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Electronic Cigarette Companies' Twitter Messages: Public Interest (Mis)communication

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Abstract

Despite increased controversies over the health effects of electronic cigarettes (e-cigarettes), little is known about how the public interest issue has been discussed by e-cigarette companies on social media. Using arguments from the theory of planned behavior as a guide, this study examines how e-cigarette companies engage with potential customers on Twitter. Using quantitative content analysis, this study examined 525 tweets from the top five e-cigarette companies that occurred between July 9, 2016, and September 9, 2016, one month before and after the U.S Food and Drug Administration implemented a new regulation limiting sales and distribution of tobacco products to minors. Results indicate that the deeming did not affect e-cigarette companies' message strategies on Twitter. Theoretical and practical applications for public interest communications are discussed.

Introduction

A growing scholarly interest in strategic communications and social causes has resulted in the emerging field of public interest communications, which seeks to increase positive behavioral changes in public interest issues (Fessmann, 2017). Health communications is a particularly important area of public interest communications (Demetrious, 2017; Downes, 2017). As such, researchers have examined some companies' efforts to change consumers' attitudes toward products that impact their health (Dixon, Scully, Wakefield, White, & Crawford, 2007). Results,

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however, have not always had the desired behavioral outcome. For example, Wagner and Sundar (2008) found that anti-drug campaigns designed to reduce teenagers' illicit drug use instead increased participants' curiosity about drug use.

For decades, research has shown that exposure to cigarette advertisements can lead to misperceptions about the danger of smoking cigarettes (Dube, Arrazola, Lee, Engstrom, & Malarcher, 2013). For example, the creation of "low tar" cigarettes was touted by the American Cancer Society in the 1970s as a healthier cigarette (Rodu, 2016). Electronic cigarette (e-cigarette) companies have followed suit by promoting their products as a healthier choice than regular cigarettes and as a socially acceptable product (Grana & Ling, 2014). Nevertheless, despite the companies' best efforts, e-cigarettes remain controversial. Is "vaping" another recreational endeavor for tobacco smokers? Or is it a cessation device that can help smokers make a permanent behavioral change and quit smoking?

These contrary communication messages have been overt on Twitter. While companies like Outbrain and Taboola have revolutionized paid content on traditional news sites through native advertising initiatives, e-cigarette companies have taken it upon themselves to promote their products directly to consumers via original and retweeted tweets—even while the FDA considers whether e-cigarettes are a public health threat and need extra regulation, particularly in their public communication strategies.

E-cigarette companies have employed sophisticated messages that are ambiguous and often conflicting (Cole-Lewis et al., 2015). Initially regulated only loosely, the e-cigarette industry has recently experienced increased restrictions. A major change occurred on August 8, 2016, when new regulations were set in motion to regulate how e-cigarette companies could communicate to potential consumers. It is not clear how marketers have viewed and understood these restrictions within the social media space. However, a growing number of researchers have begun to argue that e-cigarette marketing on social media has not been closely monitored or regulated (Phua, Jin & Hahm, 2017).

Despite increasing regulatory efforts to prevent e-cigarette companies from promoting their products, social media could be a place to get around such policies, and thus harm public health (Vance, Howe, & Dellavalle, 2009). Therefore, this study seeks to better understand this conundrum. Given the proliferation of social media content created by e-cigarette companies, this study focuses on how the top five e-cigarette companies have used Twitter as strategic communication. Using quantitative content analysis, this study examined 525 tweets that occurred between July 9, 2016, and September 9, 2016.

Literature review

E-cigarettes are battery-powered devices that contain varying amounts of nicotine, propylene glycol, and flavorings (Grana, Benowitz, & Glantz, 2014). Awareness and use of e-cigarettes in the United States have skyrocketed in the past few years (Huang, Kornfield, Szczypka, & Emery,

2014; Lazard, Saffer, Wilcox, Chung, Mackert, & Bernhardt, 2016). In particular, Mantey Cooper, Clendennen, Pasch, & Perry, 2016) noted e-cigarettes are now the most popular tobacco products for American young adults. According to the U.S. Centers for Disease Control and Prevention, the number of adolescents who used e-cigarettes exceeded those who smoked tobacco cigarettes in 2014 (Rifkin, 2015). Despite the widespread use of e-cigarettes, the potential health effects (healthy or harmful) remain contested. For example, D’Ruiz, Graff, and Robinson (2016) found that smokers who completely or partially replaced smoking with vaping e-cigarettes over five days were less likely to expose themselves to harmful smoke toxicants. However, other studies demonstrated that there was no clear relationship between the use of e-cigarettes and smoking cessation (Grana, Popova, & Ling, 2014).

Researchers have found that e-cigarettes contain toxicants, such as acetone, isoprene, and nicotine (Schripp, Markewitz, Uhde, & Salthammer, 2013). Although some e-cigarette products do not contain nicotine, Krishnan-Sarin, Morean, Camenga, Cavallo, and Kong’s (2014) study found the use of such products significantly increased users’ exposure to propylene glycol and glycerol. Despite the general view that these substances are safe, the researchers pointed out that these products should be closely assessed to inform regulations because there is insufficient evidence supporting these substances as safe when inhaled through e-cigarette vapor rather than ingested, such as in food.

Researchers have found no clear relationship between the use of e-cigarettes and smoking cessation (Grana, Popova, & Ling, 2014). Rather, studies have shown that e-cigarettes have the potential to increase tobacco cigarette use by renormalizing smoking by completely reducing individuals’ motivation to quit smoking (Hajek, Etter, Benowitz, Eissenberg, & McRobbie, 2014). Furthermore, researchers and health advocates have shown concerns about youth and young adults’ use of e-cigarettes by pointing out that using e-cigarettes could lead them to experiment with other tobacco products (Bahl, Lin, Xu, Davis, Wang, & Talbot, 2012).

Theory of planned behavior

The theory of planned behavior (TPB) expands on Ajzen and Fishbein’s (1980) theory of reasoned action by aiming to “predict and explain behaviors that are not under the volitional control of the actor” (Hale, Householder, & Greene, 2002, p. 277). Ajzen (2005) asserts that the theory of planned behavior is based on intentions. That is, “a person’s intention to perform (or not to perform) a behavior is the most important immediate determinant of that action” (p. 118). The theory of planned behavior adds a new element by considering perceived behavioral control as a factor that predicts behaviors. This concept originates from Bandura’s (1978) social learning theory (SLT), which argues that subjects can learn about something simply by observing the phenomena.

TPB has been tested with the various context of individuals’ health behavior such as e-cigarette use (Cooper, Case, Loukas, Creamer, & Perry, 2016), smoking (Harakeh, Scholte, Vermulst, de Vries, & Engels, 2004), and smoking cessation (Moan & Rise, 2006). Cooper et al.

