For RQ3, dominance of central or peripheral processing cues was examined along with the presence and characteristics of celebrities, children, and spokespersons. For RQ4, each variable examined in RQ1 and select variables from RQ2 and RQ3 were analyzed for an association with source (non-profit, for-profit, government agency). Fisher's exact test was used as cell sizes were small. The Kruskal-Wallis test was used to examine differences by source in number of views and length.

## Results

Results for RQ1 are available in Figure 1 and Table 3. Upload dates ranged from 12/6/2006 to 4/1/2015. Half of all PSAs were from non-profit organizations, while the other half was split between for-profit (23.58%) and government agencies (26.42%). The majority of the videos were produced in the United States (80.95%). Few videos focused on both quality and quantity equally (6.60%). Quantity and quality were each the focus of about 40% of videos. Half the videos had two main themes

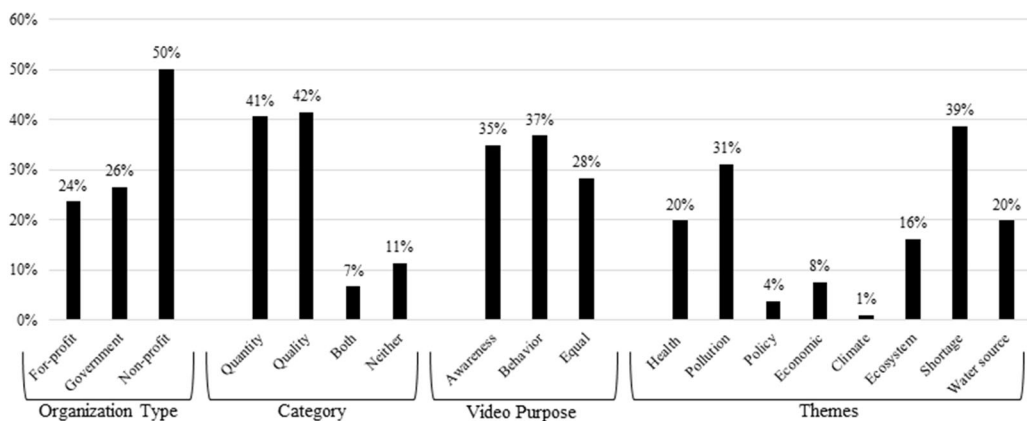


Figure 1. Video characteristics and theme variables.

**Table 3.** Video characteristic frequency.

Variable	% (n)
Produced in the United States	80.95% (85)
Number of themes	
0	1.89% (2)
1	47.17% (50)
2	50.94% (54)
Message goal	
Awareness	34.91% (37)
Behaviour	36.79% (39)
Equal	28.3% (30)
Recommendations	
Other	25.93% (21)
Conservation individual	30.86% (25)
Conservation societal	16.05% (13)
Drinking water quality individual	2.47% (2)
Drinking water quality societal	14.81% (12)
Donations	6.17% (5)
Political action	2.47% (2)
Multiple	1.23% (1)
Buy our product	0.00% (0)

+ Categories overlap.

(50.94%), while most others had one theme (47.17%). The most common theme was water shortage (present in 38.68% of PSAs), followed by pollution (31.13%), water source (19.81%), health (19.81%), and ecosystem (16.04%). Slightly more than a quarter of PSAs focused on both behavior and awareness (28.30%), with the other PSAs split almost equally between the two message goals.

The most common behavior recommended was conservation on the individual level (30.86%). A number of videos also advocated conservation (16.05%) and drinking water quality on the societal level (14.81%). About a quarter of recommendations were coded as other (25.93%), including suggestions to visit a public garden, take advantage of monetary rebates and incentives related to energy efficient appliances, and attend various events. The month during which the most videos were distributed was March (17.92%). Videos were on average 46.04 seconds long ( $SD = 23.11$ ), with a median of 35.5 seconds ( $IQR = 30$ ). Videos had an average of 2209.29 views ( $SD = 10,085$ ), with a median of 372 views ( $IQR = 981$ ). All but one video had fewer than 15,000 views.

