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Special thanks to our reviewers

Especially during these challenging times, we would like to take this opportunity to extend a special thanks to the reviewers who contributed to the December 2021 issue. Your expertise and hard work make our journal's success possible.

Melissa Adams, Shelley Aylesworth-Spink, Tor Bang, Denise Bortree, Lois Boynton, Myoung-Gi Chon, Corey Hickerson, Dean Kruckeberg, Chris McCollough, Dean Mundy, Brenda Wrigley, Xiaochen Zhang



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Editor's Essay

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There is an awful lot of communication these days. We can talk in-person, virtually, online, via social media, etc. There are friendly conversations. There are people who have dropped out of conversations. There is debate—some healthy, some destructive. There are attempts at persuasion. Even attempts at manipulation. However, what there isn't a lot of is dialogue. True dialogue. Dialogue that “involves ‘trust,’ ‘risk’ and ‘vulnerability’” and “is a product of ongoing communication and relationships” (Kent & Taylor, 2002, p. 24).

What makes dialogue so important is its ability to get to ethical communication. It can still be used unethically or immorally (Kent & Taylor, 2002), too, but dialogue is perhaps the best way for us to sum up what exactly public interest communication attempts to do—provide a space for dialogue.

Two-way communication is important. It helps us share information, such as fact or knowledge. It also lets us tell our side of the story; however, it isn't dialogue (Kent & Lane, 2021). Dialogue is something more. It isn't about reaching organization goals; it's about understanding (Kent & Lane, 2021). It's about being open to new ideas and listening to (not merely hearing) and reflecting upon what another person has to say. You can't plan for dialogue, it's something that happens (Kent & Lane, 2021). That's another thing about dialogue that's tricky. It isn't about strategy. It's about putting the other central (Kent & Taylor, 2002). It's about making all parties equal in authentic conversations, and it is rare (Kent & Lane, 2021).

As I read through the articles in this issue, I saw how each centered around communication that could move toward dialogue with continued conversation and relationship building. In “Sexual health on television: New framing of sexual health issues in Netflix's *Sex Education*,” Aruah looks at social cognition and frames as they relate to sexual health concerns. One-way communication is at the heart of this piece as it examines a streaming service's programming.

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However, it opens the door to imagining how such media could provide a path to honest talk about very human, yet difficult, subjects—sex and sexuality. Similarly, Johnson's piece, "It's good for me: The role of moral development in health advertising effectiveness," examines health messaging targeting adolescents. While these messages are also one-way communication since they are ads, the article made me think about how continued conversations about health could lead to dialogue where trust is built, and experiences are shared to build a more truthful exchange about health and the public good. Finally, Bayliss, et al.'s manuscript, "Conversing or diffusing information? An examination of public health Twitter chats," brings us to two-way communication. The authors investigate engagement in Twitter chats and whether they reach the level of dialogue. Reading through this study, I thought about how interactions on social media could be used to further understanding and the exchange of new and different ideas.

All three of these articles pushed me to think about the possibilities and to consider how dialogue isn't about agreement, it's about mutual understanding which ultimately leads to ethical and moral communication (Kent & Lane, 2021; Kent & Taylor, 2002). As the new year is upon us, let us take this opportunity to think about how we can bring dialogue into our lives and work so that we listen to the experiences of others, better understand those perspectives, and ethically respond as public interest communicators.

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It's Good for Me: The Role of Moral Development in Health Advertising Effectiveness

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Abstract

This study examines moral development's role in judgments of health messages. This research assesses which appeals and type of benefit advertised in health ads impact ad effectiveness and health intentions. Results indicate that messages advertising a third-person benefit of the behavior are more appealing than a first-person benefit and that moral development should be considered when designing health messages. The ads presenting a third-person benefit and an emotional appeal were more effective among those who rated higher in the maintaining norms schema of moral development and among those with higher moral development. This indicates that health messages targeting adolescents should emphasize the principles at play when encouraging behavior or attitude change and should highlight societal values in the behaviors.

Introduction

Among the many lessons learned during the COVID-19 pandemic, the fact that adolescents do not always follow advice from public health officials is a stark one. In 2020, five months after initial pandemic-mitigating mandates began, yet mere days after fall semester classes started, college campuses all over the United States reported hundreds of positive cases of COVID-19 (Mitropoulos, 2020). Classes that began optimistically in-person swiftly turned virtual due to rapid spreads of COVID-19 and too many instances of pandemic regulation non-compliance to

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number (Mitropoulos, 2020). The reasons behind the rampant noncompliance on college campuses will almost certainly be studied for years, and this research will fall into a category regularly explored—Why do public health campaigns fall short of their designed objectives? This research also will contribute to the growing and important field of public interest communications (PIC), which seeks to provide evidence to shape campaigns that bring about “significant and sustained positive behavioral change on a public interest issue” (Fessmann, 2016, p. 14).

Frieden (2014) noted that while some public health programs succeed in accomplishing their goals, many fail to impact health outcomes. The question then becomes—How can they be made better? What particular components of these campaigns are most effective at changing attitudes, beliefs, or behaviors? By pinpointing certain factors that make a health campaign more or less effective, better messages can be created to encourage audiences to engage in a healthier lifestyle and impact personal and community health, which is the ideal goal of PIC (Alvaro et al., 2013; Baldwin et al., 2013; Cohen et al., 2007; Fessmann, 2016; Frieden, 2014).

An area that could prove beneficial in helping practitioners create more effective messages is the theory of moral development. Moral development determines how individuals judge what is right, wrong, just, etc. This development naturally has implications when targeting individuals with messages that impact their attitudes and behaviors, especially in the context of health campaigns. Moral development helps explain how viewers might interpret the messages being presented, thereby potentially leading to the discovery of additional information on how to design campaigns more appropriately. This study applies moral development concepts specifically to health communication and advertising effectiveness research and uses these concepts to determine how to better present information that impacts public health. This study investigates adolescents' perceptions of health ads to determine if any correlations exist between perceived message effectiveness and moral development. Furthermore, this study focuses on the type of appeal used in the ad and the type of benefit being advertised in messages targeted to adolescents and young adults. While the data detailed here were collected before COVID-19 was on anyone's radar, the need for additional information on this topic has been made abundantly clear ever since coronavirus became a part of everyday lexicon.

Literature review

Public interest communications

The burgeoning field of PIC is described as “the development and implementation of science-based, planned strategic communication campaigns” to produce “a specific positive change in society” (Fessmann, 2016, p. 14). As an academic field, PIC stresses that research should serve as a base for strategic campaigns to make them more effective, not just for awareness, but to effect real behavioral changes that impact a larger community for good. Because PIC campaigns

are striving for tangible changes, it is imperative that the campaigns are “scientifically proven to work. This is critical because poorly-designed PIC campaigns intended to do good may end up causing social and physical harm in ways most PR and marketing campaigns do not” (Fessmann, 2017, p. 17).

Health campaigns are a natural part of PIC research, as such campaigns strive to promote “[p]ositive social good” and “positive benefits for individuals and the society as a whole” (Fessmann, 2016, p. 18; see also Downes, 2017). Many health campaigns, and PIC campaigns in general, endeavor to persuade an audience to do no harm, particularly with respect to rejecting or stopping a negative behavior, such as smoking; changing a current behavior, such as eating balanced meals; or beginning a new behavior, such as wearing facemasks or receiving vaccinations (Fessmann, 2016). Gleaning evidence that informs the successful creation and execution of such strategic campaigns is the primary goal of PIC research.

Campaign effectiveness

Various health campaigns have been found to produce their desired results. For example, the Montana Meth Project was successful in altering the attitudes and behaviors of adolescents toward the use of methamphetamine (Siebel & Mange, 2009). Hersey et al. (2005) found that the American Legacy Foundation’s antitobacco industry truth campaign targeted toward teenagers resulted in negative beliefs about the industry, which led to negative attitudes toward the industry. Farrelly et al. (2009) also found that exposure to the truth campaign was correlated with “changes in attitudes, beliefs and intentions to smoke” and that antismoking campaigns that are appropriately researched and implemented can impact teenagers’ beliefs and attitudes about smoking (p. 42).

However, research investigating the effectiveness of health campaigns often returns inconsistent results. Noar (2006) noted that metaanalyses of health campaigns indicate that campaigns can affect attitudes, knowledge, and behaviors, but mostly these effects have been small and at times short-lived (see also Centers for Disease Control and Prevention, 2013 and Michaelidou et al., 2010). There is some evidence that health campaigns can be effective, but not all campaigns achieve their intended goals or produce results of significance. Fessmann (2017) argues that the ultimate goal of campaigns seeking changes for the public interest “should be outcome oriented” rather than simply raising awareness, as “complacency often quickly sets in once awareness is reached and campaigns often fail because of this” (p. 22). PIC campaigns that bring about awareness without behavioral changes can often result in more long-term harm than good.

Ad components

Alvaro et al. (2013) reported that producing effective health communication requires determining specific components of ads that appeal to target audiences. Similarly, in studying the effects of the American Legacy Foundation's "truth" campaign, Hersey et al. (2005) reported that future research seeking to improve messages should "explore ad characteristics that contribute to favorable ad reactions" (p. 29). The research detailed here focused on two components of ads and audiences' reactions to them.

Type of appeal

Health communication ads often vary in the type of persuasive appeal used to encourage healthy behaviors or discourage risky ones. Lawton et al. (2009) noted that affect plays a larger role in changing attitudes than social cognition models have emphasized and could be powerful in impacting attitudes, intentions, and behaviors. Lawton et al. (2009) also found that affective attitudes significantly predicted all the health behaviors they measured and predicted nine of the health behaviors once intention was included. Although little is known about COVID-19-related messaging, it has been noted that empowering messages are "likely to be more effective than those that emphasize guilt or shame" (Katz et al., 2020, para. 15).

Both affective and factual appeals have been suggested to correlate with the effectiveness of health campaigns, but very little research has compared the two appeals (Mahapatra, 2013; Stafford & Day, 1995). This study examined impact of persuasive appeal (emotional vs. rational) on the effectiveness of health messages. However, since there is not much research comparing the two appeals, no prediction of which appeal will have the greater impact on effectiveness was made.

Type of benefit

A small amount of previous research has examined whether an ad that emphasizes first-hand effects on the self might be more or less effective than a message that features the impact a health behavior has on a third-person other (Beaudoin, 2002). However, no research compares messages that highlight health behaviors' first-hand effects on the self and second-hand effects on a third-person other. Because of the CDC's recommendation that individuals wear masks to prevent the spread of disease to others as much as, or more so, than to protect themselves, a lot of COVID-19 messaging has emphasized this third-person impact. This study sought to examine the type of benefit being advertised (first-person vs. third-person) and its impact on ad effectiveness.

Based on the research reviewed above, this study sought to examine how specific components of health campaigns—type of appeal and benefit—interact to impact ad effectiveness and whether an individual's health intentions impact his or her perceptions of an ad's effectiveness.

RQ1: How do components of health campaigns (type of appeal, type of benefit) impact ad effectiveness?

RQ2: How do components of health campaigns (type of appeal, type of benefit) interact with ad effectiveness and health intentions?

Theoretical perspective

This study applies the theory of moral development to health communication and advertising effectiveness research, using it to determine how to communicate public health information more effectively, which is a new concept in both the moral development and mass communication fields. Interestingly, anecdotal observation of the COVID-19 pandemic-related messaging shows that the morality of adhering to mandates and regulations is featured predominately, thus making this new intersection of moral development and advertising particularly timely.

Moral development

Moral development determines how individuals judge what is right, wrong, or just. This development naturally has implications when targeting individuals with messages that impact their attitudes and behaviors. Campaigns designed to encourage the adoption of beliefs or behaviors that enhance a person's or community's overall health or quality of life often frame these behaviors as being 'good for you.' Knowing how different groups of individuals judge what is good is important in developing effective messages for them.

Moral development is the result of transformations in a person's form and structure of thought. Moral development is defined by a notion of cooperation in how we define what is good and just and involves interacting in social situations that contain a moral component (Kohlberg, 1976). Rest et al. (2000) defined moral development as occurring in the personal interest, maintaining norms, and postconventional schemas. In the personal interest schema, the individual's focus is on the self. Individuals in this schema of development evaluate dilemmas based on what would be gained or lost, and decisions are justified by personal stake. In the maintaining norms schema, individuals identify existing rules and authorities and obey those authorities out of respect for the system. In the postconventional schema, the focus shifts beyond group norms and conventions to more universal definitions of goodness and justice. Those in the postconventional schema believe that moral obligations are based on shared ideals, are fully reciprocated, and open to scrutiny (Rest et al., 2000).

Moral development should be an important consideration in advertising campaigns and is especially applicable to campaigns targeting children and adolescents. The perception of advertising messages and adoption of the behaviors advertised seem to have a natural connection to moral and ethical development, yet it remains to be seen whether an individual's level of moral development would affect his perception of such messages. The research detailed here

applies moral development to the perception and effectiveness of health messages to determine whether this subject lends more insight into how messages can be more effective.

RQ3: How does moral development influence the perceived effectiveness of health messages?

Method

The research questions were investigated by conducting an efficacy study of health messages using a 2x2 within-subjects factorial design. Based on the literature reviewed, this study considers two particular components of health messages: the type of appeal (emotional vs. rational) and the type of benefit (first-person vs. third-person). Participants ($N = 196$) were exposed to each possible combination of the two components through a total of four experimental stimuli: emotional/first-person; emotional/third-person; rational/first-person; rational/third-person. Participants then answered a questionnaire that asked about the perceived effectiveness of the ads and measured their moral development levels. Participants' demographic information is represented in Table 1.