(2016) found that individuals are more likely to use e-cigarettes when they perceive lower levels of harm from e-cigarettes and higher levels of peer use of e-cigarettes. SCT posits that individuals' outcome expectations from a particular behavior are continually influenced by their own experience and observation of the consequence of others' behaviors (LaRose & Eastin, 2004). In particular, scholars have investigated how the media affect individuals' health behaviors by stimulating social and cultural changes regarding certain health behavior (Yanovitzky & Stryker, 2001). Numerous studies have shown that individuals' exposure to cigarette advertisements attenuates their perceived harm of tobacco product use (Emery et al., 2005). In particular, researchers have argued that promoting e-cigarettes as a safer alternative to combustible cigarettes increase young adults' e-cigarette use (Pokhrel, Fagan, Kehl, & Herzog, 2015).

While often applied to the content of television shows (Paredes, Cantu, & Graf, 2013; Starr & Ferguson, 2012), SLT also helps explain the content of social media including Twitter messaging. For example, Moreno and Whitehill (2014) argued that adolescents were influenced by the content they observed about alcohol on Twitter and Facebook. The researchers argued that social media provides a potentially more influential experience than traditional media because the audience can easily choose particular content that most interests them. Likes, retweets, and quoted retweets are all ways that Twitter content producers can encourage their potential customers to not only learn about their products, but engage with the messages, and ultimately, think more favorably toward the particular product and brand. When combined with the Theory of Planned Behavior, it is possible to understand companies' messages on Twitter as a first step toward moving a behavioral outcome. Being exposed to content that encourages a type of outcomes behavior (product trial, for example) has important ramifications for the success (or lack thereof) of a public strategic information campaign.

Over the years, research has consistently shown that positive messages about cigarettes, such as smoking in movies, increases adolescent smoking initiation (Choi, Ahluwalia, Harris, & Okuyemi, 2002; Dalton et al., 2003). Villanti, Boulay, and Juon (2011) found that adolescents' exposure to tobacco advertising was positively associated with former and current smoking behaviors. Researchers have also linked exposure to tobacco advertising with adolescents' smoking initiation (e.g., Akers & Lee, 1996; Villanti et al., 2011).

While previous studies have investigated how tobacco products have been presented in the media and the potential impact of exposure to such media content on adolescents, little is known about how e-cigarettes, specifically, are presented via social media as strategic communication. Strategic communication refers to an organization's purposeful use of communication to advance its mission including different communication management, such as marketing communication and public relations (Hallahan, Holtzhausen, Van Ruler, Verčič, & Sriramesh, 2007). More specifically, strategic communication aims to maximize the desired effects by delivering deliberate messages through the most effective media channels to target publics (Plowman & Wilson, 2018). Researchers have found that organizations incorporate social media into their communication strategies to increase the public's engagement (Linke & Zerfass, 2012). For

instance, researchers have examined the impact of social media message interactivity on consumers' purchase intention (Ott, Vafeiadis, Kumble, & Waddell, 2016) and the relationship between non-profit organizations' social media use and their stakeholders' intention to support the organization via volunteering and donation (Pressgrove & Pardun, 2016). Regarding e-cigarette companies' strategic communication via social media, researchers have found that e-cigarette companies use social media to fulfill various objectives, such as advertising their products (Vandewater et al., 2018) and advocating e-cigarette use (Harris, Moreland-Russell, Choucair, Mansour, Staub, & Simmons, 2014). Therefore, there is a need for more scholarly investigations in this area of research. Given Twitter's capacities to disseminate messages to a large number of audiences, e-cigarette companies and Twitter users who advocate e-cigarette use have actively engaged in Twitter conversations (Chu et al., 2015).

Electronic cigarettes and social media marketing

Researchers have found that social media has become a popular platform to find information about e-cigarettes in recent years (Clark et al., 2015; Lazard et al., 2016; Salloum, Osman, Maziak, & Thrasher, 2015). Studies have revealed that social media users are vulnerable to e-cigarette content (Link, Cawkwell, Shelley, & Sherman, 2015; Mackey, Miner, & Cuomo, 2015). Others have explored various aspects of e-cigarette advertisements: the number of product brands; presence of flavors, levels of nicotine in the products and other ingredients; product claims; description of health-related benefits; volume and topic areas/themes of online marketing; assessing characteristics of online banner/video advertisement; and examining the relationships between affiliate networks and Internet vendors (Cobb, Byron, Abrams, & Shields, 2010; Grana & Ling, 2014; Richardson, Ganz, & Vallone, 2014).

In addition, research has indicated that this increased attention is raising concerns about the potential dangers of e-cigarettes such as finding that exposure to online e-cigarette messages is associated with individuals' intention to try e-cigarettes (e.g., Krishnan-Sarin et al., 2014). Trtchounian and Talbot (2011) argued that e-cigarette online promotion has contained unsubstantiated health claims and erroneous nicotine content labeling. Despite the increasing concerns about e-cigarette social media content, however, little is known about how e-cigarette companies actually use social media to engage with their potential customers.

Due to the increased concern about e-cigarette companies' marketing strategies targeting tobacco cigarette users and nonsmokers, the FDA implemented a comprehensive regulation on e-cigarette companies' marketing in 2016. In the midst of the controversy surrounding the potential health risks of e-cigarette use, calls for increased regulation of this little-understood product led to the FDA's "deeming rule" of August 8, 2016, which allowed the U.S. Food and Drug Administration (2016) to prohibit e-cigarette manufacturers and retailers from selling e-cigarette products to minors. As a result, electronic nicotine delivery systems, such as e-cigarettes, vaporizers, and hookah pens, became regulated by the FDA as combustible tobacco products. In particular, since August 8, 2016, e-cigarette companies have been prohibited from promoting

their products as not harmful or as less harmful than tobacco cigarette products unless they have acquired scientific evidence that demonstrates such effects, approved by the FDA. In addition, e-cigarette companies are prohibited from distributing free samples (U.S. Food and Drug Administration, 2016), as tobacco cigarette companies are. Also, as of August 8, 2018, e-cigarette companies are now required to have nicotine addictiveness warning statements on their products or in advertisements.

Despite the implementation of the deeming rule of 2016, social media marketing has not been closely monitored and regulated by the government (Freeman, 2012; Vance, Howe, & Dellavalle, 2009). Researchers have found that adolescents' exposure to tobacco-related social media content is positively associated with their susceptibility to e-cigarette and combustible tobacco product use (Hébert, Case, Kelder, Delk, Perry, & Harrell, 2017). Given the lack of systematic research about e-cigarette companies' social media use as strategic communication, this exploratory research focuses on the following research question:

RQ1: How do e-cigarette companies present e-cigarettes on Twitter?

Critics of e-cigarettes are quick to associate them with tobacco products and, as such, assume the products are unhealthy and that they require regulations to limit both product sales and the advertising that encourages sales. While the regulation of tobacco cigarette advertising remains somewhat controversial, the majority of studies have argued that the advertising of tobacco cigarettes significantly increases the initiation of smoking (Biener & Siegel, 2000). Even so, tobacco companies have continually argued for the right to promote their products. For example, Hoefges (2013) showed that tobacco companies challenged regulations on tobacco advertising such as the Family Smoking Prevention and Tobacco Act.