Results for RQ2 are available in Table 4. The element most often included was susceptibility, which was reflected in 76.42% of videos. About half of videos included elements of severity (52.83%). Self-efficacy and response efficacy were included in about two-thirds of videos each. About half of videos contained both elements of threat (severity and susceptibility; 51.89%) or both elements of efficacy (self and response; 53.77%). Regarding RQ2a, an equal focus on threat and efficacy was present in 38% of videos, while 29% of videos had more of a focus on threat than efficacy.

Results for RQ3 are available in Table 4. Only 20.75% used both central and peripheral cues equally. A slight majority used primarily elements thought to promote central processing (53.77%). Answering RQ3a, celebrities were present in 19.81% of PSAs. Celebrities were most often male (66.67%) and often had speaking roles (95.24%). Children were present in 33.02% of PSAs and most PSAs including children included those of both genders (68.57%). Children were mostly either Caucasian (34.29%) or the PSA included children of multiple races (31.43%). Children spoke in few of the videos (25.71%). Most PSAs without a celebrity narrator had a spokesperson, who most often was a narrator (63.53%), and most spokespersons were male (58.21%) and Caucasian (58.21%).

Results for RQ4 for video characteristics are available in Table 5. There were significant differences in producing country by organization type, with almost all for-profit PSAs being produced in the United States (96%); this percentage was lower for among non-profits (69.23%). Significant

**Table 4.** Theoretical variable frequency.

Variable	% (n)
<i>EPPM variables</i>	
EPPM components <sup>+</sup>	
Severity	52.83% (56)
Susceptibility	76.42% (81)
Self-efficacy	65.09% (70)
Response efficacy	66.98% (72)
Efficacy	
0	21.70% (23)
1	24.53% (26)
2	53.77% (57)
Threat	
0	22.64% (24)
1	25.47% (27)
2	51.89% (55)
Threat – efficacy	
–2	9% (9)
–1	24% (24)
0	38% (38)
1	19% (19)
2	10% (10)
<i>ELM variables</i>	
Dominance	
Neither central nor peripheral	0.94% (1)
Central	53.77% (57)
Peripheral	23.58% (25)
Equal	20.75% (22)
Cannot determine	0.94% (1)
Celebrity present	19.81% (21)
Celebrity gender	
All male	66.67% (14)
All female	28.57% (6)
Both genders present	4.76% (1)
Celebrity speaks	95.24% (20)
Children present	33.02% (35)
Child gender	
All male	20% (7)
All female	11.43% (4)
Both genders present	68.57% (24)
Child race	
Caucasian	34.29% (12)
Other	22.86% (8)
Multiple	31.43% (11)
Unclear	11.43% (4)
Child speaks	25.71% (9)
Non-celebrity spokesperson	
Not present	21.18% (18)
Present visually	12.94% (11)
Present as narrator	63.53% (54)
More than one spokesperson	2.35% (2)
Spokesperson gender	
All male	58.21% (39)
All female	37.31% (25)
Both genders present	4.48% (3)
Spokesperson race	
Caucasian	58.21% (39)
Other	5.97% (4)
Multiple	2.99% (2)
Unclear	32.84% (22)

<sup>+</sup> Categories overlap

differences were also found for the focus of the video. For-profit PSAs focused on quantity (68%), while non-profit videos focused on quality (56.6%). There were significant differences in the frequency of some themes by organization type. Health and pollution messages were more common

**Table 5.** Characteristics by organization type.

Variable	Organization type			Sig.
	For-profit % (n)	Government % (n)	Non-profit % (n)	
Produced in the United States	96% (24)	89.29% (25)	69.23% (36)	*
Category				
Quantity	68% (17)	42.86% (12)	26.42% (14)	**
Quality	16% (4)	35.71% (10)	56.6% (30)	
Both	0% (0)	10.71% (3)	7.55% (4)	
Neither	16% (4)	10.71% (3)	9.43% (5)	
Number of themes				
0	4% (1)	3.57% (1)	0% (0)	**
1	68% (17)	57.14% (16)	32.08% (17)	
2	28% (7)	39.29% (11)	67.92% (36)	
Theme <sup>+</sup>				
Health	4% (1)	7.14% (2)	33.96% (18)	**
Pollution	4% (1)	32.14% (9)	43.4% (23)	***
Policy	4% (1)	10.71% (3)	0% (0)	*
Economic	8% (2)	3.57% (1)	9.43% (5)	
Climate	0% (0)	0% (0)	1.89% (1)	
Ecosystem	16% (4)	17.86% (5)	18.09% (8)	
Shortage	64% (16)	39.29% (11)	26.42% (14)	**
Water source	12% (3)	14.29% (4)	26.42% (14)	
Message goal				
Awareness	52% (13)	14.29% (4)	37.74% (20)	*
Behaviour	36% (9)	46.43% (13)	32.08% (17)	
Equal	12% (3)	39.29% (11)	30.19% (16)	