Table 1

Participant Demographics

<i>Gender</i>	<i>N (%)</i>	<i>Age</i>	<i>N (%)</i>	<i>Ethnicity</i>	<i>N (%)</i>
Male	92 (47%)	15-18 years	12 (6%)	Caucasian	113 (57%)
Female	57 (29%)	19-21 years	75 (38%)	African American	16 (8%)
Not reported	47 (24%)	22+ years	62 (32%)	Asian/Pacific Islander	12 (6%)
		Not reported	47 (24%)	Hispanic	4 (2%)
				American Indian/ Native American	1 (<1%)
				Other race/ethnicity	3 (2%)
				Not reported	47 (24%)

Stimulus

Each participant was exposed to four print ads, presented digitally, that varied by the components being manipulated. The variations were pretested to ensure they conveyed the intended

components: participants in this pilot test ($N = 143$) each evaluated 12 ads (three ads in each condition: emotional/first-person, emotional/third-person, rational/first person, rational/third-person). There were statistically significant differences among the ads in: emotional appeal, $F(1, 142) = 45.655, p = .000$; rational appeal, $F(1, 142) = 7.576, p = .000$; first-person benefit being advertised, $F(1, 142) = 2.136, p = .024$; and third-person benefit being advertised, $F(1, 142) = 66.449, p = .000$. The final ads selected for the study were those with the highest means of ratings for the desired components. Forced-choice manipulation checks also were included on this study's questionnaire to ensure participants perceived the variations as intended.

Ads demonstrating the emotional appeal played to the reader's emotions, in the vein of Aristotle's classic *pathos* mode of persuasion. The ads created for this study consisted of visuals of a cigarette, skull, or seemingly unconscious child wearing an oxygen mask, accompanied by text describing smoking's effects on items with more emotional ties (appearance, physical ability, overall quality of life, etc.). The rational ads appealed to the reader's logic using the classic *logos* appeal of persuasion and featured visuals of cigarettes or an image of drifting smoke on a dark background but also emphasized statistics that smoking increases risks for disease and death. Ads demonstrating the first-person benefit contained text that emphasized smoking's dangers for the reader's, or smoker's, own health while the third-person benefit ads contained text that emphasized the dangers of second-hand smoke, or the potential harm caused to others if the reader engaged in smoking. The ads created for this research are included as figures 1 through 4.

Figure 1

Stimulus Ad 1: Emotional Appeal, First-Person Benefit



Figure 2

Stimulus Ad 2: Emotional Appeal, Third-Person Benefit



Figure 3

Stimulus Ad 3: Rational Appeal, First-Person Benefit



Figure 4

Stimulus Ad 4: Rational Appeal, Third-Person Benefit



Participants and procedure

Adolescence is a formative time in the lifespan when individuals are beginning to make health choices for themselves. Studying participants in this critical time of life allows for the examination of health message perception at varying stages in moral development and helps inform practitioners as to the types of messages that best get through to this important demographic. Participants for this study were adolescents and young adults, ages 15-25, who were students in grades 10 through graduate school. Once the participants accessed the online-based questionnaire, the software used to conduct the questionnaire randomized the order of the experimental stimuli.

Measurements and scales

Dependent variables

The dependent variable that was measured is ad effectiveness. Ad effectiveness was measured using a five-item, Likert-type scale derived from ad effectiveness measures used by Lee et al. (2013) and Alvaro et al. (2013). The participants rated the following items on a scale of 1-5, with 1 indicating strongly disagree and 5 indicating strongly agree: This ad was convincing; This ad said something important to me; Overall, how much did you agree or disagree with what this ad said?; The information in this ad is believable to me; This ad got my attention. This scale had good internal consistency (*Cronbach's* $\alpha = .915$ for stimulus ad 1, *Cronbach's* $\alpha = .938$ for ad 2, *Cronbach's* $\alpha = .896$ for ad 3, and *Cronbach's* $\alpha = .906$ for ad 4). The results of the questions measuring effectiveness were averaged into one effectiveness score for each ad.

Independent variables

For *RQ1* and *RQ2*, this study examined whether the two ad components discussed above—appeal and benefit—impacted ad effectiveness. These independent variables were measured using each stimulus's manipulation checks. The manipulation checks were adapted from Liu and Stout's (1987; see also Cornelis et al., 2012) scale to measure ad tone. This scale was used to ensure the participants perceived the ads to be presenting the type of ad component intended. The participants were asked to select an adjective based on which word better described the ad they viewed. To measure appeal, the participants were asked to judge whether the ad was: logical/emotional; objective/subjective; or factual/nonfactual. To measure benefit, the participants were asked to judge whether the ad was: about me/about someone else; impacts me/impacts those around me; or affects me/affects someone close to me. Table 2 lists the Chi-Square results of the manipulation checks for which there were statistically significant differences.

Table 2*Manipulation Check Chi-Square Statistics*

<i>Manipulation Check</i>	<i>Chi-Square</i>	<i>df</i>	<i>Asymp. Sig.</i>	<i>Observed N for intended manipulation</i>	<i>Observed N for other manipulation</i>
Ad 1 Appeal Check 1	21.356	1	0.000	121	59
Ad 1 Appeal Check 2	6.084	1	0.014	106	73
Ad 2 Appeal Check 1	86.382	1	0.000	151	27
Ad 2 Benefit Check 1	40.819	1	0.000	131	46
Ad 3 Appeal Check 1	99.197	1	0.000	152	21
Ad 3 Appeal Check 2	131.798	1	0.000	162	11
Ad 3 Appeal Check 3	133.339	1	0.000	161	10
Ad 4 Appeal Check 1	45.786	1	0.000	131	42
Ad 4 Appeal Check 2	113.606	1	0.000	158	17
Ad 4 Appeal Check 3	133.766	1	0.000	164	11
Ad 4 Benefit Check 1	25.034	1	0.000	120	54

For *RQ2*, an independent variable that was measured was health intentions. Intentions to smoke were measured using questions from Pechmann and Reibling's (2006) measurement of intent. The participants rated the following items on a scale of 1-5, with 1 indicating strongly disagree and 5 indicating strongly agree: "In the future, I might smoke one puff or more of a cigarette," "I might try out cigarette smoking for a while," and "If one of my best friends were to offer me a cigarette, I would smoke it." The scale had good internal consistency in measuring health intention (*Cronbach's* $\alpha = .921$). The results of the questions measuring intentions to smoke were averaged into one health intention score. Health intention scores ranged from 1 (no intention to smoke) to 5 (high intention to smoke) with a mean of 2.12 ($SD = 1.21$). Thirty-three percent of the respondents ($N = 66$) reported no intention to smoke. Table 3 provides frequency statistics for the health intention score.

Table 3

Health Intention Score Frequencies

<i>Health Intention Score</i>	<i>Frequency</i>	<i>Percent of Sample</i>
1.00	66	33.7
1.33	13	6.6
1.67	6	3.1
2.00	14	7.1
2.33	7	3.6
2.67	14	7.1
3.00	14	7.1
3.33	6	3.1
3.67	6	3.1
4.00	11	5.6
4.33	7	3.6
5.00	5	2.6
Total	169	86.2

For *RQ3*, each participant's moral development was measured using the Defining Issues Test 2 (DIT2). The DIT2 is a revised version of the original Defining Issues Test (DIT1) that was designed to measure moral development and was derived from Kohlberg's (1976, 1984) work in this area. The DIT1 evaluates moral development through a multiple-choice task "that asks participants to rate and rank a standard set of items" (Rest et al., 1999, p. 645). While Bebeau and Thoma (2003) report the DIT2 reliability to generally be 0.81, and even lower for the short form version (*Cronbach's* $\alpha = .682$), Bebeau and Thoma (2003) mention that reliability may be

lower when participants do not represent a full range of educational levels. As the participants in this study were mostly college students, it was expected that the DIT2 reliability for this study would be lower than average.

Results

Ad effectiveness

RQ1 asked, “How do components of health campaigns (type of appeal, type of benefit) impact ad effectiveness?” The participants’ answers to the three questions measuring effectiveness for each ad were averaged into effectiveness scores for each ad. Table 4 presents the overall effectiveness scores for each ad. Paired samples t-tests were conducted to compare the effectiveness scores of the rational group ads to those of the emotional group ads, and the effectiveness scores of the first-person benefit ads to those of the third-person benefit ads. When comparing the effectiveness of the ads based on the type of appeal, there was no statistically significant difference. However, the third-person benefit ads were perceived as more effective than the first-person benefit ads, $t(166) = 4.056, p < .001$.

Table 4

Overall Ad Effectiveness Results

<i>Stimulus Ad</i>	<i>Mean</i>	<i>Std. Deviation</i>
Ad 1 (Emotional Appeal/First Person-Benefit)	3.54	.92
Ad 2 (Emotional Appeal/Third-Person Benefit)	4.05	.82
Ad 3 (Rational Appeal/First-Person Benefit)	3.91	.79
Ad 4 (Rational Appeal/Third-Person Benefit)	3.74	.87

In looking at the combinations of appeal and benefit and their impact on perceived effectiveness, a repeated measures ANOVA was conducted to determine which ads were rated as most effective. There was a statistically significant difference between the effectiveness of the ads, $F(1,166) = 4.934, p < .05$. A comparison of the means of the ads’ effectiveness scores reveals that ad 2, which contained an emotional appeal with a third-person benefit, was rated the most effective ($M = 4.053, SD = .815$), with ad 1, which contained an emotional appeal with a first-person benefit, rated least effective ($M = 3.537, SD = .924$).

Additional repeated measures ANOVAs were conducted with demographic information as between-subjects variables and covariates to determine whether differences exist between the participants and their perceptions of the ads’ effectiveness. There was a statistically significant

effect of the participants' gender and perceived ad effectiveness, $F(1, 143) = 13.038, p < .001$. Females rated each ad more effective than males. Table 5 illustrates this result.

Table 5

Ad Effectiveness and Gender

<i>Stimulus Ad</i>	<i>Gender</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>N</i>
Ad 1 (Emotional Appeal/First-Person Benefit)	Male	3.1927	1.04914	55
	Female	3.6222	0.83327	90
	Total	3.4593	0.94108	145
Ad 2 (Emotional Appeal/Third-Person Benefit)	Male	3.72	0.91214	55
	Female	4.2022	0.73469	90
	Total	4.0193	0.8371	145
Ad 3 (Rational Appeal/First-Person Benefit)	Male	3.6691	0.82482	55
	Female	4.0356	0.75585	90
	Total	3.8966	0.80004	145
Ad 4 (Rational Appeal/Third-Person Benefit)	Male	3.4364	0.89616	55
	Female	3.8889	0.86225	90
	Total	3.7172	0.89956	145

Health intention

RQ2 asked, "How do components of health campaigns (type of appeal, type of benefit) interact with ad effectiveness and health intentions?" A repeated measures ANOVA revealed significant differences among the rated effectiveness of the ads when using participants' reported intentions to smoke as a covariate, $F(1,162) = 4.036, p < .05$. Those with a lower reported intention to smoke rated the ads as more effective than those who reported a higher intention to smoke. The ads were evaluated as effective in the same order as general ad effectiveness, with ad 2 being rated highest ($M = 4.05, SD = .814$; see Table 6).

Table 6*Ad Effectiveness Results with Health Intention Covariate*

<i>Stimulus Ad</i>	<i>Mean</i>	<i>Std. Deviation</i>
Ad 1 (Emotional Appeal/First Person-Benefit)	3.54	.92
Ad 2 (Emotional Appeal/Third-Person Benefit)	4.05	.81
Ad 3 (Rational Appeal/First-Person Benefit)	3.92	.79
Ad 4 (Rational Appeal/Third-Person Benefit)	3.73	.87

To better examine the combinations of ad appeal and benefit and their impact on perceived effectiveness, and because significant differences were found among perceived effectiveness when comparing all four ads, additional repeated measures ANOVAs were run to determine if participants' intentions to smoke were correlated with the perceived effectiveness of two ads compared at a time. With health intention as a covariate, there were statistically significant differences between the perceived effectiveness of ad 1, a first-person benefit/emotional appeal ad, and ad 2, a third-person benefit/emotional appeal ad, $F(1, 165) = 8.516, p < .01$, with ad 2 being rated more effective ($M = 4.05, SD = .814$). There were statistically significant differences between the perceived effectiveness of ad 1, a first-person benefit/rational appeal ad, $F(1, 166) = 9.438, p < .01$, with ad 3 ($M = 3.915, SD = .786$) being rated more effective. There was also a statistically significant difference between the perceived effectiveness of ad 1 and ad 4, a third-person benefit/rational appeal ad, $F(1, 163) = 4.317, p < .05$, with ad 4 ($M = 3.734, SD = .873$) being rated more effective.

Moral development

RQ3 asked, "How does moral development influence the perceived effectiveness of health messages?" Table 7 presents descriptive statistics of the participants' DIT2 results.

Table 7*DIT2 Descriptive Statistics*

<i>Measure</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
Post Conventional (P Score)	127	.00	68.00	27.1772	14.02613
Personal Interest (Stage 2/3)	127	2.00	70.00	33.1339	13.66397
Maintaining Norms (Stage 4)	127	.00	66.00	31.9055	13.90411
N2 Score	127	-.56	65.33	25.7444	12.73080
Valid N	127				

To answer *RQ1*, a repeated measures ANOVA was conducted to determine if participants' moral development levels predicted their perceived effectiveness of the ads. Table 8 presents each ad's effectiveness score with moral development as a covariate.

Table 8*Ad Effectiveness Results with Moral Development Covariate*

<i>Stimulus Ad</i>	<i>Mean</i>	<i>Std. Deviation</i>
Ad 1 (Emotional Appeal/First Person-Benefit)	3.47	.93
Ad 2 (Emotional Appeal/Third-Person Benefit)	4.06	.82
Ad 3 (Rational Appeal/First-Person Benefit)	3.97	.76
Ad 4 (Rational Appeal/Third-Person Benefit)	3.76	.90

There were no statistically significant differences in these effectiveness ratings. However, to better explore the combinations of ad appeal and benefit, and their relationship with moral development and perceived effectiveness, additional repeated measures ANOVAs were run to determine if participants' moral development levels were correlated with differences between the perceived effectiveness of two ads compared at a time, rather than all four. With moral development as a covariate, there were statistically significant differences between the perceived effectiveness of ad 1, a first-person benefit/emotional appeal ad, and ad 2, a third-person benefit/emotional appeal ad, $F(1,124) = 4.802, p = .030$, with ad 2 being rated more effective ($M = 4.05, SD = .814$). There were statistically significant differences between the perceived

effectiveness of ad 2 and ad 4, a third-person benefit/rational appeal ad, $F(1,124) = 9.485, p = .003$, with ad 2 ($M = 3.915, SD = .786$) being rated more effective. There was also a statistically significant difference between the perceived effectiveness of ad 3, a first-person benefit/rational appeal ad, and ad 4, $F(1,124) = 6.555, p = .012$, with ad 3 ($M = 3.915, SD = .786$) being rated more effective. To sum, the ad demonstrating the third-person benefit with an emotional appeal was rated significantly more effective than the first-person emotional and third-person rational ads, with the first-person rational ad also being rated significantly more effective than the third-person rational ad, when moral development was covaried.