The Master Settlement Agreement (MSA) of November 1998 prohibited tobacco companies from targeting youths in marketing (Hamilton, Turner-Bowker, Celebucki, & Connolly, 2002). This historic ruling yielded some important research studies that examined its effect on subsequent tobacco use as well as the change in messaging before and after the agreement. Hamilton et al. (2002) investigated the impact of the MSA on tobacco companies' targeting youths in marketing. The researchers found that the expenditures on cigarette advertisements in national magazines with substantial youth readership increased after the MSA was implemented, whereas the expenditures decreased after the Massachusetts Department of Public Health and the Campaign for Tobacco-Free Kids heavily publicized that cigarette advertising in publications with high youth readership had significantly increased after the implementation of the MSA.

Baek and Mayer (2010) content-analyzed 657 cigarette advertisements from 1994 to 2003 to examine the impact of the MSA on the sexual imagery in cigarette magazine advertisements. The results of Baek and Mayer's (2010) study indicated that the cigarette advertisements containing visual sexual imagery more frequently appeared in the post-MSA period compared to the pre-MSA period. Chung, Garfield, Rathouz, Lauderdale, Best, and Lantos (2002) examined how the MSA influenced youth targeting in magazine cigarette advertisements. The results of the study

revealed that the three major manufacturers did not comply with the banning of youth-targeting advertising implemented by the MSA.

Due to the prevalence of pro-smoking messages in the media and the potential influence on publics, substantial scholarly attention has been paid to cigarette-related product advertising (King & Siegel, 2001). The potential for similar messaging for e-cigarettes may also yield future research and thus connect the impact of both the MSA as well as the recent deeming. Social media enables e-cigarette companies to promote their products and interact with potential customers beyond advertising (Vandewater et al., 2018). Given the lack of systematic research about e-cigarette companies' message strategies on social media, this exploratory study focuses on two additional research questions:

RQ2: How has the FDA deeming rule of August 8, 2016, impacted e-cigarette companies' messages on Twitter?

RQ3: How have e-cigarette companies employed strategic communication strategies that are prohibited for tobacco product advertisements?

Method

Research design

To investigate e-cigarette companies' communication strategies on Twitter, this study examined 525 tweets that appeared on five e-cigarette companies' Twitter accounts between July 9, 2016, and September 9, 2016. To obtain representative samples of e-cigarette companies in the United States, the researchers investigated the lists of popular e-cigarette companies from e-cigarette review websites (e.g., vapingdaily.com and ecigarettereviewed.com) and then cross-checked whether the companies that appeared on the lists were popular among e-cigarette users. The initial search included 10 companies, which have a variety in terms of brands, such as United States-based companies (e.g., Volcano) and brands owned by large tobacco companies (e.g., Blu, which is owned by Imperial Brands). Most companies that appeared in such websites had been examined in previous studies (e.g., Huang et al., 2016; Luo, Zheng, Zeng, & Leischow, 2014) due to their active use of social media. However, of the 10 companies that were identified from the initial search, five companies did not operate an official Twitter account (e.g., Juul) or posted no further tweets after August 8 (e.g., Njoy), which resulted in eliminating five companies. With the remaining five companies, the researchers conducted a content analysis to analyze both textual and visual components of the companies' tweets, specifically with regard to how e-cigarette companies presented their products and the issue of e-cigarette use on Twitter. E-cigarette companies' tweets that used reply functions were not included in this study's sample because pretest results indicated that such tweets were generally e-cigarette companies' responses to their consumers' questions or complaints and were not in the context of strategic

communication. Table 1 provides the volume of tweets posted by five e-cigarette companies before and after August 8.

Table 1. Volume of tweets posted by e-cigarette companies

Company	Tweets before 8/8	Tweets after 8/8	Total
Blu	54 (62.1%)	33 (37.9%)	87
Vaporfi	32 (42.1%)	44 (57.9%)	76
Volcano	48 (38.4%)	77 (61.6%)	125
Vapor4life	42 (47.7%)	46 (52.3%)	88
Whitecloud	71 (47.7%)	78 (52.3%)	149
Total	247 (47.0%)	278 (53.0%)	525 (100%)

Coding scheme

Basic information was analyzed about each tweet such as the date of the tweet, how many retweets and likes each tweet had, and whether the tweet was commercially focused or advocacy focused. In addition, coders recorded whether the tweet was posted before or after August 8, 2016, when the new regulations were put in place.

The FDA's deeming and potential regulatory items

The analysis about current and potential regulatory items were split into two major categories: the FDA's deeming items and potential regulatory items. Coders determined whether tweets complied with the deeming. Coders then decided whether the tweets used persuasive communication techniques that are prohibited for tobacco products. Regarding the deeming, coders examined whether the content indicated distribution of sample items, whether e-cigarettes were presented as a safe alternative to tobacco cigarettes, and whether there was any information about banning sales to minors (1 = Yes; 2 = No). To examine potential regulatory items, celebrity endorsement, the use of cartoon characters, sponsoring music concerts and sport events, and flavoring were analyzed (1 = Yes; 2 = No). The code book was refined and revised through several rounds of discussions and testing using a small portion of the sample.

User engagement

To access Twitter users' engagement with e-cigarette companies' tweets, the number of likes and retweets were measured. Although number of likes and retweets may be somewhat different from individuals' self-reported attitude toward social media content, the two variables have been widely used as a proxy of social media users' levels of engagement in studies that examined Tweets (e.g., Chung & Yoon, 2013; Marozzo & Bessi, 2018). Researchers have pointed out that Twitter users are more likely to retweet others' tweets when they find the tweets interesting (Stieglitz & Dang-Xuan, 2013).

Inter-coder reliability test and coding

Three graduate student coders were trained through coding practices and discussion after the codebook was refined. A mutual understanding of the codebook was achieved before the inter-coder reliability test. To test inter-coder reliability, the three coders independently coded 10 percent of the tweets that were randomly chosen from the sample. Therefore, a total of 56 tweets were selected using a random sampling method to test inter-coder reliability. Coder reliability was calculated using Krippendorff's alpha (Hayes & Krippendorff, 2007). Krippendorff's α for all coding categories ranged from .76 to 0.93 (see Table 2). Thus, the overall reliability was satisfactory. The level of reliability for each coding category reached above the acceptable threshold, .70, as suggested by Lombard, Snyder-Duch, and Bracken (2002). After obtaining acceptable inter-coder reliability, the coders coded the remaining tweets.

It should be noted that inter-coder reliability could not be calculated for three variables (displaying information about the sales of e-cigarettes to minors, the presence of cartoon characters and displaying coupons) because their frequencies were too small to calculate reliability. However, the coding is included because of the particular relevance to the current and potential FDA regulations.

Table 2. Coding variables and inter-coder reliability

Coding variables	<i>Krippendorff's alpha</i>
General Tweet information	
Date (before or after the FDA deeming)	0.84
Nature of tweet	0.87
Number of retweets	0.93
Number of likes	0.92
Advertising techniques	
Embedding retail websites in tweets	0.88
Contest participation	0.86
FDA deeming variables	

Sample distribution message	0.81
Reduced harm claim	0.78
Minor sale information	Undefined*
Potential regulatory variables	
Celebrity endorsement	0.79
Cartoon characters	Undefined*
Flavoring	0.77
Sponsoring concert/sports events	0.81
Discount coupons	Undefined*
Scenario	0.76

* Frequency is too small to determine inter-coder reliability.