<sup>+</sup> Categories overlap.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

among non-profit produced videos, while policy messages were more common in government-produced PSAs. The shortage theme was more common in for-profit produced videos. Significant differences were found in message goal between the three organization types. For-profit PSAs most often focused on awareness (52%), while government PSAs most often focused on behavior (46.43%). The focus of non-profit videos was more evenly split between awareness, behavior, and their combination. Length differed significantly between organization types ( $p < .05$ ). Distributions of length differed significantly between for-profit and non-profit sources, with non-profit videos being longer. The for-profit median of 30 seconds (IQR = 12) was smaller than the non-profit median of 43 seconds (IQR = 31). Results for the theoretical aspect of RQ4 are available in Table 6. Presence of children was the only theoretical variable with significant differences among the types of videos. Children were more likely to be present in non-profit PSAs (45.28%) than for-profit (16%) or government (25%) PSAs.

## Discussion

YouTube videos provide producers the opportunity to disseminate information to billions of people around the world. The use of YouTube as a medium to discuss the global water crisis has the potential to engage people with this vital topic on a previously impossible scale. Prior to this study, no academic scholarship examined the content of such videos. This investigation of water-related PSAs on YouTube has important theoretical implications related to the use of EPPM and ELM as an evaluative framework for environmental communication products and important practical implications for organizations and individuals who wish to produce subsequent products of this type. Improving future communication efforts related to the global water crisis is a crucial means of affecting real changes via individual behaviors, societal norms, and eventually policy in the water sector.

**Table 6.** Theoretical variables by organization type.

Variable	Organization type			Sig
	For-profit % (n)	Government % (n)	Non-Ppofit % (n)	
<i>EPPM variables</i>				
EPPM components <sup>+</sup>				
Severity	44% (11)	46.43% (13)	60.38% (32)	
Susceptibility	68% (17)	71.43% (20)	83.02% (44)	
Self-efficacy	56% (14)	78.57% (22)	62.26% (33)	
Response efficacy	72% (18)	71.43% (20)	62.26% (33)	
Efficacy				
0	20% (5)	14.29% (4)	26.42% (14)	
1	32% (8)	21.43% (6)	22.64% (12)	
2	48% (12)	64.29% (18)	50.94% (27)	
Threat				
0	28% (7)	28.57% (8)	16.98% (9)	
1	32% (8)	25% (7)	22.64% (12)	
2	40% (10)	46.43% (13)	60.38% (32)	
Threat – efficacy				
–2	8.33% (2)	19.23% (5)	4% (2)	
–1	29.17% (7)	19.23% (5)	24% (12)	
0	37.5% (9)	38.46% (10)	38% (19)	
1	20.83% (5)	23.08% (6)	16% (8)	
2	4.17% (1)	0% (0)	18% (9)	
<i>ELM variables</i>				
Dominance				
Neither central nor peripheral	0% (0)	3.57% (1)	0% (0)	
Central	44% (11)	57.14% (16)	56.6% (30)	
Peripheral	36% (9)	28.57% (8)	15.09% (8)	
Equal	20% (5)	10.71% (3)	26.42% (14)	
Cannot determine	0% (0)	0% (0)	1.89% (1)	
Celebrity present	20% (5)	21.43% (6)	18.87% (10)	
Children present	16% (4)	25% (7)	45.28% (24)	*
Non-celebrity spokesperson				
Not present	15% (3)	9.52% (2)	29.55% (13)	
Present visually	10% (2)	23.81% (5)	9.09% (4)	
Present as narrator	75% (15)	66.67% (14)	56.82% (25)	
More than one spokesperson	0% (0)	0% (0)	4.55% (2)	