The participants' levels of moral development were analyzed using the N2 index score calculated from their DIT2 results. Dong (2009) reported normative scores from a database of DIT2 results, stating that undergraduates ($N = 32,974$) exhibit an average N2 score of 34.76 ($SD = 15.45$). The mean N2 score for this study's sample ($N = 127$), which consists largely of undergraduates, was 25.7 ($SD = 12.73$). As this is significantly lower than average, it may be that the N2 is not a good representation of the strategies participants are using to interpret ad effectiveness. In addition to the overall N2 score, the DIT provides assessments of three developmentally ordered moral schema: personal interest (in which moral judgments are formed with a focus on the self and personal relationships), maintaining norms (which prioritizes the rule of law, social norms, and the role of authority in formulating a moral judgment) and postconventional (which attends to the underlying shared ideals that ought to organize social cooperation). The N2 score primarily focuses on the most-developed postconventional schema, but the DIT also offers an index for each schema. Given that the current sample overwhelmingly prefers the maintaining norms schema for making moral judgments, the primary analyses of this study were expanded to include maintaining norms as the index for moral judgment development.

Although differences for ad effectiveness were found between genders when moral development was controlled for, $F(1, 143) = 13.038, p = .000$, when the maintaining norms (stage 4 score) was covaried out, that significant difference no longer existed. To better examine the relationship between moral development and perceived ad effectiveness, multiple regressions were run to determine where correlations may occur and how strong these relationships are. For ad 2, the maintaining norms schema explained a statistically significant amount of the variance in ad effectiveness, $R^2 = .094, F(1, 124) = 6.296, p = .002$. Similarly, for ad 3, maintaining norms explained a statistically significant amount of the variance in ad effectiveness, $R^2 = .069, F(1,124) = 4.527, p = .013$. Thus, when the participant's preferred moral judgment strategy was included in the analysis, findings indicate that moral judgment scores do account for a portion of the variance in the ad effectiveness ratings for two of the ads.

Discussion

Although not many previous studies have compared ad appeals, some research credits emotional appeals with greater ad success (Mahapatra, 2013; Niederdeppe, et al., 2008; Stafford & Day, 1995). In this study, however, paired sample *t*-tests comparing the effectiveness of the ads based on type of appeal revealed no significant differences between emotional or rational appeals. For this sample, whether the ad used an emotional or a rational appeal did not impact the participants' perceived effectiveness of that ad. Similarly, few previous studies have examined whether an ad that emphasizes first-hand effects on the self might be more or less effective than one that features the impact a health behavior has on a third-person other, although some research indicates that second-hand effects of smoking in anti-smoking ads were generally effective (Beaudoin, 2002). In this study, the ads presenting a third-person benefit of the reader quitting smoking for the sake of those around them were perceived as more effective than ads advertising a first-person benefit. When analyzed with the type of benefit as the only consideration, ads that implored the viewer to quit smoking for the sake of others resonated better with the participants in this study. These findings indicate that, although the type of appeal used in an ad may not impact its perceived effectiveness, whether the ad speaks to benefits to the viewer's self or third-person other should be taken into consideration when designing a campaign for maximum effectiveness and is deserving of more research.

Evaluating the impact various combinations of these components have on ad effectiveness provides more insight than just weighing the components separately. Analyzing all four ads together revealed statistically significant differences among their effectiveness, as ad 2 was consistently rated most effective. Ad 2 presented a third-person benefit, which is consistent with the finding that this benefit was more effective, and an emotional appeal.

Most of the participants' demographic information had no bearing on the ads' effectiveness ratings, as there were no significant differences found among educational levels, age, or even smoking status and their perceived effectiveness of the ads. However, the ads used in this study seemed to be more appealing to females than males. There were statistically significant differences between gender and the ads' effectiveness, even though the effectiveness rank order of the ads according to gender was the same as the rank order when gender was controlled: ad 2 was most effective among both males and females. Each of the four ads was more effective among females in this sample than males, as the females' mean effectiveness score was significantly higher for each ad. However, this may indicate that females are generally more affirming than males when making an evaluation.

To answer *RQ1*, the findings of this study indicate that the type of appeal being used in a health ad does not impact that ad's effectiveness, while messages advertising changing a behavior for the sake of those around the reader are more effective than those beseeching the reader to change for his or her own health benefits.

As discussed earlier, many studies seek to determine how health campaigns influence health intentions and behaviors (Lee et al., 2013; Pechmann & Reibling, 2006; Shen, 2010). However,

there is very little research that examines whether a viewer's existing health intentions impact the way he or she evaluates a health message. In taking into consideration participants' intentions to smoke as a covariate, significant differences were found among perceived ad effectiveness. This is especially interesting considering participants' smoking status (closed to smoking, open to smoking, prior experimenter, early smoker, or established smoker) having no significant influence on their evaluations of the ads' effectiveness. Lower scores of intentions to smoke predicted greater perceived ad effectiveness than higher intention scores. The ads' rank in order of effectiveness was the same as when health intentions were controlled for. For those with a lower intention to smoke, the ad presenting a third-person benefit and an emotional appeal were seen as most efficacious, followed by the ad advertising a first-person benefit and rational appeal.

To answer *RQ2*, the results of these analyses indicate that using either an ad with a third-person benefit and an emotional appeal, or one with a first-person benefit and a rational appeal, would have success communicating with viewers who already have low intentions to smoke. An ad presenting a first-person benefit and emotional appeal would not be effective among this audience.

Moral development determines how individuals judge what is right, wrong, just, etc. This development has implications when targeting individuals with messages that impact their behaviors, especially when considering health campaigns. As this sample of participants was mostly students in high school or undergraduate college, it could be reasonably assumed most of these students would be in a maintaining norms schema of development, where their focus has been shifted to the group and what the group defines as right and wrong, or entering a post-conventional stage, where the focus shifts beyond group norms and conventions to more universal definitions of goodness and justice.

In analyzing moral development as a covariate with the ads' effectiveness, there were no significant differences found. A surface exploration of this concept would make it appear as if moral development does not have any influence in how these participants perceived the ads. However, a more detailed look at the differences in perceived ad effectiveness, by comparing two ads at a time rather than all four, revealed that ad 2 was perceived as more effective than ads 1 or 4. Taking levels of moral development as calculated by participants' N2 index scores into consideration, ads 2 and 3 were considered the most effective, even though there were no significant differences between the two.

However, the DIT2 results for this sample were lower than average for individuals of similar age and education level, and the sample itself did not contain individuals of a range of education levels idealized for moral judgment studies, perhaps skewing the outcome of this investigation. A more accurate examination of these data, then, involves analyzing levels of moral judgment from the perspective of developmental indices. Examining differences in ad effectiveness using the maintaining norms schema as a covariate negated the differences found among the ads' ratings by gender. While before there was a significant difference between the way women and men rated the ads when other factors are controlled, the presence of the maintaining norms

schema, which could be reasonably assumed would be prominent among this sample, disavowed that difference. Further, regressions run to look more closely at the impact of moral development on the perception of health message effectiveness revealed that ads 2 and 3 were again more effective among those with higher maintaining norms schema reasoning than the other ads. Ads 2 and 3 appealed more to those who scored higher in the maintaining norms schema, suggesting that moral development does come into play in rating the effectiveness of health messages.

Realizing that participants in this study preferred the maintaining norms schema for making moral judgments helps provide some insight into their penchant for ad 2 in most analyses. Ad 2 presented an emotional appeal with a third-person benefit, and individuals in the maintaining norms schema believe that without law there is no order, and that maintaining social order defines morality. They identify existing rules and authorities and obey those authorities out of respect for the system. When individuals develop into this schema of moral reasoning, their focus has been shifted to the group and what the group defines as right and wrong. Actions are performed based on laws and group-wide decisions, and there is an assumption that laws and rules will be applied society-wide and maintain a level of reciprocity.

To answer *RQ3*, the findings of this study indicate that moral development does play a role in how an individual evaluates a health ad. The ads presenting a third-person benefit and an emotional appeal were more effective among those who rated higher in the maintaining norms schema and among those with higher moral development as indicated by the N2 index score. Taking moral judgment into account through developmental indices for this sample also seemingly erased gender differences in ad effectiveness that were revealed in previous analyses.

The results of this study provide a foundation for further research investigating advertising effectiveness from the lens of the moral development theoretical perspective and show that this perspective should be taken into consideration when designing health messages. As formative research, this study also contributes valuably to literature in the field of PIC, since it is imperative that PIC campaigns are evidence-based (Fessmann, 2016), and, as pointed out by Shafer and Macary (2020), “formative research seeks to understand a public, its experiences, needs, and preferences to shape the social change strategic campaign rather than imposing the beliefs of an organization onto a public” (p. 39). Further, the introduction of a new theoretical concept to health campaigns accomplishes one of the considerations proposed by Downes (2017) for building positive social change through PIC—interdisciplinary scholarship, which can bring about “a rich, inclusive formula for promoting and moving the [PIC] field forward” (p. 33). Therefore, the results of this study indicate several factors that should be emphasized or avoided while planning strategic and public interest campaigns targeting individuals in the adolescent and young adult stages of life.

Adolescents are often in the stage of life where their focus is on group conventions. They are in the law and order, mutual perspectives time of life where they want to fit in and be like the group. In fact, maintaining group norms has been described as the heart of adolescence. Messages designed to influence health behaviors of individuals in the maintaining norms schema of moral development should focus on group norms, emphasizing that the behaviors are

beneficial for the group, that the group approves or does not approve of doing them, or that the behaviors follow the group's agreed upon rules. For instance, a campaign to encourage teenagers not to text while driving could show that their actions may affect not only themselves but other people, too, or highlight celebrities or other people held in high esteem by their peers who have spoken out against texting while driving. Messaging designed to encourage social distancing and wearing masks could emphasize that individuals are helping others with such actions, that others in their peer groups are performing those behaviors, and that they could be met with disapproval from their peer group for not complying.

Young adults have hopefully developed so that they are able to recognize societal perspectives and more universal principles. These individuals can see beyond the good of the self and the group into a more universal sense of justice and equality. Messages targeting young adults should emphasize the principles at play while encouraging behavior or attitude change and should point out the societal value in the behaviors. For instance, a campaign designed to discourage drunk driving among young adults may emphasize the societal consequences of the number of lives lost due to drunk driving and the financial strain drunk driving places on society. Pandemic messaging could focus on the number of lives lost because of not complying with mandates, or the number of lives potentially saved due to compliance, as well as other societal consequences of not curbing spread of the disease, such as local and national economies or mental health.

Limitations and directions for future research

While this study has produced interesting insights into the perception of health messages, several limitations prohibit the results from being generalized. First, time and financial limitations necessitated the use of a convenience sample recruited from students enrolled in classes at a large university in the Southeast in the semesters during which data collection took place. The convenience sample resulted in a relatively homogenous sample. While a homogenous sample helps to limit confounding variables in examining perceived ad effectiveness, a more diverse sample would have enabled a better exploration of the relationship between moral development and message evaluation. The sample was also limited in that a majority reported having never or rarely smoked. The participants' already low intentions to smoke and young age may have impacted their judgments of the ads. Future studies in this area using similar samples should utilize stimulus materials that advertise a more relatable health message that more greatly impacts the participants, such as healthy eating or pandemic-mitigating behaviors.

Second, this sample generated moral development scores that deviate from the norms as reported by Dong (2009). The normative N2 index score for undergraduates is 34.76, while the students in this sample returned an average of 25.7. The results of this study do not allow for speculation as to why the moral development levels for this sample would be so much lower than average, although the relatively unvaried demographic characteristics of the participants would

impact moral development results. The lack of educational diversity in the sample prohibits a rich analysis of perceived ad effectiveness over varying levels of moral development, which is necessary to reach a full understanding of how these two areas may overlap. The results from this study indicate that the interaction of moral development and health message effectiveness should be studied further; however, future studies in this area should utilize diverse samples.

Even though this study produced interesting results that provided insight into how various ad components and moral development interact to impact perceived effectiveness, this topic should be studied further. For this sample, the combination of third-person benefit and emotional appeal was effective in communicating an anti-smoking message to this sample of participants. However, most of this sample reported that they have never or rarely smoked, a characteristic that may have impacted participants' responses to questions about the ads they viewed. Those who do not smoke may naturally find an anti-smoking message appealing or may not relate to any message regarding smoking. To more fully understand how the type of benefit and appeal used in a health ad interact to impact the effectiveness of a health message, a variety of health messages should be studied on a variety of samples. For instance, would these results be replicated in a study using ads that encourage healthy diets or regular exercise? Would the type of appeal and benefit impact the effectiveness of a message encouraging certain behaviors known to prevent different types of cancers? Do different components affect the perceived efficacy of messages differently among various age groups, genders, races, or educational levels? While this study has made an important step in understanding how to better design campaigns to encourage behavior changes that impact public health, these questions are important to answer to distinctly improve health campaigns and, in turn, impact health behaviors and create an overall healthier society.

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Conversing or Diffusing Information? An Examination of Public Health Twitter Chats

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Abstract

This study examines the one-way information diffusion and two-way dialogic engagement present in public health Twitter chats. Network analysis assessed whether Twitter chats adhere to one of the key principles for online dialogic communication, the dialogic loop (Kent & Taylor, 1998) for four public health-related chats hosted by CDC Twitter accounts. The features of the most retweeted accounts and the most retweeted tweets also were examined. The results indicate that very little dialogic engagement took place. Moreover, the chats seemed to function as pseudoevents primarily used by organizations as opportunities for creating content. However, events such as #PublicHealthChat may serve as important opportunities for gaining attention for issues on social media. Implications for using social media in public interest communications are discussed.