Data analysis overview

Pearson's chi-square tests were used to examine e-cigarette companies' message strategies on Twitter. The researchers compared the volume of tweets posted before and after August 8. Tweets' attributes including marketing strategies (e.g., coupons) were also examined across companies. E-cigarette companies' messages that were prohibited by the deeming or were not allowed for combustible tobacco companies were investigated across companies before and after August 8.

As addressed earlier, the number of likes and retweets were used as an indicator of user engagement. Due to the non-normal distribution of number of likes and retweets in the sample data, percentile bootstrapping approach was employed. Bootstrapping procedures provide a less biased point estimate when the data do not show normal distribution (Kelley, 2005). Bootstrapping *t*-tests and one-way analysis of variance (ANOVA) tests enable researchers to test group differences when their data violate assumptions for the tests, such as normal distribution of data and equal variances across groups. In particular, when a group's sample size is drastically different from the other group(s), bootstrap sampling provides an estimate for the mean and standard deviation by randomly selecting cases from the sampled data. When percentile-corrected bootstrap confidence interval does not contain zero, mean differences between groups are considered significant. Independent sample *t*-tests and one-way ANOVA tests with 5,000 bootstrap samples were performed.

Results

Communication strategies on Twitter

Results indicate that e-cigarette companies employed various traditional advertising techniques, such as embedding their retail websites in tweets ($n = 30, 5.7\%$), distributing coupons ($n = 28,$

5.3%), or offering sample products ($n = 13$, 2.5%). Moreover, e-cigarette companies used promotions, such as asking for participation in contests ($n = 18$, 3.4%), or sponsoring music concerts or sports events ($n = 4$, 0.8%). Independent sample t -tests were performed to examine the relationship between the marketing strategies and Twitter users' engagement. The tweets displaying a retail website ($n = 30$, $M = 2.03$, $SD = 2.57$) were less likely to receive likes from Twitter users when compared to the tweets that did not depict a retail website, $n = 495$, $M = 7.53$, $SD = 19.99$, $t(523) = -5.50$, $p < .001$, 95% CI = (-7.55, -3.66). The relationship between displaying retail websites was not associated with the number of retweets, $t(523) = -5.42$, $p = .10$, 95% CI = (-11.28, 1.73). Twitter users were less likely to share tweets that distributed a coupon ($n = 28$, $M = 2.86$, $SD = 12.22$) than tweets without a coupon, $n = 497$, $M = 13.20$, $SD = 24.33$, $t(523) = -4.05$, $p < .01$, 95% CI = (-14.36, -4.55). Twitter users were less likely to click likes on tweets distributing a coupon (tweets embedding coupons: $M = 2.43$, $SD = 4.38$, tweets without coupons: $M = 7.48$, $SD = 19.95$, $t(523) = -5.06$, $p < .01$, 95% CI = [-7.48, -2.63]).

Presentation of e-cigarette use

Regarding the scenario of tweets, approximately two-thirds of the tweets were identified as occurring in a "social/every day" context ($n = 338$, 64.4%) followed by educational ($n = 135$, 25.7%), comedic ($n = 37$, 7.0%), action/athletic theme ($n = 14$, 2.7%), and other ($n = 1$, 0.2%). Chi-square analysis showed that this pattern was not random ($\chi^2 = 751.52$, $df = 4$, $p < .001$). The results indicated that e-cigarette companies often described e-cigarettes and/or vaping during normal, everyday scenes. A one-way ANOVA test indicated that there was no significant difference for the number of retweets, $F(3, 520) = .96$, $p = .41$, and likes, $F(3, 520) = 1.87$, $p = .13$, between the four scenarios ("other" was excluded from the calculation).

Characteristics of tweets between companies

In addition, the researchers examined how Twitter messaging varied across e-cigarette companies. Blu, Vaporfi, and Volcano posted a greater number of commercially focused tweets than tweets that were advocacy focused, whereas Vapor4life and Whitecloud's tweets that advocated vaping in general outnumbered commercially focused tweets. Table 3 provides further information about how Twitter messaging varied across e-cigarette companies.

Table 3. Characteristics of tweets by commercial use and vaping advocacy companies

Commercial use companies				
	Blu (<i>n</i> = 87)	Vaporfi (<i>n</i> =76)	Volcano (<i>n</i> = 125)	Total (<i>n</i> = 288)
Commercial	84 (96.6%)	73 (96.1%)	124 (99.2%)	281 (97.6%)
Vaping advocacy	3 (3.4%)	3 (3.9%)	1 (0.8%)	7 (2.4%)
Free samples	1 (1.1%)	11 (14.5%)	0	12 (4.2%)
Coupons	1 (1.1%)	15 (19.7%)	10 (8.0%)	26 (9.0%)
Retail websites	5 (5.7%)	3 (3.9%)	18 (14.4%)	26 (9.0%)
Contests and events	82 (94.3%)	6 (7.9%)	1 (0.8%)	10 (3.5%)
Vaping scene	7 (8.0%)	0	2 (1.6%)	9 (3.1%)
Vaping advocacy company				
	Vapor4life (<i>n</i> = 88)	Whitecloud (<i>n</i> = 149)	Total (<i>n</i> =237)	
Commercial	33(37.5%)	16 (10.7%)	49 (20.7%)	
Vaping advocacy	55 (62.5%)	133 (89.3%)	188 (79.3%)	
Free samples	1 (1.1%)	0	1 (0.4%)	
Coupons	1 (1.1%)	1 (0.7%)	2 (0.8%)	
Retail websites	1 (1.1%)	3 (2.0%)	4 (1.7%)	
Contests and events	0	8 (5.4%)	8 (3.4%)	
Vaping scene	11 (12.5%)	20 (13.4%)	31 (13.1%)	

Note: Pearson's Chi-square tests between commercial use and vaping advocacy companies * $p < .05$, ** $p < .01$, *** $p < .001$.

Independent sample *t*-tests indicated that commercially focused companies' tweets ($n = 288$, $M = 15.70$, $SD = 24.97$) were more likely to be shared with Twitter users compared to the tweets posted by vaping advocacy companies, $n = 237$, $M = 8.93$, $SD = 22.13$, $t(520) = 6.78$, $p < .01$, 95% CI = (2.58, 10.76); however, vaping advocacy companies' tweets ($n = 237$, $M = 10.23$, $SD = 27.27$) received a greater number of likes than commercial-use companies' tweets, $n = 288$, $M = 4.74$, $SD = 8.15$, $t(520) = -5.49$, $p < .05$, 95% CI = (-9.49, -2.23).

Commercial-use companies were more likely to embed their retail websites into tweets ($n = 26$) than vaping advocacy companies ($n = 4$, $\chi^2 = 13.00$, $p < .001$). Commercial-use companies more frequently disseminated information about how to get a free sample ($n = 12$) or a coupon ($n = 26$) on Twitter than vaping advocacy companies (free sample: $n = 2$, $\chi^2 = 7.55$, $p < .01$; coupon: $n = 2$, $\chi^2 = 17.25$, $p < .001$). Commercial-use companies did not differ from vaping advocacy companies for asking participation in contests. Vaping advocacy companies were more likely to display tweets that claim e-cigarette use reduces health risk, ($n = 60$, 25.3%) as compared to commercial-use companies ($n = 2$, 0.7%, $\chi^2 = 75.68$, $p < .001$).