<sup>+</sup> Categories overlap.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

This study has several key findings, each of which has important practical and theoretical implications for future water communication campaign efforts. These findings, to be discussed in detail subsequently, include: the discrepancy between water quality and water quantity focused videos produced by different types of organizations, the trend for threat messages to outweigh efficacy messages, and the prevalence of central-route cues over peripheral-route cues within the sample. We begin the section with a brief overview of findings and potential explanations related to general video characteristics from our sample, followed by in-depth discussion of the three key findings (listed above). The section concludes by showcasing one exemplar PSA from our sample, which highlights the successful application of constructs from both EPPM and ELM.

### General video characteristics

The videos in our sample were uploaded throughout the months and years since YouTube's 2005 inception, yet upload dates were not equally distributed across each year. Unequal distribution over time is expected, however, environmental news media coverage often peaks during times of relevant weather events (Altaweel & Bone, 2012) or when an issue can be directly connected to recent policies discussed by public figures (Weathers & Kendall, 2016). More videos in our sample were



uploaded during March than any other month (18%), which may be due to World Water Day being in March. This is important for environmental communicators to note, as it likely reflects an increased awareness and promotion of water issues during this month, indicating a key time to disseminate communication products. Alternatively, communicating at this time could prove challenging because audiences are already inundated with water-related messages. However, this situation exemplifies the utility of using the theoretically directed balance of constructs from both the EPPM and ELM to create communication products. Conscientiously crafted persuasive messages should be able to supersede audience ennui and may benefit by the corresponding exposure to similar messages as issue attention reinforcement, which may also serve as cues to action (Champion & Skinner, 2008).

The vast majority of the videos in our sample were produced by US entities, which may help explain why the three most common themes among the videos water shortage, water pollution, and water source, reflect an agenda aligned with Global North water interests. For example, the theme of “water source,” is depicted through PSAs centered on a particular watershed or water body for the purpose of educating citizens about their drinking water source. One series of PSAs appearing in our sample was produced by an Arkansas utility company and was entitled “Where does your water come from?” Rather than highlighting issues related to water conservation or protection (i.e. be careful of household products flushed into our water supply), the videos prompt viewers to consider of the role of the lake in the community’s lives. This is done explicitly via the PSA audio and is paired with images of crystal clear drinking water coming out of the faucet and teenagers water skiing in the lake. The videos, while slightly informative, seem more like advertisements for the utility company than PSAs.

The least common themes (climate and policy) represent water issues more pertinent for a broader, global audience, which may not reflect the primary goals of the US entities producing the majority of these videos. This discrepancy has important implications related to the continuing digital divide. As Anderson (2015) emphasizes,

[w]ithin the increasingly international, multi-national, multi-digital, interactive, and fragmented media environment, there is a growing need to examine how competing rationality claims are framed by different media given that they are complexly differentiated and governed by different political, economic, and organizational constraints. (p. 381)

Despite being a global issue, and YouTube being a global medium, the water crisis is framed through a primarily Western/Global North perspective in the videos in our sample. Depicting the water crisis in this way does not help inform or increase awareness of the global interconnectedness of the current water situation for Western audiences. For example, American environmental policies have significant long-term impacts on global weather patterns, leading to increased severe weather events and rises to sea level that result in the displacement of people in vulnerable areas around the world (Schnoor, 2010). This displacement can result in overcrowding and poor habitation conditions in other areas, increasing the potential for inadequate sanitation facilities and/or little access to safe drinking water, leading to increased disease and morbidity (WHO/UNICEF, 2015). The fragmented, discrepant representation of the main issues, i.e., water shortage issues in the US and water quality issues in the Global South, does not portray the situation accurately—likely resulting in the continued apathy of Global North audiences. Even if audiences do feel concerned about drought conditions and impending water scarcity, they still see clear, safe, plentiful water streaming from their multiple in-home water sources.