Introduction

Using communication to build relationships can be an important step in bringing about social change, and such dialogue can lay an important foundation for public interest communicators' work (Brunner, 2017). Twitter "chats," as the term would suggest, may be useful tools for facilitating dialogue as part of such strategic communication efforts. Research on dialogic communication in social media can either address a relational orientation between organizations and their publics or principles for communication practice (Zhou & Xu, 2020). This paper

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addresses the latter; rather than focusing on the quality of the relationships between publics and organizations as exemplified through chat, we will address whether Twitter chats seem to follow dialogic principles for promoting engagement.

Past research has indicated that science communication, (e.g., Lee & Van Dyke, 2015), health communication (e.g., Park et al., 2016), and nonprofit communication (e.g., Lovejoy et al., 2012) that take place on Twitter outside of chats do not engage outsider users in conversation-like communication. If Twitter chats resemble these more general tweets, then many Twitter chats likely follow one-way patterns of diffusion instead of the “two-way, relational, give-and-take between organizations and stakeholders” characteristic of dialogic engagement (Taylor & Kent, 2014, p. 391). In the case that organizations do use Twitter chats for broadcasting information rather than conversing, further analysis can be used to determine what can make organizations more successful in broadcasting to audiences through retweets, increasing the opportunities for reaching new audiences about topics that benefit public health and the social good.

To explore whether Twitter can be used effectively for dialogic engagement in the public interest, this paper examines the Centers for Disease Control and Prevention’s (CDC) use of Twitter chats. The CDC was chosen as the subject of this research so that multiple chats could be compared from the same organization. The CDC occasionally initiates Twitter chats using one of its 69 Twitter profiles (CDC, 2012). For crisis communication, the CDC’s chats have lacked dialogue (Dalrymple et al., 2016), so only public interest topics not linked to a crisis were examined. Of particular interest are the features of chats and Twitter users that promote dialogue and the spread of information regarding the designated chat topics. By examining chat and user features, we hope to determine how public interest practitioners can improve their own efforts to use Twitter chats and similar social media platforms for public interest communications.

Literature review

Dialogic principles and Twitter

Twitter chats are designed to create synchronous conversations on Twitter. These conversations are marked by a chat sponsor-designated hashtag and moderated by a host (Cooper, 2013). The term “chat” implies that a genuine, two-way conversation takes place. A broad view of two-way communication appears in the theoretical framework of the symmetrical model of communication, which includes a variety of public relations activities ranging from listening to research on the target publics (J. E. Grunig, 2001, 2009; J. E. Grunig & Kim, 2021). Dialogic theory, on the other hand, has a narrower focus on two-way communication, though it has some of the same goals, including “the building of relationships” (J. E. Grunig & Kim, 2021, p. 306). Dialogic theory has strong philosophical underpinnings that accept that “the outcome [of dialogue] is not always predictable and that the precise outcome cannot always be achieved”

(Theunissen & Noordin, 2012, p. 7). Dialogic theory has also been applied specifically to understand the nature of organizations' online communication efforts (Kent & Taylor, 1998, 2014). Therefore, this paper will take a dialogic approach to exploring the use of Twitter chats for public interest communications.

Although internet-based communication channels were once heralded as an opportunity for dialogic communication (Kent & Taylor, 1998), social media have not been found to be particularly dialogic or conducive to two-way, relationship-building communication in practice (Kent & Li, 2020; Lovejoy et al., 2012; Taylor & Kent, 2014). This study addresses whether Twitter chats adhere to the dialogic loop, one of the key principles for online dialogic communication (Kent & Taylor, 1998). A dialogic loop exists if the infrastructure exists for individuals and organizations to respond to one another. Twitter has the technical features required for a dialogic loop (Watkins, 2017), and past research indicates that Twitter can sometimes serve as a better dialogic loop than company websites (Rybalko & Seltzer, 2010). In addition to the presence of technical features allowing organizations and publics to interact, accounts would need to actively communicate with publics during a chat for a functioning dialogic loop to exist. Therefore, this paper examines whether the CDC is using the platform features that allow for the dialogic loop to visibly occur during Twitter chats.

Retweets should be considered a key component of the dialogic loop. Both replies and retweets may be considered types of conversation-oriented, rather than broadcasting, tweets (Grant et al., 2010). A major difference between retweets and replies lies in who is likely to see the conversation. Replies are likely to be viewed by followers only under certain circumstances, such as when audience members follow both accounts or when Twitter predicts that the audience would enjoy the conversation; otherwise, audiences must seek out the information in replies (Twitter, 2020). In contrast, retweets share information with all followers. Retweets bring the rest of the audience into the context of the original comment and extend the public conversation between different participating accounts (Boyd et al., 2010).

To study the flow of information and the dialogic nature of Twitter chats, network centralization can be examined. When peers share information with one another instead of relying on opinion leaders, the network will be noncentralized (Bastos et al., 2018). In other words, when many accounts—rather than a select few—are retweeted, the network will be noncentralized. Therefore, the first way to examine if CDC-sponsored Twitter chats promote a dialogic form of communication is to determine if networks are noncentralized. Past research indicates that Twitter-based discussions tend to be less centralized and more characteristic of two-way conversations when broad topics are discussed (Bastos et al., 2018). Therefore, a Twitter chat with a broad focus will be examined in this study and will be compared with chats with narrower focuses; this type of approach ensures that the study's assessment of the one-way or two-way nature of communication is not unduly influenced by the topic of the chat.

RQ1a: Are retweet networks centralized, indicating that one-way interactions of diffusion or limited two-way communication is taking place, or decentralized, indicating that dialogic communication may be taking place as account users share information with one another?

In the case that chat retweet networks are centralized around a few accounts, further examination of the opinion leader accounts will be necessary to determine if the one-way nature of the conversation is truly being driven by the lack of a dialogic loop. If the dialogic principles are in place for the Twitter chats, any opinion leaders that do appear should not primarily be from organizations with close ties to the host. For example, when a CDC account hosts a chat, the primary opinion leaders in dialogic communication would not be drawn primarily from the other 68 CDC Twitter accounts. Instead, individuals not associated with the organization should appear among the opinion leaders. If the opinion leaders are primarily from the CDC's own accounts, then any dialogue in the chats would appear to be fully orchestrated, and the chats may simply serve as an excuse to generate and distribute content. Such orchestrated social media chats would serve the role of a virtual pseudoevent, or event planned for the purpose of gaining media coverage; in such cases the meaning of the event is ambiguous and the meaning the organizers give the event is a sort of "self-fulfilling prophecy" (Boorstin, 1992, p. 12). However, in an age of social media, coverage by the press may not be required, and the virtual pseudoevent may simply give the organization justification to distribute a high volume of content all at once on social media.

RQ1b: If networks are centralized, which types of accounts serve as opinion leaders (e.g., organizations or individuals), and do the types of opinion indicate that dialogic principles may be in place for Twitter chats (anyone can become an opinion leader) or the chat operates only as a one-way channel of diffusion?

Opinion leadership and retweet prediction

If health and science communicators promoting ideas in Twitter chats do persist in using one-way communication as indicated by organization-dominated centralized networks, further analysis of the chat networks also may indicate how opinion leader accounts, and particularly any organization's accounts supporting the chat, can strategically improve the rate of diffusion.

Opinion leaders' influence has previously been operationalized as "the frequency of one's remarks being passed along by others" and, in the case of Twitter, the frequency of retweets (Choi, 2014, p. 217). Therefore, this study will seek to predict how likely an individual account is to be retweeted. Potential predictors of whether a tweet will be retweeted can be categorized into two types, including social features and tweet features (Petrovic et al., 2011). Social features (user's attributes) are about user's background information while tweet features (tweet's attributes) are only about the tweet itself. A better understanding of how user attributes and tweet attributes contribute to opinion leadership in the context of a Twitter chat could be useful for

both communication practitioners and participants who wish to reach a broad audience during chats.

On Twitter, followers are the accounts that subscribe to tweets from a given Twitter account; in contrast, followees are accounts to which users are subscribed. Both Adnan et al. (2018) and Petrovic et al. (2011) found that the account features of follower and followee numbers predict retweets; however, relatively little consensus exists about which tweet features best predict retweets. Using a dataset of 21 million tweets, Petrovic et al. (2011) found that social features, such as follower and followee numbers, predicted retweets better than features of the tweets themselves. Suh et al. (2010) found that both social features (the age of account, the number of followers, and the number of followees) and tweet features (hashtags and URLs) predicted retweets; however, Suh et al. (2010) also found that the number of past tweets (a social feature) did not have a significant effect on retweets. Therefore, social features such as follower and followee numbers appear to be important predictors of retweets, but other social features and account features merit further study.

Of the limited number of studies that focus on retweets, few focus on the domain of public health (e.g., Petrovic et al., 2011; Suh et al., 2010), and many use only descriptive statistics without showing associations and predictive relationships (e.g., Weitzel et al., 2011). Blankenship et al.'s (2018) study of a sample of tweets with the hashtag #vaccine serves as one of the few studies that focus on predictive relationships between retweets and public health topics. Their results indicated that users with a high follower count (at or above the geometric mean in the sample) are retweeted nearly four times as often as users with a low follower count (below the geometric mean in the sample) after controlling for vaccine sentiment and other user characteristics. In another study of a sample of tweets with the hashtag #pneumonia around World Pneumonia Day in 2011 to 2016, Adnan et al. (2018) found that, after controlling for other factors, a 10-fold increase in follower count will increase the odds of a user's tweet being retweeted by nearly fourfold and, if retweeted, increase the retweet frequency by nearly fivefold.

Communicators in public health could benefit from research regarding the account and tweet features that predict retweets. In trying to improve the diffusion of information over Twitter, the information in this study will help strategic communicators determine whether to prioritize strategies such as increasing the number of account followers, following more accounts, using a more well-established account, or communicating via trusted channels. This study will test various predictors of retweets in the previously described Twitter chats, including both account features (e.g., \log_{10} of follower count, \log_{10} of followee count, \log_{10} of account age in days, and user type), and tweet features (e.g., count of relevant tweets and retweets issued). Results may also inform strategies for how often communicators should tweet and/or retweet during a Twitter chat.

RQ2a: Which social (user account) features predict retweets during Twitter chats?

RQ2b: Which tweet features predicted retweets during Twitter chats?

Method

To study these patterns, this research focuses on #PublicHealthChat, a chat organized in September 2016 and hosted by the National Center for Emerging and Zoonotic Infectious Diseases (NCEZID) at the CDC. The event was used to promote official policies and to increase public awareness of public health work. Therefore, #PublicHealthChat serves as an example of how the CDC communicates about public health in a nonemergency situation when no specific health issue is being addressed.

To address *RQ2*, only #PublicHealthChat will be used to examine the effects of tweet and account features. However, to contextualize the level of centralization present in #PublicHealthChat when addressing *RQ1*, three additional chats also organized by CDC Twitter accounts during this same month also were examined as a point of comparison for #PublicHealthChat's level of centralization and opinion leader characteristics: #AMRChallenge, #HIVAgeingChat, and #CDCPrep2016 (see Table 1). In contrast to #PublicHealthChat, the other three Twitter chats focused on specific issues, such as HIV (#HIVAgeingChat), antimicrobial resistance (#AMRChallenge), and emergency preparedness (#CDCPrep2016). Because all four events occurred in the same month, the comparison controls for possible changes in the external environment, such as secular change in the number of Twitter users. Therefore, these three case-focused Twitter chats will be used to compare the spread of information for specific public health topics with the spread of information for a broad, topic-nonspecific campaign, #PublicHealthChat.

Table 1

Participant Demographics

Hashtag	Event	Date and time*	Event hosts
#PublicHealthChat	Future of Public Health Twitter Chat	Sep 22, 2016 1pm-2pm	NCEZID** (@CDC_NCEZID) American Public Health Association (@GetReady)
#AMRChallenge	Antimicrobial Resistance Diagnostic Challenge Twitter Chat	Sep 15, 2016 2pm-3pm	CDC (@CDCgov) NIH Director (@NIHDirector)
#HIVAgingChat	HIV Aging Chat, part of the event of “National HIV/AIDS and Aging Awareness Day”	Sep 16, 2016 3pm-4pm	Randomized Trial to Prevent Vascular Events in HIV (@reprivetrial) National Library of Medicine (@NLM_HIVplus50) AIDS Clinical Trials Group (@ACTGNetwork)
#CDCPrep2016	National Preparedness Month Twitter Chat	Sep 27, 2016 1pm-2pm	CDC Emergency (@CDCEmergency)

*All times in Eastern Daylight Saving Time (USA), 4 hours behind Universal Coordinated Time (UTC-4).

**NCEZID: National Center for Emerging and Zoonotic Infectious Disease

Data collection

Tweets containing #PublicHealthChat, #AMRChallenge, #HIVAgingChat, and #CDCPrep2016, were obtained through a combination of Twitter Search Application Programming Interface (API) and web scraping techniques. Because developers can only retrieve tweets via the Twitter Search API published in the past 7 days with a frequency of less than 180 requests per 15 minutes, the process is somewhat limited; to address this problem, collection was supplemented with a web scraping technique, namely TwitterScraper (<https://github.com/taspinar/TwitterScraper>), which was developed based on Twitter’s website search to automatically retrieve tweets’ IDs. This inventory of IDs is more complete than API data. To collect data consistently for all four chats, only tweets from 5 hours before each Twitter chat started to 1 hour after the event ended were retained for analysis. In total, 5,169 tweets were eventually retained and analyzed from the four Twitter chats, 1,074 of which were from #PublicHealthChat.

Measures

For the included tweets, several variables were measured, including retweets received, follower count, followee count, account age, original tweets, and user type. Retweets issued were measured to answer both research questions. Retweets received, follower count, and user account creation dates were obtained directly as part of the API calls. Account age then was calculated as the number of days between the date on which the account was created and the date on which the Twitter chat occurred.