Compliance with the FDA's deeming

RQ2 examined how the FDA's deeming imposed on August 8, 2016 influenced the ways in which e-cigarette companies promote their products on Twitter. The e-cigarette companies in this study posted 247 tweets (47% of the sample) before August 8, 2016, and 278 tweets (53% of the sample) after the deeming rule took effect; the increase was not statistically significant ($\chi^2 = 1.83$, $df = 1$, $p = .18$).

Additionally, there were no differences between distributing free samples before August 8 ($n = 9$) and after August 8 ($n = 3$, $\chi^2 = 2.63$, $df = 1$, $p = .11$). There were also no differences in the level of coupon distribution before August 8 ($n = 11$) and after ($n = 11$, $\chi^2 = 0.72$, $df = 1$, $p = .40$), indicating that the deeming did not affect such marketing strategies.

Finally, results indicated that there were no significant differences in e-cigarette companies' tweets about reduced health risks from using e-cigarettes rather than tobacco products before and after the deeming rule (before August 8; $n = 35$, after August 8; $n = 27$, $\chi^2 = 0.35$, $df = 1$, $p = .56$). As to disclosing banning sales to minors, the occurrence was too infrequent (one tweet before and one after the deeming rule) to analyze statistically (see Table 4).

Table 4. The FDA's deeming and potential regulation items

Coding Variables	Before August 8 ($n = 278$, 53%)	After August 8 ($n = 247$, 47%)	Total ($N = 525$)
The FDA's deeming			
Free sample distribution	9	4	13 (2.5%)
Reduced harm claim	27	35	62 (11.8%)
Disclosure of minor sale information	1	1	2 (0.4%)
Potential regulatory items			
Celebrity endorsement**	17	7	24 (4.6%)
Cartoon Characters*	4	13	17 (3.2%)

Flavoring (any flavor)	68	57	125 (23.8%)
Sponsoring concerts/sports games	4	1	5(1.0%)
Discount coupons	11	17	28 (5.3%)

Note: Pearson's χ^2 tests between before and after August 8 ** $p < .01$, * $p < .05$

Potential regulatory message strategies

RQ3 questioned how e-cigarette companies employed strategic communication techniques that are prohibited for tobacco products. While sponsoring sporting events is a common outlet for advertisers, when it comes to Twitter and e-cigarette companies, this is a rarity. Of the 525 tweets, only five tweets (four before August 8 and one after August 8) contained a message sponsoring sporting games or music concerts. Additionally, while there was not a preponderance of celebrity portrayals, the date of the deeming rule, apparently, did matter. E-cigarette companies were less likely to depict an image of celebrities after August 8 ($n = 7$, 2.5% of all tweets posted before August 8) than before August 8 ($n = 17$, 6.9% of all tweets posted after August 8, $\chi^2 = 5.71$, $df = 1$, $p < .05$). The presence of celebrities, however, was not significantly associated with the number of retweets, $t(523) = 6.93$, $p = .46$, 95% CI = (-7.93, 26.61), or the number of likes, $t(523) = 15.50$, $p = .39$, 95% CI = (-3.78, 48.40).

While only a small number of tweets depicted cartoon characters such as Pokémon and the Simpsons, e-cigarette companies were more likely to depict cartoon characters after August 8 ($n = 13$) than before August 8 ($n = 4$, $\chi^2 = 3.90$, $df = 1$, $p < .05$). Even so, tweets depicting cartoon characters were less likely to be retweeted by social media users (tweets with a cartoon character: $n = 17$, $M = 1.59$, $SD = 2.42$, tweets without a cartoon character: $n = 508$, $M = 13.02$, $SD = 24.26$, $t(523) = -11.43$, $p < .001$, 95% CI = [-13.82, -9.04]). Tweets displaying a cartoon character ($n = 17$, $M = 1.59$, $SD = 2.42$) tended to receive fewer number of likes, when compared to tweets without a cartoon character ($n = 508$, $M = 13.02$, $SD = 24.26$, $t(523) = -4.60$, $p < .05$, 95% CI = [-6.93, -2.13]).

About one-fourth of the tweets ($n = 145$, 27.6%) depicted an e-cigarette flavor through either text or visuals. E-cigarette companies frequently depicted fruit flavors such as strawberry ($n = 36$), sweet flavors such as custard ($n = 30$) and other flavors ($n = 79$). One-way ANOVA test showed that there is significant deference in number of retweets between depicted flavors, $F(3, 521) = 6.87$, $p < .001$). Tukey's post-hoc analysis indicated that Twitter users were more likely to share the tweets displaying a fruit-flavored e-cigarette ($M = 23.64$, $SD = 28.19$) compared to sweet flavors ($M = 6.39$, $SD = 15.80$, $p < .01$, 95% CI = [4.28, 34.30]), other flavors ($M = 9.30$, $SD = 19.06$, $p < .001$, 95% CI = [8.70, 33.12]), and unflavored e-cigarettes ($M = 12.49$, $SD = 24.31$, $p < .01$, 95% CI = [4.14, 23.32]), indicating that the presence of a fruit-flavored e-cigarette significantly increases social media users' engagement with e-cigarette content. Depicting flavors was not associated with the number of likes, $F(3, 521) = 1.19$, $p = .31$.

Discussion

Even though this study is exploratory in nature, it provides some interesting results that warrant further research. First, consistent with previous studies that found that e-cigarette companies make efforts to normalize nicotine consumption (Hajek et al., 2014; Vandewater et al., 2018), the results of this study indicate that e-cigarette companies are more likely to present e-cigarette use as normal and socially acceptable behavior. E-cigarette companies' attempts to renormalize tobacco product use could hamper public interest communication regarding this lesser known health product and, in turn, threaten public health.

This study attempted to investigate how e-cigarette companies differ in their communication strategies. Previous research has tended to treat the e-cigarette industry monolithically, but this study provides evidence that, perhaps, that approach is short sighted. The main difference in strategies tended to be whether the company used Twitter in an advocacy role or as purely commercially driven. This is particularly interesting in the context of public interest communication. Perhaps e-cigarette companies are working to get consumers to try their products now, but also to influence behavioral change long term by presenting e-cigarette use as a lifestyle. Some messages encouraged e-cigarette potential customers to use e-cigarettes as a mechanism to stop smoking while others urged customers to fight regulations. Other companies, however, used Twitter in a more traditional promotional way, encouraging the use of e-cigarettes as additional opportunities for smoking (albeit tobacco-less) or to experiment with the world and flavors of e-cigarettes. This apparent dichotomy continues to compel the medical community, public interest communicators, and tobacco companies to debate whether e-cigarettes are a healthier alternative to traditional tobacco cigarettes. While public interest communication would align more comfortably with advocacy messages than commercially focused messages, this study raises some alarms as to the kind of advocacy in which these companies are engaging. Reducing health risk is certainly in the public interest, but without strong evidence that e-cigarettes do, indeed, create more healthy opportunities (such as helping people to stop smoking), one should question e-cigarette companies' actual interest in public health.