Overall, a call for political action was nearly absent among the videos included in our sample, which is disheartening given the dire need for this type of mobilization among Global North audiences living in democratic societies. Interestingly, the few videos which did not fit into predetermined thematic categories and were instead open-coded based on their latent themes seemed to emphasize the interconnectivity of water issues more than the other videos. For example, the three videos categorized in this way yielded the following themes: the nexus of poverty, social justice,

and water rights; capitalism as responsible for desecrating nature; and the need to support local water utility providers. We believe that these latent themes should be explored through subsequent research and emphasize the need for subsequent studies to integrate qualitative components into research methodologies.

### **Quantity vs. quality by entity**

Videos focused on water quality and water quantity appeared almost equally in our sample. However, the quality versus quantity focus of videos differed significantly by production entity type. PSAs sponsored and produced by non-profit entities focused most on water quality, while those produced by for-profit entities were more often focused on water quantity. Many non-profit organizations in the water sector are dedicated to international development work aimed at securing safe drinking water for people in Global South countries. In contrast, the majority of for-profit entities represented in our sample were US-based water utility companies. American water infrastructure generally affords water utility companies little difficulty in providing safe water for consumption to consumers. However, water utility companies can do nothing to manifest greater quantities of water. Thus, the attempt by such entities to reduce water demand seems appropriate and has the additional business benefit of helping the company appear environmentally/socially motivated.

However, because water shortages are still somewhat geographically distinct, especially in the US, future studies should aim to investigate whether this finding holds in states and regions where water is plentiful. In our sample, utilities based in Colorado and California produced many of these videos. These states are already experiencing drought conditions and the associated negative consequences of water shortages (see Liang et al., 2017), which may be an explanation as to why these two states produced the most PSAs in our sample, whereas PSAs produced in states surrounding the Great Lakes, for instance, were absent. This is troubling, as locations within the US and around the world with seemingly endless supplies of water are at risk of running out in the future.

Regarding the water quality-focused videos, several PSAs were centered on access to clean drinking water. Considering that twice the population of the US lives without access to safe water around the world (WHO/UNICEF, 2015), this theme might be the most globally relevant water quality concern. However, awareness-based messages related to this theme, such as the dangerous distances females around the world are forced to travel daily to fetch water for their families, or the link between adequate sanitation facilities, such as community latrines, and decreased child morbidity from waterborne diarrheal diseases, were notably absent. Instead, the majority of the quality-focused PSAs were centered on the theme of water pollution. Water pollution was addressed in the videos through descriptions of the way lawn fertilizers, pharmaceuticals, and dog waste can all flow from homes and lawns into water supplies. While there is no doubt, this problem is of vital importance to the global water crisis; it does underscore the earlier concerns related to the framing of the crisis through an American, or Global North, lens. Correspondingly, future research is needed to investigate more comprehensively the specific types of water pollution discussed within environmental communication efforts. While it was outside the scope of the present study, the sources of water pollution (individuals and households) mentioned most often in these PSAs have much smaller global water quality impacts than some other pollution sources notably absent within our sample. For example, current industrialized agricultural practices, such as those prominent throughout the American Midwest, are contributing to dangerous nutrient excesses in the Mississippi River and causing hypoxic conditions in the Gulf of Mexico (EPA, 2015).

### **Threat messages over efficacy messages**

The construct of susceptibility, as informed by the EPPM, was included in the majority of the PSAs. Many of these messages included information about the likelihood of running out of water or being affected by impaired water quality. However, severity was included in only half of the videos. One

possible explanation for this discrepancy between the prominence of the two constructs (which together comprise the “threat” component of the EPPM) is that PSA producers may have felt that the seriousness of consequences of running out of water, or lacking safe drinking water, were universally understood. It is outside the scope of the present study to analyze whether audiences of these PSAs do in fact understand the dire consequences of life without safe water, and empirical evidence on global water literacy is generally lacking. However, several foundational studies on the water literacy of American K-12 students and college freshmen suggest disappointingly low levels of water knowledge, understanding, and education (Cockerill, 2010; Covitt, Gunckel, & Anderson, 2009; Ewing & Mills, 1994). According to Cockerill (2010), the low water literacy level among US children and young adults likely translates into an “ill-informed general populace” (p. 151); ultimately this may indicate that audiences of these PSAs do not adequately understand the severity of the global water crisis.