Retweets issued refers to the number of posts that a given user retweets from others pertaining to a specific hashtag. As defined by Suh et al. (2010), there are two ways to identify retweets: regular expression method and feature retweet method. The feature retweet method identifies retweets by checking the column of `retweeted_status` through API calls; however, this method excludes retweets created using the copy and paste method and RT @ to designate tweets as retweets. In contrast, the regular expression method identifies retweets by scanning for retweet text markers, namely RT @ syntax; therefore, the regular expression method was used to identify retweets in this study. A related variable, original tweets count, refers to the number of tweets a user has created originally and excludes all retweets. Tweets that were not found to be retweets using the regular expression method were sorted by user ID and the number of original tweets each user has posted was counted.

Finally, account user types were identified using content analysis. Three coders were trained to classify all users who had participated in at least one of four hashtag events into four mutually exclusive categories of identities: government agencies and non-governmental organizations (NGOs); media organizations; individual health-related professionals; and miscellaneous accounts. To establish inter-coder reliability, a random subset of 150 users was obtained. Two coders independently looked through these listed users' Twitter profiles and annotated their categories according to the definitions. After that, Cohen's Kappas (1960) were calculated to measure the interrater reliability. The initial reliability scores were lower than 0.70. Therefore, the two coders discussed the disparities one by one until consensus was reached. Then the codebook was extended to include clarifications over those disparities. Two coders continued to code another 103 users separately and calculated a second run of interrater reliabilities. Ultimately, the reliabilities of four categories were 0.92 (Government agencies and NGOs), 0.85 (Media organizations), 0.89 (Individual health-related professionals), and 0.86 (Miscellaneous) respectively. The average Kappa was 0.88, indicating a high level of interrater reliability.

One coder then coded the remaining users. In our analysis, we operationalize opinion leaders as the top 10% of users who tweeted most (both original tweets and retweets) in the sample. In the generalized linear regression model, user type was dichotomized into three dummy variables—i.e. Health-related Organizations or Not, Media or Not, and Professionals or Not. However, because too few users qualified as media organizations, they were excluded from the regression analysis.

Analysis

Health chat networks

Social network analysis was used to determine whether information shared during the chats more closely resembled broadcasting or dialogic communication (*RQ1*). Four retweeting networks were constructed from four datasets respectively—#PublicHealthChat, #AMRChallenge, #HIVAggingChat, and #CDCPrep2016. Nodes can represent everything from individuals to countries, and networks represent any ties between these nodes (Opsahl et al., 2010). For this study, nodes denoted the Twitter users who mentioned the hashtag, while edges denoted retweeting relations. For example, when user A retweeted a post from user B, an edge, starting from node B and targeting at node A, was constructed to illustrate this retweeting relationship.

Furthermore, several critical network attributes such as network density, node centrality, and network centralization were calculated and compared. Density in social network analysis is the ratio of potential connections that has turned into actual edges. Higher density means the network's nodes are more closely related.

Node centrality is a series of measurements used to define how important a node is for the whole network structure. The most widely used measurement is called degree centrality, which is the number of other nodes to which a given node is adjacent. In social network analysis, degree is equivalent to the number of edges. In our study, the retweet network is a directed graph, as the retweeting relation (edge) is asymmetric; user A could retweet B's post without the need to ask B for permission, and B may not reciprocate by retweeting user A. Therefore, directionality of edges does and can be divided into two sub-categories: in-degree and out-degree. In-degree centrality is the number of other users from whom a given user has retweeted, while out-degree centrality is the number of other users who have retweeted posts from a given user.

Based on node centrality, Freeman (1979) developed a measurement of network centralization, which is the sum of difference of node centrality divided by its maximum in a graph with the same size. Using numeric expression, network centralization = $100 * \frac{\sum(C^* - C_i)}{\text{Max } \sum(C^* - C_i)}$, where C^* is the maximum centrality and C_i refers to centrality of i th node. This value unveils how the most central node exceeds others' centrality. The most centralized network is the star network, where nodes are all related to the star (in the center of the network) but not to each other. In this network, the star dominates the whole message's transmission activity, and its centralization value equals to 1. It will decrease to 0 only when the network is completely inter-connected.

Retweet prediction

Regression analysis was performed to examine which tweet and user features predicted retweets (*RQ2a* and *RQ2b*). R package `pscl` (version 3.1.3) in R 3.1.2 was used. For tweet features, we examined the number of relevant original tweets posted (in the limited time range) and the number of relevant tweets retweeted from others. The following account features were also

examined: the logarithm (base 10) of one's number of followers, the logarithm (base 10) of one's followee count, the logarithm (base 10) of the age of one's Twitter account (in day), whether the Twitter user was an organization or not, and whether the Twitter user was a professional or not.

Given that retweet data is usually over-dispersed count data with excessive zero values, the best fit model would be a hurdle count model (Fu & Chau, 2013; Mullahy, 1986) with one truncated model for positive counts and one hurdle model for zero counts. Specifically, for zero vs non-zero values, binomial distribution with logit link function was fitted (logistic hurdle model). For positive count values, negative binomial distribution with log link was fitted. Since retweet frequency is count data and is often skewed with long tail, negative binomial distribution is more appropriate than other discrete distribution such as Poisson, which assumes the mean value to be equal to the variance. The analysis revealed a dispersion parameter (θ) of 3.72, indicating an overdispersion of the distribution of retweet count, justifying this decision.

Results

In our sample, the CDC-initiated Twitter chat #PublicHealthChat generated 1,074 tweets and involved up to 348 unique users (see Table 2). For all unique users, although the average number of total tweets per unique user (including retweets) was 3.09, the average number of original tweets per user was 1.14. Furthermore, the 398 original tweets (37.1% of the sample) were originally written by only 74 unique users. This low number of original tweets explains why the median of original tweet per user in the sample was 0.

Table 2

Descriptive Statistics for the Twitter Events

Account and tweet features	#PublicHealthChat	#AMRChallenge	#HIVAgeingChat	#CDCPrep2016
Number of tweets	1,074	1,440	887	1,768
Original tweets	398 (37.1%)	361 (25.1%)	238 (26.8%)	601 (34.0%)
Total unique users	348	444	99	548
Unique users with original tweets	74 (21.3%)	43 (9.7%)	46 (46.5%)	65 (11.9%)
Mean tweets per unique user (SD)	3.09 (6.19)	3.24 (9.21)	8.96 (20.64)	3.23 (9.26)
Median tweets per unique user (Q1, Q3)	1 (1, 2)	1 (1, 2)	2 (1, 8.5)	1 (1, 2)
Mean original tweets per unique user* (SD)	1.14 (4.52)	0.81 (4.64)	2.40 (3.53)	1.10 (6.46)
Median Original tweets per unique user* (Q1, Q3)	0 (0,0)	0 (0,0)	0 (0,4)	0 (0,0)

Q1: first quartile; Q3: third quartile; SD: standard deviation.

*The denominator is the total number of unique user and not the number of unique users who posted original posts.

#PublicHealthChat, #AMRChallenge, and #CDCPrep2016 had similarly high levels of unique users and relatively high levels of nonoriginal, retweeted content compared to #CDCPrep2016 (see Table 2). Although #HIVAgeingChat generated the highest average number of posts per unique user (8.96, including both original and retweets) and the highest percentage of unique users who tweeted original tweets (46.5%), it had the fewest participants ($N = 99$). #CDCPrep2016 involved the most unique users ($N = 548$) and elicited the greatest number of tweets ($N = 1,768$). #AMRChallenge had the lowest percentage of users who drafted their own posts (9.7%), indicating that most users simply retweeted rather than posted their own tweets during the #AMRChallenge event.

Table 3

Statistics of Retweet Networks

Hashtag	Nodes*	Edges	Density	Centralization	Highest out-degree centrality**
#PublicHealthChat	328	507	0.004	0.26	@CDCgov (92)
#AMRChallenge	438	563	0.003	0.65	@CDCgov (284)
#HIVAggingChat	97	319	0.003	0.21	@NIAIDNews (23)
#CDCPrep2016	534	836	0.003	0.60	@CDCemergency (321)

*These retweet networks do not include those solitary users who have never retweeted others nor have been retweeted by others. Therefore, the numbers of nodes in these network might be inconsistent with unique users reported in Table 1.

**Out-degree centrality denotes the number of other users who have retweeted posts from given users. It is different from the count of retweets received as some other users might retweet more than one time from the given user.

RQ1: Twitter chat networks

Centralization

All four chat’s network analysis revealed that, comparatively speaking, the retweet network of #PublicHealthChat is moderately centralized, less centralized than #AMRChallenge or #CDCPrep2016 but more centralized than #HIVAggingChat (see Table 3). However, the distribution of out-degrees of #PublicHealthChat was skewed with a long tail, clustering around 0.

Opinion leaders

Opinion leaders, as represented by the top 10% users ($n = 32$) of #PublicHealthChat, dominated the retweet network, as they were responsible for over 97% of the total number of retweets (outdegrees). Similarly, the top 10% of users for #AMRChallenge and #CDCPrep2016 were responsible for 100% of the retweets for each of those chats. In contrast, less than half of the retweets for #HIVAggingChat (48%) were generated by the top 10% of users.

Table 4

Makeup of Top 10% of Users

Hashtag	Count	Share of out-degree*	Organization	Professional	Media	Others
#PublicHealthChat	32	97.0%	26 (81.2%)	4 (12.5%)	0 (0.0%)	2 (6.3%)
#AMRChallenge	46	100.0%	16 (36.4%)	18 (40.9%)	1 (2.3%)	9 (20.5%)
#HIVAgeingChat	10	48.0%	7 (70%)	1 (10.0%)	0 (0.0%)	2 (20.0%)
#CDCPrep2016	53	100.0%	15 (28.3%)	11 (20.8%)	2 (3.8%)	25 (47.2%)

*The “share of out-degree” refers to the percentages of edges in the retweet network that were originated from the top 10% users.

When compared with the other three Twitter chats, #PublicHealthChat was found to have the largest portion of organization profiles (81.2%, $n = 26$) for its 32 opinion leaders (top 10% of users), although all four chats’ opinion leaders were dominated by organization profiles (see Table 4). The most retweeted account for #PublicHealthChat was @CDCgov, even though it was not the host of this event (the hosts were @GetReady and @CDC_NCEZID). The accounts @CDC_NCEZID, @DrFriedenCDC, @CDCGlobal, and @PublicHealth were also among the top five retweeted users, all of which were held by health-related organizations. For the other three Twitter chats examined, the top users were similarly all government agency accounts (see Table 3 for the accounts with the highest out-degree centrality).

#PublicHealthChat as well as #HIVAgeingChat had no media accounts among their top 10% of users. In contrast, of the 53 top users for #CDCPrep2016, two (3.8%) were media accounts and only 15 (28.3%) were organization profiles. #PublicHealthChat also had a low proportion of professional accounts involved as opinion leaders (4/32, 12.5%) similar to #HIVAgeingChat (1/10, 10.0%) and #CDCPrep2016 (11/53, 20.8%). #AMRChallenge had the highest percentage of professionals (18/46, 40.9%) involved as top users. In short, although #CDCPrep2016 and #AMRChallenge showed some variation in the types of opinion leaders involved, opinion leaders for all the chats tended to be organizations.

Table 5

Factors Associated with the Number of Retweets Received Using a Hurdle Model

Hurdle model (logistic)	Odds ratio	95% CI	P
Log10(followers)	2.2563	0.8611, 5.9117	0.0978
Log10(followees)	1.2652	0.2208, 7.2511	0.7917
Retweets issued	0.9353	0.7785, 1.1237	0.4749
Original tweets	4.8496	2.5403, 9.2583	<0.0001
Organization	4.3759	0.7144, 24.8214	0.0955
Professional	0.0179	0.0003, 1.2706	0.0643
Log10(account age)	4.3849	0.0883, 217.6836	0.4581
Count model (neg. binomial)	Relative risk	95% CI	P
Log10(followers)	2.1513	1.6234, 2.8508	<0.0001
Log10(followees)	0.8003	0.4470, 1.4329	0.4535
Retweets issued	1.0047	0.9551, 1.0569	0.8560
Original tweets	1.0635	1.0372, 1.0904	<0.0001
Organization	1.7763	0.6688, 4.7178	0.2490
Professional	1.9318	0.6391, 5.8392	0.2433
Log10(account age)	0.6729	0.2208, 2.0506	0.4859

Dispersion parameters (theta) = 3.7781. Log-likelihood = -145.9 (degree of freedom = 17)

RQ2: Retweet prediction for #PublicHealthChat

For #PublicHealthChat, both account features (*RQ2a*) and tweet features (*RQ2b*) were examined using a two-component hurdle model over the retweet frequencies. The original tweets issued (tweet feature) were found to significantly predict retweets (see Table 5). If users posted one more original tweet, the odds of their #PublicHealthChat tweet being retweeted (the possibility of being retweeted divided by the possibility of not being retweeted) would increase by 4.85 times (95% CI, 2.54, 9.26; $p < 0.001$); if retweeted (tweet feature), there would be a 6% increase in its retweet count (adjusted prevalence ratio = 1.06, 95% CI, 1.03, 1.09, $p < 0.001$). If a tweet is retweeted, a tenfold increase in the number of followers (account feature) increases the count of retweets by 2.15 times (95% CI, 1.62, 2.85, $p < 0.001$). However, the two-fold increase in the odds of being retweeted in the first place by a ten-fold increase in follower count was not

statistically significant (adjusted odds ratio = 2.2563, 95% CI, 0.8611, 5.9117, $p = 0.0978$). Therefore, users who generated a higher number of original tweets (tweet feature) as part of #PublicHealthChat were more likely to be retweeted by others, and the number of followers they had (account feature) did not necessarily increase the number of retweets.

Discussion

This study has compared four Twitter chats hosted by the CDC to identify communication patterns relevant to public interest communicators and constitutes one of the first studies that compare multiple Twitter chats pertinent to public health communication. As discussed in the results related to *RQ2*, the findings have practical implications for those wishing to become influential opinion leaders in Twitter chats, in that certain factors like original tweets lead to more retweets. Moreover, the nature of the network of tweets addressed in answer to *RQ1* has important implications for interpreting Twitter chats in terms of the dialogic loop. The lack of structure allowing for dialogue in these chats should be further explored, as well as the features of the chats that public interest organizations could improve in practice.