The results of this study show that the current FDA deeming has not influenced e-cigarette companies' various strategic communication, such as advertising products and advocating e-cigarette use. More specifically, the current FDA deeming prohibits e-cigarette companies from promoting their products as being relatively less harmful than tobacco products. E-cigarette companies also are not allowed to present any health-related benefits unless the benefits are confirmed by the FDA. However, the findings of this study indicate that the FDA's deeming did not significantly influence how e-cigarette companies advertise their products on Twitter. Consistent with previous findings that e-cigarette advertising is unregulated (Duke et al., 2014), this study found that e-cigarette companies continue to display strategic communication strategies that are prohibited by the FDA's deeming even after the regulation took effect. In other words, the companies in this exploratory study continued to send the message that e-cigarettes are a better health alternative to tobacco use. The insignificant effect of the FDA's deeming on e-

cigarette companies' Twitter use may result from the fact that there is no federal law regulating e-cigarette companies' marketing on social media (Hébert et al., 2017). However, consistent with researchers' call for implementing regulations on tobacco companies' social media content (Dai, Deem, & Hao, 2017), the results of this study show that e-cigarette companies continue to use message tactics that are prohibited for other media channels.

In addition, while the use of celebrity endorsements decreased after the deeming rule went into effect, the use of cartoon characters in tweets increased significantly (although the overall number remained small). Given that only two messages out of 525 included the message that e-cigarettes cannot be sold to minors, it is surprising, if not alarming, that cartoon characters are used at all in tweets from e-cigarette companies. The use of cartoon characters in tobacco product advertising is restricted by the MSA, such as displaying cartoon characters with comically distorted features or human characteristics (Pierce & Gilpin, 2004). Displaying cartoon characters in the same ways in e-cigarette advertisements could attenuate viewers' perception of the harm of e-cigarettes and increase their likelihood to experiment with e-cigarettes. Given the preponderance of emphasis on flavors that can appeal to children, the notion that e-cigarette companies are only interested in promoting e-cigarettes as better than traditional smoking seems hollow.

In addition, e-cigarette companies employed various advertising techniques that are prohibited for tobacco products. E-cigarette companies continued to display celebrities and cartoon characters after August 8, although Twitter users did not favorably react to such tweets. It is possible that the presence of celebrities or cartoon characters in tweets increases users' curiosity about and favorable attitude toward e-cigarettes; however, they may not view e-cigarette content as socially acceptable or share such content with others on social media. Perhaps users visited e-cigarette companies' Twitter accounts or websites rather than directly responding to the companies' tweets. More studies are needed to better understand what specific behavioral outcomes could occur from exposure to e-cigarette-related social media content.

When it comes to flavoring, Twitter users were more likely to disseminate tweets depicting fruit flavors than tweets displaying other flavors or tweets with the absence of a flavor. Consistent with the previous studies' findings (Vandewater et al., 2018), this result indicates that social media users could be substantially exposed to flavored e-cigarettes from not only e-cigarette companies' social media content but also individual users' content. While e-cigarette users and dual users advocate e-cigarette use as an aid to smoking cessation, the popularity of fruit flavors in this study indicates that nonsmokers or non-e-cigarette users could be attracted by e-cigarette advertisements with flavoring options. More recently, several large cities, such as Chicago and New York, implemented regulations on the sale of flavored e-cigarette products (Kowitt, Goldstein, Schmidt, Hall, & Brewer, 2017). The results of this study demonstrate that flavored e-cigarettes are more likely to increase social media users' engagement, which potentially attenuates social media users' perceived harm of e-cigarettes and in turn increases their susceptibility to e-cigarette use. However, the FDA and federal government have not implemented a regulation to prohibit e-cigarette companies from advertising flavored e-cigarette

products. Consistent with the growing number of states banning the sale of flavored e-cigarettes, the findings of this study could be used to promote regulations on advertising of flavored e-cigarettes. Given the increased number of cities that have prohibited use of flavors for e-cigarette products, the FDA and other regulatory authorities should consider banning flavoring advertisements and the sale of flavored e-cigarette products into consideration.

Theoretical implications

This study contributes to the literature in several ways. First, this study adds breadth to the body of literature that has examined and applied arguments from Ajzen and Fishbein's (1980) TPB within a strategic communications approach. While the nature of a content analysis cannot determine the actual effects of media content on subsequent behavior, findings from the present study provide insight into the messages that are being distributed in viral settings. That is, results from this study highlight Moreno and Whitehill's (2014) arguments about the potentially effective influence of content on social media platforms. Presenting e-cigarette use as a lifestyle on social media can lead viewers to develop positive social norms about e-cigarette use, thereby increasing their susceptibility to e-cigarette use. In particular, social media users may come to view e-cigarette use as a socially acceptable behavior after observing e-cigarette companies' discourse on social media, as social learning theory posits. Individuals may become open to e-cigarette use when e-cigarette companies' social media posts are shared by their in-group members, such as friends or acquaintances on social media. As a growing number of researchers have investigated the influence of social media on social norms (Neiger et al., 2012), the findings of this study provide insight into the potential effects that e-cigarette companies' social media content have on individuals' opinions for e-cigarette use as a socially acceptable behavior. The results of this study show that e-cigarette companies attempt to maximize the use of Twitter not only by promoting their products via traditional advertising techniques, but also by depicting e-cigarette use as an everyday life activity.

Practical implications

Though previous studies have found positive associations between individuals' exposure to e-cigarette content and their susceptibility to e-cigarette use (e.g., Pokhrel et al., 2018), little is known about e-cigarette companies' specific messages that may violate current and potential regulations on e-cigarette marketing. This study provides insight into the strategic communication used by e-cigarette companies to decrease the public's interest in discussing the potential risks of e-cigarette use. In particular, e-cigarette companies' efforts to present e-cigarettes on social media as less harmful and more socially acceptable products may discourage the public from discussing the potential health risks in using e-cigarettes. Social media users' increased engagement with such content via retweeting and clicking likes results in e-cigarette

companies' designated messages becoming more salient on social media, thereby increasing individuals' exposure to social media content that is more supportive of e-cigarette use.

By examining content on Twitter, this study offers a starting point for additional investigations seeking to further understand e-cigarette companies' strategic communication in the social media space, especially with consideration to newly implemented and upcoming regulations that may potentially impact the way in which e-cigarette companies present their products on social media. The results of this study show that e-cigarette companies continue to use some marketing strategies prohibited for tobacco or e-cigarette products (e.g., free sample distribution and reduced health risk claims), which is an important potential extension of understanding public interest communications. Findings from the study provide useful information about a complex consumer product and the relevant health risks, and the social implications that have not been widely examined thoroughly in scholarship.