Self-efficacy and response efficacy were well represented in our sample, and the fact that over half of the videos contained both efficacy components is promising. However, consistent with previous research using the EPPM to help evaluate communication content (Lapinski, 2006; Lee, 2011; Kline & Mattson, 2000), nearly a third of the videos still relied more heavily on threat than efficacy components. As Witte (1992) emphasizes, perceived efficacy is the crucial variable that determines whether a person accepts or rejects the prescribed behavior. This imbalance of threat and efficacy messages is highly problematic to find in videos related to the global water crisis because it could result in complete avoidance or rejection of a PSA’s message altogether among some viewers. Rather than spur cognitive engagement, interpersonal discussion and eventually behavioral change, the lack of efficacy messaging within the videos may actually work to stall any progress towards such ends.

### ***Central cues prevalence over peripheral***

Regarding ELM constructs, a slight majority of videos relied on central route cues, such as statistics and clearly articulated arguments. Contrary to Bator and Cialdini’s (2000) recommendations to combine central and peripheral cues to increase message acceptance, only about one fifth of the videos used both cues equally. However, it is important to consider the fact that these central cues were found within PSA videos—an inherently visual medium. Thus, while the use of data and clearly articulated elements was prominent in slightly over half of the videos, nearly a fourth of the videos relied only on peripheral cues. Based on Lazard and Atkinson’s (2014) work regarding the way some visual content is processed more centrally, this might not seem problematic. However, the criteria for videos to be coded as peripheral cue dominant does not align with the type of visual content, infographics, Lazard and Atkinson (2014) studied. Still, a limitation of this study is that no coding criterion was developed to document the presence of infographics specifically, thus infographics instead were encompassed within the central cue category.

Similar to the potential explanation for lack of severity messaging, the lack of peripheral cues may result from the personal relevance that water has in everyone’s lives. PSA producers may assume audiences already have high levels of motivation to process messages related to water, thus requiring fewer visual appeals, celebrities, and other efforts to grab and maintain viewer attention. This is problematic considering Bator and Cialdini’s (2000) first key principle for successful pro-environmental PSAs—to “assume that most audiences are likely to be only mildly interested in the message” (p. 528). As these scholars suggest, ignoring key principles derived from mass communication research is the most efficient way to ensure proenvironmental PSAs are unsuccessful (Bator & Cialdini, 2000).

Of the peripheral route cues utilized, celebrity spokespeople were present in slightly less than 20% of the videos. Previous scholarship regarding celebrity endorsement in environmental awareness campaigns reinforces the importance of this strategy. For example, Northfield and McMahon (2010) discuss how the celebrity of Steve Irwin helped popularize conservation (Amos, Holmes, & Strutton, 2008; Myrick & Evans, 2014). Similarly, former Vice President of the US, Al Gore, became

the celebrity face of climate change media coverage (Boykoff, 2007) and may have helped make the topic more salient by creating a “celebrity hook” (Dotson, Jacobson, Kaid, & Carlton, 2012, p. 75). In our sample of PSAs, the variety of personalities included Jackie Chan, Jennifer Connelly, Dennis Haysbert, and The Sacramento Kings basketball team.

Another peripheral cue, the presence of children, occurred in some of the PSAs. Children were most utilized in non-profit produced PSAs, with the difference between organization types being significant. The use of imagery of children in environmental PSAs has not been well studied; we argue that their role in these PSAs is to evoke emotions, such as empathy, among the audience. Research on the personal factors influencing environmental attitudes and behavior has shown that emotional involvement plays a significant role (Kals, Schumacher, & Montada, 1999; Kollmus & Agyeman, 2002; Searles, 2010), and it has been suggested that the stronger the emotional reaction, the more likely a person will engage in pro-environmental behavior (Kollmus & Agyeman, 2002). Based on the ELM and Bator and Cialdini’s (2000) recommendations, the combination of children actors to elicit emotion with central route cues would likely be effective as it would target individuals through both central and peripheral routes.