Twitter chat outcomes: Diffusion rather than dialogue

The relatively low number of users generating original tweets for all four chats, including #PublicHealthChat, indicates that Twitter chats often may lead to one-way interactions of diffusion, rather than dialogic engagement, despite the use of the term ‘chat.’ In particular, #PublicHealthChat reflected the power-law phenomenon, indicating that the retweet network is centralized around health-related organizations. Although past research has indicated that tweets regarding less specialized information tend to have less centralized networks (Bastos et al., 2018), in this case the broad topic of discussion seems to have been mainly an opportunity for various organization-sponsored accounts to diffuse their ideas.

The strong role of organization-run accounts as opinion leaders for #PublicHealthChat is consistent with past findings of how science organizations approach communication on social media (e.g., Lee & Van Dyke, 2015; Su et al., 2017). Given that many of the opinion leaders at the center of the centralized network were health organization accounts related to (or under the umbrella of) the CDC, the chat appears largely to have been orchestrated. In other words, accounts related to the CDC tweeted content and then retweeted one another as part of this chat. Public interest communicators in other organizations may similarly recruit sister and partner organizations to further diffuse information as part of Twitter chats. However, such strategies cannot improve the functional structure of the dialogic loop (Kent & Taylor, 1998), and, more importantly, such a strategic, instrumentalist approach to Twitter chats makes the chats inherently not dialogic (Kent & Lane, 2021).

Twitter chats as pseudoevents

Given that these chats appear to have been orchestrated, the chats seem to function as a sort of social media pseudoevent. Public interest communications develop through trigger events (Fessmann, 2017), and organizations may be using such pseudoevents to draw attention to issues when no trigger events occur naturally. Two potential strategies can be derived from this observation: organizations can use timeliness to make the events more authentic, or they can lean into pseudoevents as a strategy for marshalling resources for promoting dialogic engagement.

To make Twitter chats more authentic as events, timeliness may be a key strategy. The only chat that appeared less like a pseudoevent was #CDCPrep2016. This chat involved a more diverse array of opinion leaders than #PublicHealthChat (see Table 4) even though it had a similar network shape in terms of density and centralization. This finding may explain, in part, #CDCPrep2016's relatively higher number of total tweets and number of unique users compared to #PublicHealthChat. The very specific and relatable subject matter, compared to that of #PublicHealthChat, may have made opinion leader diversity possible, as the chat centered on National Preparedness Month during September, when hurricanes are common. The timeliness of the #CDCPrep2016 topic may have lent authenticity lacking in the other chats, making it less like a pseudoevent. However, the highly centralized network and low rate of original tweets of #CDCPrep2016 still means that the chat was primarily characterized by interactions of diffusion rather than interactions of conversation. As such, although the chat avoided the inauthenticity of pseudoevents, it did not engage audiences in dialogue.

The tweets regarding emergency preparedness during a time when emergencies are likely to occur may have made the #CDCPrep2016 chat more useful, leading to more involvement from a diverse array of users. While studying the dialogic nature of Twitter, Watkins (2017) found that the usefulness of the information, one of the five principles of dialogic communication, can change the dialogic quality of tweets and improve target publics' reactions to tweets. To set the grounds for interactions of conversation for a science-focused Twitter chat, therefore, strategic communicators should ensure that chat topics are timely and provide information that the public can use. An emphasis on timely Twitter chats gives more authentic news value to the chat and avoids the potential inauthenticity of a virtual pseudoevent.

Redeeming the pseudoevent: An opportunity for improving the dialogic loop?

However, an alternative to making the chats timely is to begin to take advantage of the time flexibility of a pseudoevent. Although the technical features are present in Twitter for the dialogic loop to exist, the CDC's procedures during a chat do not appear to allow for a dialogic loop. These procedures, wherein individual accounts are not engaged, may be due to a lack of available personnel within the host organization. Particularly in science and health communications, knowledgeable employees would need to be available to support direct engagement and, hopefully, dialogue with social media accounts during chats. Although

organizational resources may limit the number of qualified individuals available to assist in dialogic communication, organizations should consider dedicating employees to the task of supporting engagement during dedicated chats because Twitter chats offer an opportunity for authentic dialogic engagement for a short burst. Organizations such as the CDC may see dedicating employees to engaging with the public as a strain on resources; however, from another perspective, dialoging on social media would ideally take place all the time, and Twitter chats serve as a compromise, making dialogic public interest communications available for a manageable, limited amount of time.

Public interest communicators may therefore use Twitter chat pseudoevents to promote communication during times when the greatest number of personnel are available to help assist in engaging with participants. More personnel may allow the structure of a dialogic loop to exist and improve the opportunity for truly dialogic communication, which requires that dialogue allow for information based on personal experience instead of only scientific information (Kent & Lane, 2021). A true exchange of ideas could be used to reduce any perceived power differentials, build mutual understanding between organizations and their publics, and establish greater trust. Dialogic communication on social media is difficult and may be even more so with a large governmental organization, but Twitter chats' structure could be redesigned to make dialogue at least possible.

Characteristics that predict retweets

Despite the merits of dialogic communication, the focus of Twitter chats currently seems to be on information diffusion. Organizations hoping to become opinion leaders should take note that, in our study, only users who tweeted original material rather than retweets were likely to then be retweeted. To attract more retweets, more relevant tweets will further improve accounts' influence in this retweet-able group, leading to more retweets. This finding may be encouraging for organizations that are late to joining conversations on Twitter and wish to use such chats primarily for diffusion. Despite having shorter account ages and fewer followers, these organizations may still be able to reach a large audience if they compose original tweets during Twitter chats. However, this finding also could have important implications for encouraging organizations to take part in a more dialogic approach to communication (Kent & Lane, 2021). Original tweets, rather than merely sharing what others have stated, offer opportunity for a dynamic response to the Twitter conversation even as they provide opportunity for more attention.

Limitations

Through a comparative study design, our study reveals the nature of public health Twitter chats in terms of dialogue and opinion leadership. However, the method does have limitations. First, our analysis was limited to Twitter data, as we have no knowledge regarding the intent of the

Twitter chat hosts; therefore, although we assume that elements of the chats are orchestrated by multiple CDC accounts, we have no proof. Second, in the analysis of retweets we took three predictors into account but may have omitted other, unknown confounding variables. Finally, Twitter does not show a complete retweeting route to its audience (Liang et al., 2019; Meng et al., 2018). It only displays the starting and ending node, thus skipping all intermediaries. User A could read a post, originally written by user B, from user C's page and retweet it afterwards. Literally speaking, the message flowed from B to C to A. In practice, however, we can only recognize retweeting relation between A and B, leaving out C's role as an intermediary. Thus, the retweeting networks we tested below may miss some details which might lead to an overestimation of the social impact of the source, whose voice may not reach out that broadly without those intermediaries.

Conclusion

Current use of Twitter chats indicates that organizations communicating information relevant to the public good do not support the dialogic loop during these so-called chats. To improve the dialogic potential for chats, strategic communicators would need to spend more time reading and responding to other users' tweets. The centralized nature of the retweet network indicates that chats currently serve, perhaps intentionally, as organization-dominated platforms for information diffusion rather than conversation. The fact that dialogic potential, much less actual dialogue, is so obviously lacking in these chats may increase the perception of power differentials between public interest organizations like the CDC and its publics, and such perceived distance could in turn undermine Twitter users' trust in those organizations.

Given the limited time and resources of the people running organization accounts, strategic communicators may need more resources to improve the dialogic potential of the chats by assembling groups of individuals to read and respond to nonorganization Twitter users. Considering the communication and trust problems that can occur during public health emergencies, health organizations should develop opportunities to improve public trust through dialogic communication during nonemergency situations as well.

In conclusion, this paper describes how Twitter users may broaden their reach in the context of Twitter chats and provides the encouraging finding that those who post original content can dramatically increase their ability to become opinion leaders. This paper also suggests that such chats have potential for bringing attention to issues lacking naturally occurring trigger events, and we submit that creating such opportunities may allow for the marshalling of resources to improve the structure of the dialogic loop. Because such trigger events are important for the development of public interest communications (Fessmann, 2017), public interest communicators may choose to use Twitter chats as a tool when key issues are receiving little attention. However, overall, Twitter chats currently do not appear to be implemented in a way that encourages dialogic engagement or the building of trust.

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Sexual Health on Television: New Framing of Sexual Health Issues in Netflix's *Sex Education*

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Abstract

Television drama series have the potential to create awareness about sexual health problems and solutions. This study deployed a qualitative analysis of framing to understand how the Netflix show *Sex Education* framed sexual health concerns. Findings indicate that some sexual health concerns were depicted in the context of teaching sexual responsibility and destigmatizing processes such as seeking information or coming out as LGBTQ+. The show also portrayed the negative consequences of sexual violence and how people might choose to seek help related to sexual trauma. Overall, this study discusses how *Sex Education* frames sexual health issues in both expected and novel ways compared to those previously explored in public interest communications research.

Introduction

On January 11, 2019, Netflix released a British-American television show titled *Sex Education*. The show follows the life of a sexually inexperienced 16-year-old boy, Otis Milburn, whose mother is a sex therapist. Otis perceives himself as talented as his mother in diagnosing and treating people's sexual problems and recommending an enjoyable, active sex life. Otis partners with his friend and schoolmate, Maeve, to counsel their fellow students of Moordale High about sex-related problems. The series portrays sexual violence, sexuality, birth control, LGBTQ+

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identities, sexually transmitted diseases (STDs), masturbation, virginity loss, and the consequences of sexual risk-taking. One year after it was released, *Sex Education* had become the fourth most-viewed show on Netflix with over 40 million viewers (Lee, 2019).

Reviewers of *Sex Education* consider the series to broaden and address perspectives on sexual identity, consent, and contraceptive use and to offer a refreshing portrayal of openness, truth, and diversity (Cumming, 2020). The show has been described as a “smart, sensitive look at teens finding their place and figuring out the owner’s manuals for their bodies” (Poniewozik, 2019, para 7). The show has also been subjected to criticism since its debut. Critics have noted that, for example, “the surreal glossiness in *Sex Education* is a joke and a cloak,” in that, in one episode, the show concealed important facts about chlamydia, treating the disease as harmless and humorous (Cumming, 2020, para 5). However, it is not yet known whether the show was framed to solve the major sexual health problems facing U.S. teenagers. This study adds to the literature of public interest communications by exploring the framing of sexual health problems in the show *Sex Education* and analyzing how it relates to previous concerns regarding the negative influence of television shows on teenagers’ sexual health.

Sexual health among teenagers is a public health issue in the United States and beyond. Three primary sexual health issues include teenage pregnancies, abortion, and STDs. The CDC reports that the U.S. teen pregnancy rate is substantially higher than those in other western industrialized nations, with a birth rate of 18.8 per 1,000 among females ages 15 to 19 (Centers for Disease Control and Prevention, 2019b). In 2017, 194,377 babies were born to females ages 15 to 19 (Centers for Disease Control and Prevention, 2019a).

STD rates are also on the rise in the United States. A CDC report revealed that in 2018 alone, approximately 2.5 million Americans were infected with STDs (Centers for Disease Control and Prevention, 2019c). Cases of chlamydia were most frequent, affecting 1,758,668 people; 179 per 100,000 people were infected with gonorrhea, and there were 115,045 cases of syphilis. Females ages 15 to 19 accounted for 44% of reported cases of chlamydia, which causes infertility to more than 20,000 females each year when undiagnosed (Centers for Disease Control and Prevention, 2019c). Similarly, an FBI report also revealed that hate crimes based on sexual orientation are on the rise and are the third most common type of hate crime in the United States (Hauck, 2019).

Previous research has suggested that consistent viewing of sexual content on television contributes to young people's formation of expectations, attitudes, and beliefs about sex, which can have both positive and negative impacts on sexual behaviors (e.g., Booker et al., 2016; Collins, 2004; Collins et al., 2003; Gamble & Nelson, 2016; Kinsler et al., 2019; Ward & Rivadeneyra, 1999). Because teenagers use television to model their own sexual health behaviors and because popular television shows contain frequent sexual scenes, it is vital that these shows frame sexual health issues in ways that reflect the consequences of sexual risk behaviors and the dangers of holding opinions that increase hate crimes against women and LGBTQ+ people. The considerable influence of television warrants showcasing incidents where sex is portrayed in conflict with the research.

Thus, this study takes a cue from previous media studies research to explore *Sex Education*, a show worthy of attention given its recent popularity. This study includes a qualitative approach to the framing of sexual health topics in *Sex Education* to address the extent to which the show's portrayal of sexual health problems aligns with previous research into on-screen portrayals of sex and sexual health issues. In addition, this study seeks to understand how such portrayals contribute to the field of public interest communications.

Literature review

Sexual health portrayals in primetime television

Netflix is the most popular streaming service globally, with up to 207 million subscribers and the largest selection of television shows (Haslam, 2021). Having both the features of a traditional television medium and online streaming service, Netflix serves as one of the most prominent sources of media related to sex and sexual health for today's youth (Dudek et al., 2021). Teens watch about seven hours and 36 minutes of traditional television per week, or about one hour and five minutes per day (Marketing Charts, 2021). Along with parents, school, and friends, online media provide an important source of information for youth to learn about sex (Nikkelen et al., 2020).

Previous research has examined the portrayal of sex and reproductive health in primetime television; one of the most common sexual health issues scholars have examined is the portrayal of sexual risks and responsibilities on television, particularly teenage pregnancy, contraceptive use, and abortion (Aubrey et al., 2014; Behm-Morawitz et al., 2019). Studies reveal only limited information regarding on-screen portrayals of contraceptives, birth control, abortion, and STDs. For instance, Lance et al. (2012) analyzed 35 episodes of the reality show *16 and Pregnant* and found that, among the 35 episodes, all the teens experienced unplanned pregnancies; no episode showed a teen who opted for abortion. Moreover, although episodes of *16 and Pregnant* often included mention of birth control, the series rarely offered information about the need for birth control after birth.