Limitations

As with any exploratory study, this study has limitations. Given the preponderance of tweets that are produced daily, examining only 525 tweets requires caution. Also, attributes of the companies in the sample were not considered. Some characteristics, such as the locations of companies and the amount of business, may have influenced the way in which the companies used social media to promote their products. For example, Whitecloud, which has a limited number of retail stores that are only on the East Coast of the United States, is more likely to advocate e-cigarette use rather than promote their products on Twitter. In contrast, Blu, which belongs to a large tobacco company, is more likely to use Twitter to increase consumer awareness of the brand. Thus, more studies are needed to examine the relationship between e-cigarette companies' characteristics, such as ownership and the types of sales (offline focused or online focused), and their use of social media to attract potential consumers.

Understanding the regulatory environment of e-cigarettes needs more investigation. Despite a growing number of studies that found a positive association between exposure to e-cigarette messages on social media and users' susceptibility to e-cigarette use, e-cigarette companies' social media content has not been viewed and regulated as clearly as with other communication strategies such as advertising. However, when it comes to social media content, this study found that e-cigarette companies have used similar strategies to advertising, which are prohibited for e-cigarette advertisements and marketing by the FDA. As public interest communicators increase their understanding of the potential health risks of e-cigarettes, it will be even more important to investigate how this impacts e-cigarette messaging.

Directions for future research

The current study was exploratory in nature, and as such, is an early attempt to better understand how e-cigarette companies are promoting their products via Twitter. It would be interesting to

expand this approach and look at other social media platforms to better understand similarities and differences. For example, there are a number of Instagram postings of consumers vaping in different scenarios. But how these postings relate to e-cigarette companies' use of social media advertising has yet to be explored. Also, e-cigarette companies have a large arsenal of advertising strategies they can use to increase their usage—both on social media platforms as well as in legacy media. Investigating these strategies particularly within the dichotomy of messages (is the product a healthy alternative to tobacco cigarettes for example) is going to be even more important for public interest communicators as the debate of regulation will most certainly continue. Finally, from a theoretical standpoint, actually measuring behavioral intentions with regard to this health topic would further advance public interest communications literature that examines how e-cigarette advertising impacts society.

Conclusion

This study provides a novel examination of e-cigarette companies' messaging strategies on social media. While the messages of e-cigarette advertising remain fairly ambiguous, this study provides direction for understanding e-cigarette companies' strategic approaches and advertising strategies in this realm and the social implications that accompany them. Results indicate that social media enable e-cigarette companies to further develop their advertising strategies such as advocating e-cigarette use. Rather than only embedding such messages in product advertising, e-cigarette companies also explicitly convey anti-regulation messages on social media. Clearly, more research about advertising and e-cigarettes, particularly within a social media environment, needs to be conducted. This study is an early attempt to expand the understanding of how health products companies' messages on social media potentially impact public health as a public interest issue.

References

- Ajzen, I. (2005). *Attitudes, personality, and behavior* (2nd ed.). New York, NY: Open University Press.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviors*. New Jersey: Prentice Hall, Inc.
- Akers, R. L., & Lee, G. (1996). A longitudinal test of social learning theory: Adolescent smoking. *Journal of Drug Issues*, 26(2), 317-343. doi:10.1177/002204269602600203
- Baek, T. H., & Mayer, M. (2010). Sexual imagery in cigarette advertising before and after the master settlement agreement. *Health Communication*, 25(8), 747-757. doi:10.1080/10410236.2010.521917

- Bahl, V., Lin, S., Xu, N., Davis, B., Wang, Y. H., & Talbot, P. (2012). Comparison of electronic cigarette refill fluid cytotoxicity using embryonic and adult models. *Reproductive Toxicology*, 34(4), 529-537. doi:10.1016/j.reprotox.2012.08.001
- Bandura, A. (1978). Social learning theory of aggression. *Journal of Communication*, 28(3), 12-29. doi:10.1111/j.1460-2466.1978.tb01621.x
- Biener, L., & Siegel, M. (2000). Tobacco marketing and adolescent smoking: More support for a causal inference. *American Journal of Public Health*, 90(3), 407. doi:10.2105/AJPH.90.3.407
- Cobb, N. K., Byron, M. J., Abrams, D. B., & Shields, P. G. (2010). Novel nicotine delivery systems and public health: The rise of the “e-cigarette”. *American Journal of Public Health*, 100(12), 2340-2342. doi:10.2105/AJPH.2010.199281
- Choi, W. S., Ahluwalia, J. S., Harris, K. J., & Okuyemi, K. (2002). Progression to established smoking: The influence of tobacco marketing. *American Journal of Preventive Medicine*, 22(4), 228-233. doi:10.1016/S0749-3797(02)00420-8
- Chu, K. H., Unger, J. B., Allem, J. P., Pattarroyo, M., Soto, D., Cruz, T. B., & Yang, C. C. (2015). Diffusion of messages from an electronic cigarette brand to potential users through Twitter. *PloS One*, 10(12), e0145387. doi:10.1371/journal.pone.0145387
- Chung, P. J., Garfield, C. F., Rathouz, P. J., Lauderdale, D. S., Best, D., & Lantos, J. (2002). Youth targeting by tobacco manufacturers since the Master Settlement Agreement. *Health Affairs*, 21(2), 254-263. doi:10.1377/hlthaff.21.2.254
- Chung, E., & Yoon, J. (2013). An analysis of image use in Twitter message. *Journal of the Korean BIBLIA Society for Library and Information Science*, 24(4), 75-90. doi:10.14699/biblia.2013.24.4.075
- Clark, E. M., Jones, C. A., Williams, J. R., Kurti, A. N., Nortotsky, M. C., Danforth, C. M., & Dodds, P. S. (2015). Vaporous marketing: Uncovering pervasive electronic cigarette advertisements on Twitter. *PloS One*, 11(17), e0157304. doi:10.1371/journal.pone.0157304
- Cole-Lewis, H., Pugatch, J., Sanders, A., Varghese, A., Posada, S., Yun, C., & Augustson, E. (2015). Social listening: A content analysis of e-cigarette discussions on Twitter. *Journal of Medical Internet Research*, 17(10), 1-14. doi:10.2196/jmir.4969
- Cooper, M., Case, K. R., Loukas, A., Creamer, M. R., & Perry, C. L. (2016). E-cigarette dual users, exclusive users and perceptions of tobacco products. *American Journal of Health Behavior*, 40(1), 108-116. doi:10.5993/AJHB.40.1.12
- Dai, H., Deem, M. J., & Hao, J. (2017). Geographic variations in electronic cigarette advertisements on Twitter in the United States. *International Journal of Public Health*, 62(4), 479-487. doi:10.1007/s00038-016-0906-9
- Dalton, M. A., Sargent, J. D., Beach, M. L., Titus-Ernstoff, L., Gibson, J. J., Ahrens, M. B., & Heatherton, T. F. (2003). Effect of viewing smoking in movies on adolescent smoking initiation: a cohort study, *The Lancet*, 362(9380), 281-285. doi:10.1016/S0140-6736(03)13970-0