### **Example: charity water**

To conclude our discussion of key findings and implications for environmental communicators, we highlight one PSA from our sample as an exemplar, demonstrating the complementary use of key principles from both EPPM and ELM. This PSA (available at: <https://www.youtube.com/watch?v=bzGb12fN3Uc>) comes from the non-profit organization, Charity Water. The PSA features two peripheral cues: the actress Jennifer Connelly and two children. The video shows Connelly and the children carrying water jugs through New York City to a park pond where they fill the containers and carry them home. Connelly pours glasses of the dirty water for the children, who look at it cautiously. The text “Imagine drinking this” is displayed, followed by a statistic regarding the number of people around the world who lack access to clean drinking water. The PSA ends with the statement “You can help. Charitywater.org.” This PSA uses the initial peripheral cue of the well-known actress followed by a scene depicting severity of the arduous trek to retrieve water that many women in the Global South must do each day. Placing the dirty water in front of anxious-looking children may elicit emotional appraisals, which are coupled with a susceptibility message regarding how many people around the world do have just such an experience daily. Self-efficacy is directly targeted in the final message by directing viewers to the organization’s website. This PSA not only portrays an example of effective use of the EPPM and the ELM but is reflective of our findings related to sponsoring organizations. Non-profit organizations were more likely to discuss susceptibility on a global level and to include children in their messages.

### **Limitations and future research**

The sampling strategy, combined with YouTube’s inherent search function limitations, makes it difficult to ensure the study’s sample was generalizable. This limitation is consistent with many previous content-related studies which investigate YouTube videos (Athanasopoulou et al., 2016; Briones et al., 2012; Keelan et al., 2007; Kim et al., 2010; Paek et al., 2010; Yoo & Kim, 2012). Also, the low alpha and kappa reliability scores for one theoretical variable (central cues) in this study is also a limitation, although the variable was still included due to the high percent agreement. We acknowledge that percent agreement is not the ideal statistic for inter-coder agreement, but is generally considered an acceptable supplemental statistic (Hayes & Krippendorff, 2007; Lombard et al., 2004).

While we acknowledge these study limitations, associated mainly with using the YouTube medium and using quantitative content analysis as the primary methodology, these results do illuminate several important potential areas for future exploration in this understudied realm.

Quantitative content analysis is just one way to explore online PSAs regarding the global water crisis. An important next step is qualitative analysis. This will allow for deeper investigation into the latent messages and content of the PSAs which may prove helpful in understanding the nuanced differences in communication strategies employed by the various producing organizations. Subsequent studies may also consider revising the sampling strategy to look more deeply at the specific PSAs produced by several predetermined entities, allowing for a comparative analysis between major entities from each of the three organization types. Paek et al.'s (2011) study comparing the persuasive effects of peer versus expert produced PSAs suggests the utility of a study including lay person produced PSAs as well as the perspective of the audience.

## Conclusions

YouTube provides PSA producers free access to billions of people from around the world without the time or monetary restrictions of traditional televised air time. As the global water situation continues to decline, more concerted efforts need to be taken by communicators to help raise awareness of this crisis and ultimately help persuade people to change their behaviors. This study has several main findings. Our analysis revealed that current water-related PSAs often do convey susceptibility to the water crisis but would benefit from more efficacy-based messaging to ensure viewers' acceptance of the overall message. As efficacy has been demonstrated to be essential to the positive reception of risk messaging (Witte & Allen, 2000), this absence is very concerning. Additionally, the behaviors recommended most were those encouraging individual conservation efforts. This may reflect that organizations promoting water conservation, such as utility companies, are more effective at providing viewers specific actions (efficacy messages) they can take to help remedy the water shortage problem. Finally, the pattern relating organization type to video focus is important to recognize for evaluating environmental risk communication efforts. The presence of several exceptional non-profit and governmental ads in our sample reflects the success that careful consideration of theoretically based message components combined with adequate funding can have.

As the average American only needs to turn on one of the multiple water faucets in their home for unlimited access to safe, clean drinking water, there is little motivation for individuals to think about water or change current habits. Thus, it falls on environmental communication efforts to bring this vital issue to the forefront of the American consciousness. Correspondingly, as environmental communication scholars, it is necessary we continue to study the content of current mass media products related to water and subsequently use this knowledge to help inform improved communication efforts in the future.

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