Similarly, Hust et al. (2008) assessed *Whose Line Is It Anyway?*, *American Pie*, *Seventeen*, and *OutKast* using quantitative and qualitative content analysis. The authors found that the shows rarely mentioned STDs and thus failed to promote safe sex. Of the 446 sexual mentions in these shows, STDs were mentioned only 51 times and were largely depicted as funny and embarrassing. In addition, the shows portrayed teens as feeling ashamed to seek medical help when they experienced STDs; even for those shows that had an urgent tone and portrayed STDs as a common sexual health problem, the producers mostly drew attention to the stigma of having STDs as preventing people from seeking help (Pariera et al., 2014).

Gender stereotypes and bias regarding sex and sexual health responsibilities are also present in television shows. While boys are scripted as being obsessed with sex and sexual performance,

girls are portrayed as being responsible for pregnancy, contraception, and STD prevention (Hust et al., 2008). Kim et al. (2019) suggest that men are consistently portrayed as treating women as sex objects and being consumed by sexual thoughts, fantasies, and urges. Television shows portray men as being free to openly discuss their sexual desires with their friends; men are regarded as sex initiators, often through dubious or forceful means (Kim et al., 2019). Some television shows represent women as being responsible for keeping relationships by maintaining their fitness and looking attractive. Men are portrayed as independent and desiring sexual fulfillment more than intimacy, whereas women are shown to be more in need of relationships and often judged by their sexual conduct (Kim et al., 2019).

Negative portrayals of LGBTQ+ communities are also pervasive in mainstream television, which often contains stereotypes, jokes, and insults about minority gender and sexual identities while overrepresenting heterosexuality (Bond, 2015). Positive representations included LGBTQ+ people overcoming the obstacles of coming out to friends and families, talking about sexual experiences, dealing with physical attraction, and normalizing minority gender and sexual identities (Bond, 2015). One study found that media framing of LGBTQ+ individuals was characterized mainly by a focus on the fight for equal rights, a victimization frame, a deviance frame, a religion frame, and an abnormality frame (Jacobs & Meeusen, 2020). The victim frame focuses on labeling LGBTQ+ communities as victims of discrimination and physical violence. The deviance frame describes the portrayal of LGBTQ+ people as being in unstable relationships, being susceptible to HIV/AIDs, having sex with minors, and engaging in inappropriate sexual behaviors. The religious frame draws on religious arguments regarding the acceptance and endorsement of LGBTQ+ people in different religions such as Christianity and Islam. The abnormality frame depicts LGBTQ+ identity as a mental disease or problem. Jacobs and Meeusen (2020) contend that these frames have implications in normalizing and increasing stereotyping and negative attitudes toward sexual minorities.

Television shows often include portrayals of unhealthy sexual behaviors but erase the consequences of such behaviors. Some of the most common on-screen sexual behaviors among teenagers include teenagers engaging in casual sex, having multiple partners, cheating on their partners, and having sex without love or on the first date. In one study, young adolescents were portrayed as people who enjoyed sex without love and had multiple sexual partners. Depictions of casual sex as part of a committed relationship were a norm in most television programs, as were instances of casual sex within noncommitted relationships (Timmermans & Van den Bulck, 2018). In a similar study, researchers found that portrayals of the emotional consequences of sex and relationships, including consequences of adultery or sexual violence, are scarce in television programs (Carpentier et al., 2017).

Sexual violence against women and the LGBTQ+ community is another essential sexual health issue often portrayed in television dramas. Depictions of force in sexual interaction are common in television shows and can influence how society normalizes sexual violence and treats victims of sexual assault or battery (Gökulu, 2013). For example, Joy (2019) found that the highly rated show *Breaking Bad* depicted frequent implicit and explicit instances of the main

character, Walter White, isolating, degrading, exploiting, frightening, and controlling his wife through domestic abuse and sexual violence; the author argued that the show reinforced a culture of misogyny and victim-blaming. In contrast, critics of *Game of Thrones*, another widely popular television series, have argued that including rape scenes was necessary to educate viewers about the realities of rape in a historical context (Thompson, 2017).

Theoretical perspective

This study is grounded in social cognitive theory and framing theory, two theories of mass communications. The theory of social cognition argues that “media portrayals can alter perceived social sanctions by the way in which the consequences of different styles of conduct are portrayed” (Bandura, 2001, p. 277). Bandura (2001) recognized that the emotional expressions of others move people, and observers can attain long-lasting attitudes, emotional reactions, and behaviors toward persons, places, or things that have been associated with modeled emotional experiences. More recent studies buttress Bandura’s assertion that mass media, and especially television, serve as models for people to learn how to perform behaviors (e.g., Mitchell et al., 2021; Żerebecki et al., 2021).

Social cognitive theory has been used to design interventions to promote healthy lifestyles and behavioral change among those people most likely to be affected by health issues (Joseph et al., 2017; Ortiz & Harwood, 2007). This theory also may be used to predict entertainment media consumption, including its positive and negative effects (LaRose & Eastin, 2004). Scholars have widely used social cognitive theory to investigate relationships between exposure to sexual content in the media and real-world sexual behaviors, including sexual consent, violence, and initiation (e.g., Kelly, 2010; Kim et al., 2019; Martino et al., 2005; Medley-Rath, 2007).

This study also is grounded in framing theory, which explains the relationship between media construction of meaning and public opinion (Scheufele, 1999). Framing theory suggests that the manner in which issues are framed determines how viewers interpret and react to those issues (Tewksbury & Scheufele, 2009). According to Entman (1993), frames define problems, identify causes, diagnose judgments, suggest remedies for the problems, and predict their effects. This study emphasizes textual frames, or the “presence or absence of certain keywords, stock phrases, stereotyped images, sources of information, and sentences that provide thematically reinforcing clusters of facts or judgments” (Entman, 1993, p. 52).

Framing in television also has the potential to promote negative and oppressively normative sexual behaviors. For example, Smith (2012) found that television shows framed teen girls’ desires as focused on romance, attachment, and love and conveyed that such needs should be calm, passive, and heterosexual. Also, Creager (2019) revealed that some LGBTQ+ films are framed to reinforce heterosexuality and increase stereotyping of men who have sex with men. In another study of teen television dramas, Kelly (2010) ascertained that virginity was framed in three ways: as a valuable gift to be given to a deserving partner, as a stigma and something to get rid of to fit into the social status, and as a sexual status that people would eventually abandon.

These kinds of depictions suggest that media frames can be powerful influences on behaviors that lead to common sexual health problems American teenagers face. Because some sexual health frames are problematic while others may promote healthy sex, it is crucial to examine Netflix's show *Sex Education* to determine whether its content differs from previously studied media content or reinforces previous findings.

RQ: How does *Sex Education* frame modern teenagers' sexual health issues and how does this framing relate to previous research about the negative influence of television shows on teenagers' sexual health?

Method

The main objective of this study was to determine how the framing of sexual health issues in *Sex Education* compares to previous research about the negative influence of television shows on teenagers' sexual health. The frames focus on critical sexual health concerns such as teenage pregnancies, birth control use, STDs, sexual identities, sexual violence, masturbation, and virginity loss. Thus, this study deploys a qualitative framing analysis to emphasize the meaning of the messages delivered to the show's audience rather than the amount of coverage each topic received. The qualitative framing analytical method allows for a discussion of how meanings and ideologies are transmitted through storytelling and drama.

Frames are not issues, story topics, or themes, but rather general patterns that can be applied to various issues (Dahinden, 2005). While issues, topics, and themes categorize stories by their subjects (e.g., crime, welfare, or economy), frames lend insight into patterns of emphasis, interpretation, and exclusion in stories (Carragee & Roefs, 2004). According to Dahinden (2005), frames typically comprise problem definition, causal interpretation, moral evaluation, and treatment recommendation.

Because this study examines the subjective frames of the characters in the show, generalizability is not a motive for this research. The study employs five predetermined frames as proposed by Entman (1993) to analyze media representation of health issues, including the problem, causative, consequence, solution, and responsibility frames. However, within these predetermined frames, the researcher also identified subframes as they emerged from the data to better reflect the unique elements of *Sex Education* when compared to what others have found in previous studies of sexual content on television.

To date, *Sex Education* has produced two seasons and each season has eight episodes, totaling a data set of 16 episodes to be analyzed in this study. There were 17 main characters and 27 recurring characters in the show, and the characters were predominantly teenagers, their parents, and their friends. The unit of analysis for this study was the storyline—a series of events related over several episodes. Framing analyses of sexual health narratives are better understood when storylines are used as the unit of analysis, as opposed to program or scene analysis (Kelly,

2010). In *Sex Education*, storylines conveying sexual health information portrayed characters making sexual health decisions or seeking advice from a sex therapist, friend, or parent about sex; this study considers both sexual talk and behavior.

The researcher used the constant discovery tenet of qualitative research to analyze the 16 episodes of *Sex Education* (Gore-Gorszewska, 2020). To do so, the researcher first watched each episode twice, following the storyline scene by scene, and taking notes based on the discussions and behaviors characters exhibited regarding their sexual health. Conversations, quotes, and phrases were recorded. After taking down the notes, the researcher watched the episodes again, searching for new frames that may have been missed. The researcher then manually connected each quote, phrase, and conversation to the frames identified in the series. Eventually, frames for each health issue were developed based on storylines portrayed in the show (Shenton, 2004). The qualitative research method is rich in identifying statements, quotes, or phrases that characterize the differences in the portrayal of sexual health issues in *Sex Education* and other shows studied in previous research.

Results

Overall, the researcher found five dominant types of sexual health frames present in the *Sex Education* television series. These frames are the problem, causative, responsibility, consequence, and solution frames. Each of these frames generated interesting subframes, as explored below.

Problem frame

This study found that *Sex Education* depicted sexual health problems facing teenagers in the United States and Britain to include teenage pregnancy, sexual violence, contraceptive use, abortion, STDs, queerness, masturbation, and virginity loss. In terms of framing, these sexual health problems were framed in three unique ways: as institutional, social, or individual problems.

The institutional frame refers to the roles of educational, religious, health, and family institutions in regulating the rate of sexual health problems among teenagers. This finding was observed in the characters of health professionals, peers, parents, teachers, headmasters, and the preachers, who, in their roles, were supporters or opposers of some of the teens' sexual behaviors. The framing of sexual health issues as a social problem suggests that sexual health issues are common and that teenagers and their peers often discuss and commiserate about such problems. For instance, several scenes showed that sexual violence and body dissatisfaction were common among young girls.

In the individual frame, the show revealed that even though these problems are common, teenagers encounter them and are affected differently. For example, Otis was worried about his

inability to masturbate despite watching pornography and viewing sex magazines. In season 2, episode 4, an unnamed student was concerned he had masturbated so much that his penis had run out of erection (Nunn & Taylor, 2020b). Yet another needed help because his pubic hair had grown out of control. One girl asked if she could get pregnant from oral sex, and a boy asked why he had a “fermented penis.” There were also inquiries about anal sex, oral sex, and menstruation in the same episode (Nunn & Taylor, 2020b). *Sex Education* reveals that, depending on context, sexual health issues can be an institutional, social, or individual problem.

Causation frame

The causation frame represents the causes of sexual health issues identified in the series. Four types of causative frames were identified: shame, desperation, stereotypes, and negligence.

The shame frame appeared several times throughout the show. For instance, in season 2, episode 1, Owen was ashamed to reveal to his two sexual partners that he had likely given them an STD (Nunn & Taylor, 2020a). In season 2, episode 7, Ruby was ashamed to purchase emergency contraceptives after engaging in unplanned, unprotected sex with Otis (Nunn & Taylor, 2020c). In season 1, episode 4, yet another depiction of shame involved Otis’ embarrassment while disclosing that he was a virgin to his crush, Maeve (Neal, 2019).

The desperation frame was exemplified by the character of Lily, who was so desperate to lose her virginity that she asked Eric and Otis to have sex with her on different occasions in season 1, episode 3 (Goodhart & Taylor, 2019) and episode 4 (Neal, 2019), respectively.

The stereotype frame involved scenes and storylines in which abortion was negatively stereotyped by religious institutions. For instance, in season 1, episode 3, Maeve visited a clinic to get an abortion and religious activists at the clinic entrance accused her of murder (Goodhart & Taylor, 2019). Another stereotype throughout the show was evident in Ruby’s belief that people would assume that she was promiscuous if they saw her purchasing emergency contraceptives.

The negligence frame was depicted in the scenes where teens were seen engaging in irresponsible actions such as getting drunk at a party to the point that sexual intercourse happened without consent. For example, in season 2, episode 7, Otis and Ruby got drunk and had sex after Otis hosted a party at his house, but neither remembered the ordeal later (Nunn & Taylor, 2020c).

Sex Education suggests that sexual health problems among teenagers may be rooted in the public perception of some common sexual health issues such as STDs, virginity, and abortion.

Solution frame

The solution frame describes solutions to sexual health issues presented throughout *Sex Education*. Four types of subframes were categorized as solutions to tackling sexual health issues: diffusing stigma, normality, acceptance, and seeking help.

The diffusing stigma frame was exemplified by scenes and storylines encouraging destigmatization of abortion, STDs, masturbation, homosexuality, virginity, and contraception. For example, in season 2, episode 1, when students learned that some girls who attended the school had been infected with chlamydia, many started to wear face masks and avoid the girl accused of spreading the disease (Nunn & Taylor, 2020a). School officials invited Jean, a sex therapist, to an emergency parent meeting to make recommendations for sex education. Jean suggested that the sex education curriculum should include programs that decrease the stigma and unwarranted shame associated with STDs. In season 2, episode 6, Otis encouraged Aimee, who was engaged in casual sex with multiple partners, to masturbate because it would help her identify the pleasure points in her body without the need for multiple partners (Goodhart & Taylor, 2020).

The normality frame refers to the framing of homosexuality as something that cannot be faked or rejected. This finding was exemplified through the characters of Adam, Ola, and Lily, who experienced sexual incompatibilities in heterosexual relationships. Though it required a process of denial before each accepted their own sexuality, each ultimately found they enjoyed being in homosexual relationships. The normality frame also applied to masturbation, though not always in a positive manner. *Sex Education* depicted that it was normal for one to masturbate even in public or to be triggered to masturbate by non-human objects such as trees and cats. This example of framing likely involves an element of satire given that *Sex Education* is a comedy-drama; in this type of show, some of the framing of sexual health topics may not be presented in a sincere or straightforward manner.

Eric Effiong, a gay character who is a funny, loyal friend to Otis, exemplified the acceptance frame. The frame suggests that one of the solutions to preventing sexual violence against LGBTQ+ communities is for people to accept different sexualities as the norm. The show reveals that Eric had come out as gay when he was 13. He dresses in bright colors and often wears makeup and jewelry. Everyone is accepting of Eric; his parents and siblings are aware of his sexuality and supportive. Eric also attends a church where the pastor and other church members genuinely love him. In season 2, episode 7, the pastor demonstrated acceptance by welcoming Eric into the church with a hug, telling the teen that the church was his home (Nunn & Taylor, 2020c).

Finally, the seeking help frame hinges on the importance of speaking out when faced with sexual violence. In season 1, episode 5, when Ruby's faceless nude picture was leaked online, she sought the help of her friends Maeve and Otis, who helped her to track down the perpetrator (Goodhart et al., 2019). Another scenario in season 2, episode 3 illustrated the importance of reporting sexual harassment; after Aimee experienced sexual harassment from a man who ejaculated on her on the bus, Maeve took her to the police to report the incident (Goodhart, 2020).

Responsibility frame

Two types of responsibility frames were identified in the show, including birth control as a requirement before sex and birth control as the equal responsibility of both sexual partners. Numerous scenes showed characters revealing, before or after sex, the condoms they would use or have used; other scenes centered on conversations about the implications of not using condoms. For instance, in season 1, episode 6, Otis tried to have sex with Lily, a girl who is desperate to lose her virginity. Both appeared clueless on how to begin the act, but the scene also showed that although they were sex novices, Lily gets a condom from her bag (Nunn et al., 2019). A more straightforward example appeared in season 2, episode 2, when sex therapist Jean Milburn lectured students about their right to decline sex with partners who refuse to use contraception (Nunn et al., 2020).

The second theme, birth control as the responsibility of both sexual partners, was depicted in season 2, episode 7, when Otis and Ruby went to the store together to purchase a morning-after pill. Both were critically concerned about the implications of having an unplanned pregnancy and they jointly answered the questions posed by the pharmacist (Nunn & Taylor, 2020c).

Consequence frame

Sex Education reveals two types of consequence frames: the psychological and physical consequences of sexual violence, infidelity, and casual sex.

The psychological consequence was depicted in season 2, episode 4, where Aimee was psychologically traumatized after a man masturbated on her while riding the bus, ruining her best jeans and the cake she had baked for Maeve (Nunn & Taylor, 2020b). The storyline portrays Aimee as having been so deeply traumatized that she stopped taking the bus to school and chose to walk instead; she became hyperalert and could not even tolerate her boyfriend's touch. Aimee also cried frequently but could not confide in her mother.

Another psychological consequence was the impact of Otis's father's infidelity on his son. The infidelity cost the couple their marriage and greatly affected Otis, who witnessed his father sleeping with his mother's friend (Nunn et al., 2019). Later, during the scene in which Otis and Lily attempted to have sex for the first time, Otis suffered a panic attack as he flashed back to his father's infidelity.

In terms of physical consequence, *Sex Education* included an account of Eric's experience with sexual violence. Eric, one of the show's gay characters, was walking home from the bus station when three men in a car stopped him, mocked his flamboyant appearance, and physically assaulted him. This experience caused Eric to isolate himself and question his sexuality (Nunn et al., 2019).

Elements of Jean's life also portrayed the physical consequences of casual sex, in that Jean, an older woman with multiple sexual partners, became pregnant. Jean's pregnancy was surprising to the other characters and the audience because she was a sex therapist and should

have been versed in knowledge about contraceptive use. The physical consequence of infidelity also appeared in season 2, episode 4, where Otis's father cheated on his second wife and was kicked out, leaving him homeless and desperate as a result (Nunn & Taylor, 2020b).

While *Sex Education* includes characters who have abortions, these scenes are notably not framed as psychological and/or physical consequence. Though the show depicted vital facts about abortion, it failed to highlight the real-world emotional and physical consequences of abortion that many people endure.

Discussion and conclusions

This study of *Sex Education* supports the five basic frames—problem, causation, solution, consequence, and responsibility—originally proposed by Entman (1993). Surprisingly, these frames revealed new findings quite in contrast to previous research into sexual health portrayals on television (Aubrey et al., 2014; Behm-Morawitz et al., 2019; Lance et al., 2012). While previous researchers have found that television shows frame sexual health issues in ways that do not encourage positive sexual behaviors, this study revealed that *Sex Education* contained positive teachings about many sexual health problems that U.S. and British teenagers face.

The framing of sexual health topics in *Sex Education* has several implications for public interest communications. Studies of framing in popular television can reveal how public understandings of topics related to sexual health, for example, are evolving and can inform future health messaging campaigns for various audiences. It was earlier stated that U.S. teenagers may rely heavily on television and similar media for sex education due to the foundational issues of limited sex education in schools and nongovernmental institutions (Edwards, 2016). Thus, framing sexual health issues in the context of causes, solutions, responsibility, and consequences could benefit those public interest communicators seeking to encourage teenagers to make healthier choices. For instance, following the tenets of social cognitive theory, if viewers observe frequent use of condoms on television, they might imitate these actions when they face similar real-world situations (Bandura, 2001). Likewise, for teens who might be reluctant to decline sexual intercourse with a partner who chooses not to use contraceptives, the show provides models to teach that it is safer to decline than to engage in unprotected sex.

Understanding how popular television treats sensitive sexual health topics like abortion may also be of use to public interest communicators and future public health campaigns. For example, in contrast with previous research, *Sex Education* highlighted abortion as a viable option for dealing with unwanted pregnancy. Lance et al. (2012) found no portrayals of abortion in 35 episodes of *16 and Pregnant*. This difference may reflect the stricter abortion laws in the United States, where *16 and Pregnant* was produced, compared to those in Britain, where *Sex Education* was produced (Zornosa, 2021). It is also possible that, at the time *16 and Pregnant* was first produced in 2009, the general U.S. population was more conservative regarding abortion (Pew Research Center, 2009). *Sex Education* reflected on the stigma of

abortion and the judgment religious groups cast on abortion providers and recipients, a potential point of interest for public interest communicators working with such topics. The show also suggested that choosing to have an abortion can symbolize strength; through the character of Maeve, *Sex Education* frequently portrayed female strength in coping with stigmatized sexual health challenges (Joseph et al., 2017; Ortiz & Harwood, 2007).

The show also revealed the need for health care practitioners to provide better care and support for people seeking abortions by equipping them with emotional and physical support rather than inciting feelings of shame and regret. The show's sympathetic portrayal of young people seeking abortion could also help increase viewers' empathy and reduce stigma toward people who choose abortion over, for instance, adoption. However, the lack of emotional impact displayed by the show's characters who have abortions may downplay the real-world phenomenon of abortion guilt. Emphasizing negative consequences of abortion could impact teenagers' perceptions of the issue by, for example, underscoring the importance of contraceptives.

Another concerning element of the show was its suggestion that people might be ashamed to use emergency contraceptives after unprotected sex. For example, in season 2, episode 7, Ruby, who had unprotected sex with Otis in a drunken state, could not comfortably express her needs to the unapproving pharmacist selling emergency contraceptives (Nunn & Taylor, 2020c). Also, while previous research suggests that television shows typically present contraception as a woman's responsibility (Kissling, 2017), *Sex Education* was unique in its portrayal of both partners' responsibility in the decision to use the morning-after pill.

STDs were framed in the context of diffusing stigma to establish that people with STDs should be sincere with their sexual partners to enhance treatment and prevent further spread. This representation may encourage viewers to learn more about STDs and help reduce the stigma of STD diagnoses. It is not uncommon for people to feel ashamed when infected with STDs, but it becomes problematic when they do not seek treatment or inform their sexual partners. *Sex Education* has the potential to increase awareness about STDs and inform related health messaging; this is an important consideration especially because STD rates are at an all-time high in the United States (Keller, 2020). The show also depicted a lack of knowledge about STDs and highlighted the need for overhauling high school sex education curricula to reflect the importance of dialogue, trust, and truth.

Teenagers tend to learn about sex and sexual health from their parents and high school sex education teachers (Shtarkshall et al., 2007). However, from 2006 to 2013, there was a significant decline in U.S. high school instruction and parental communication about birth control, HIV/AIDs, and STDs (Lindberg et al., 2016); instead, sex education in U.S. high schools continues to emphasize abstinence (Hall et al., 2016). *Sex Education* suggests the potential of a more conversational, individualized education within British and U.S. high schools.

Previous research suggests that primetime television shows emphasize heterosexuality over homosexuality (Creager, 2019); even when nonheterosexual characters appear in shows, they are often portrayed as lacking self-esteem (Bond, 2014). *Sex Education* is different in that

homosexuality is portrayed for both women and men, and most of the gay characters are confident. The character, Eric, is perhaps the best example of this trait. The show consistently presents homosexuality as natural and acceptable to God, thus contradicting previous research suggesting that LGBTQ+ characters largely lack self-confidence or represent abnormality (Bond, 2015; Creager, 2019). Eric was inspired by a church sermon to accept and love his sexuality; he even invited his friend, Rahim, to the church to convince him that God loves LGBTQ+ people. These on-screen scenarios may be influential in both reducing real-world hate crimes targeted at people of gender or sexual minority identities and increasing the self-confidence of LGBTQ+ viewers. Drawing on Bandura's (2001) theory, parents who find it difficult to accept their LGBTQ+ children may also be motivated toward greater love, acceptance, and respect, as demonstrated by Eric's parents. Given the frequency of anti-LGBTQ+ hate crimes in the United States (Ronan, 2020), representing marginalized groups on screen in a positive manner, as people who are proud of themselves and who are largely accepted by society, may help create similar feelings even among more conservative viewers.

Studies about sexual violence on television often have focused on rape (Elwood, 2018; Joy, 2019; Thompson, 2017), but in *Sex Education*, the audience sees how teenagers struggle with cyberbullying and sexual harassment and how such practices often go unpunished. Because the series has not yet concluded, it is yet unknown whether the sexual harassment victims will eventually find justice. Nevertheless, the show attempts to educate viewers about the varied adverse effects of sexual harassment. Lee et al. (2010) suggested that television portrayals of sexual violence can inform viewers about the reality of victims' lived experiences and recourses for dealing with assault. *Sex Education* offers strategies for combatting sexual harassment and cyberbullying, such as seeking help from the authorities and discussing experiences with therapists, family, and friends. Unlike *Game of Thrones* and *Breaking Bad* (Abi-Khalil, 2020; Puthillam & Karandikar, 2020), *Sex Education* highlights the importance of social consent for sexually active teenagers.

Where previous research has described virginity on television to be stigmatized (Kelly, 2010), the framing of virginity in *Sex Education* appeared to destigmatize sexual inactivity in the face of the social pressures teenagers often face. *Sex Education* attempted to shift the reoccurring narrative that it is abnormal to still be a virgin at 16 years old.

Some of the portrayals of masturbation in *Sex Education* might negatively impact viewers because masturbation was frequently framed as an activity that teenagers can perform frequently in closed and open spaces, and as a sexual act that can boost sexual confidence. Such portrayals might encourage teenagers to imitate such behaviors, which may be damaging to their emotional and physical health. Nevertheless, by portraying female masturbation, *Sex Education* may help to reduce associated social stigma (Robbins et al., 2011).

In *Sex Education*, the topics of divorce and pregnancy were often framed in terms of consequences (Carpentier et al., 2017), but the show largely omitted the emotional consequences of sex itself. In future seasons, the show could include the mental health challenges of sexual

intercourse and break-ups, such as constantly thinking about sexual partners, losing appetite, or losing focus and attention.

Drawing from social cognitive theory, this study concludes that, where some television programs may provide unhealthy models for audiences, *Sex Education* instead has the potential to help viewers unlearn unhealthy scripts related to sexuality and sexual health in favor of more positive examples, such as voicing concerns about sexual health and maintaining open dialogue even about sensitive topics. Overall, this study builds on public interest communications theory by highlighting the role that popular media like *Sex Education* can play to destigmatize modern sexual health issues and model healthier behaviors for viewers.

Limitations of the study

One fundamental limitation of this study is that it presents sexual health issues raised from only one television series such that the interpretations in this article are not generalizable. A larger sample of media geared toward teenagers has the potential to generate richer narratives. However, given the popularity and the target audience of *Sex Education*, this framing analysis proved useful in highlighting a singular case of media and how it frames modern issues related to sexuality and sexual health.

Another limitation is that this study does not include any opinions from viewers, and especially teenage viewers. The prominence of frames in a text does not guarantee that they also resonate with various subsets of viewers (Entman, 1993). For instance, how homosexuality is framed in *Sex Education* may not be acceptable to a conservative viewer. While frames cannot guarantee how a reader will interpret or comprehend an issue or text, they “play a fundamental role in structuring the range of likely decodings” (Greenberg & Knight, 2004, p. 157), often in ways that support dominant ideologies (Foust & O’Shannon Murphy, 2009). This study is based solely on the long-standing argument that television producers cannot make educational programs dramatic, engaging, and emotional (Collins, 2004; Dajches et al., 2021; Timmermans & Van den Bulck, 2018).

Future research could consider viewers’ perceptions of *Sex Education* as well as its impact on teens’ beliefs, attitudes, and behavioral intentions related to sexuality and sexual health. Similarly, researchers could study other teen drama series on Netflix to compare representations of sex and sexual health issues across series. It is vital to investigate whether the platforms that air teen programs influence the nature of the sexual content shown. For example, a show such as *Sex Education* likely would not be picked up by major U.S. television networks (e.g., ABC, NBC, CBS), but it would be something viewers might see on cable networks or streaming platforms.

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