- Demetrious, K. (2017). Contemporary publics, Twitter and the story of PR: Exploring corporate interventions to promote “Clean Coal” in Australia. *The Journal of Public Interest Communications*, 1(1), 94-113. doi:10.32473/jpic.v1.i1.p94
- Dixon, H. G., Scully, M. L., Wakefield, M. A., White, V. M., & Crawford, D. A. (2007). The effects of television advertisements for junk food versus nutritious food on children's food attitudes and preferences. *Social Science and Medicine*, 65(7), 1311-1323. doi:10.1016/j.socscimed.2007.05.011
- Downes, E. (2017). “Doing Good” scholarship: Considerations for building positive social change through the emerging field of public interest communications. *The Journal of Public Interest Communications*, 1(1), 31-44. doi:10.32473/jpic.v1.i1.p31
- D’Ruiz, C. D., Graff, D. W., & Robinson, E. (2016). Reductions in biomarkers of exposure, impacts on smoking urge and assessment of product use and tolerability in adult smokers following partial or complete substitution of cigarettes with electronic cigarettes. *BMC Public Health*, 16(1), 543. doi:10.1186/s12889-016-3236-1
- Dube, S. R., Arrazola, R. A., Lee, J., Engstrom, M., & Malarcher, A. (2013). Pro-tobacco influences and susceptibility to smoking cigarettes among middle and high school students—United States, 2011. *Journal of Adolescent Health*, 52(5), S45-S51. doi:10.1016/j.jadohealth.2012.07.007
- Duke, J. C., Lee, Y. O., Kim, A. E., Watson, K. A., Arnold, K. Y., Nonnemaker, J. M., & Porter, L. (2014). Exposure to electronic cigarette television advertisements among youth and young adults. *Pediatrics*, 134(1), e29-e-36. doi:10.1542/peds.2014-0269
- Emery, S., Wakefield, M. A., Terry-McElrath, Y., Saffer, H., Szczypka, G., O’Malley, P. M., & Flay, B. (2005). Televised state-sponsored antitobacco advertising and youth smoking beliefs and behavior in the United States, 1999-2000. *Archives of Pediatrics & Adolescent Medicine*, 159(7), 639-645. doi:10.1001/archpedi.159.7.639
- Fessmann, J. (2017). Conceptual foundations of public interest communications. *The Journal of Public Interest Communications*, 1(1), 16-30. doi:10.32473/jpic.v1.i1.p16
- Freeman, B. (2012). New media and tobacco control. *Tobacco Control*, 21(2), 139-144. doi:10.1136/tobaccocontrol-2011-050193
- Grana, R., Benowitz, N., & Glantz, S. A. (2014). E-cigarettes. *Circulation*, 129(19), 1972-1986. doi:10.1161/CIRCULATIONAHA.114.007667
- Grana, R. A., Popova, L., & Ling, P. M. (2014). A longitudinal analysis of electronic cigarette use and smoking cessation. *JAMA Internal Medicine*, 174(5), 812-813. doi:10.1001/jamainternmed.2014.187
- Grana, R. A., & Ling, P. M. (2014). Smoking revolution”: A content analysis of electronic cigarette retail websites. *American Journal of Preventive Medicine*, 46(4), 395-403. doi:10.1016/j.amepre.2013.12.010
- Hale, J. L., Householder, B. J., & Greene, K. L. (2002). The theory of reasoned action. In J. P. Dillard & M. Pfau (Eds.). *The persuasion handbook: Developments in theory and practice*. (pp. 259-286). Thousand Oaks, CA: Sage.

- Hamilton, W. L., Turner-Bowker, D. M., Celebucki, C. C., & Connolly, G. N. (2002). Cigarette advertising in magazines: The tobacco industry response to the Master Settlement Agreement and to public pressure. *Tobacco Control, 11*(suppl 2), ii54-ii58. doi:10.1136/tc.11.suppl_2.ii54
- Harris, J. K., Moreland-Russell, S., Choucair, B., Mansour, R., Staub, M., & Simmons, K. (2014). Tweeting for and against public health policy: Response to the Chicago Department of Public Health's electronic cigarette Twitter campaign. *Journal of Medical Internet Research, 16*(10), e238. doi:10.2196/jmir.3622
- Hajek, P., Etter, J. F., Benowitz, N., Eissenberg, T., & McRobbie, H. (2014). Electronic cigarettes: Review of use, content, safety, effects on smokers and potential for harm and benefit. *Addiction, 109*(11), 1801-1810. doi:10.1111/add.12659
- Harakeh, Z., Scholte, R. H., Vermulst, A. A., de Vries, H., & Engels, R. C. (2004). Parental factors and adolescents' smoking behavior: An extension of the theory of planned behavior. *Preventive Medicine, 39*(5), 951-961. doi:10.1016/j.ypmed.2004.03.036
- Hayes, A. F., & Krippendorff, K. (2007). Answering the call for a standard reliability measure for coding data. *Communication Methods and Measures, 1*(1), 77-89. doi:10.1080/19312450709336664
- Hébert, E. T., Case, K. R., Kelder, S. H., Delk, J., Perry, C. L., & Harrell, M. B. (2017). Exposure and engagement with tobacco-and e-cigarette-related social media. *Journal of Adolescent Health, 61*(3), 371-377. doi:10.1016/j.jadohealth.2017.04.003.
- Hoefges, R. M. (2013). The strong First Amendment right to promote lawful products. In: Pardun C.J, (Ed.), *Advertising and Society: An Introduction* (pp. 4-73). Hoboken, NJ; John Wiley & Sons.
- Huang, J., Kornfield, R., Szczypka, G., & Emery, S. L. (2014). A cross-sectional examination of marketing of electronic cigarettes on Twitter. *Tobacco Control, 23*(suppl 3), iii26-iii30. doi:10.1136/tobaccocontrol-2014-051551
- Hallahan, K., Holtzhausen, D., Van Ruler, B., Verčič, D., & Sriramesh, K. (2007). Defining strategic communication. *International Journal of Strategic Communication, 1*(1), 3-35. doi:10.1080/15531180701285244
- Kelley, K. (2005). The effects of non-normal distributions on confidence intervals around the standardized mean difference: Bootstrap and parametric confidence intervals. *Educational and Psychological Measurement, 65*(1), 51-69. doi:10.1177/0013164404264850
- King III, C., & Siegel, M. (2001). The Master Settlement Agreement with the tobacco industry and cigarette advertising in magazines. *New England Journal of Medicine, 345*(7), 504-511. doi:10.1056/NEJMsa003149
- Kowitz, S. D., Goldstein, A. O., Schmidt, A. M., Hall, M. G., & Brewer, N. T. (2017). Attitudes toward FDA regulation of newly deemed tobacco products. *Tobacco Regulatory Science, 3*(4), 504-515. doi:10.18001/TRS.3.4.10

- Krishnan-Sarin, S., Morean, M. E., Camenga, D. R., Cavallo, D. A., & Kong, G. (2014). E-cigarette use among high school and middle school adolescents in Connecticut. *Nicotine and Tobacco Research, 17*(7), 810-818. doi:10.1093/ntr/ntu243
- LaRose, R., & Eastin, M. S. (2004). A social cognitive theory of Internet uses and gratifications: Toward a new model of media attendance. *Journal of Broadcasting & Electronic Media, 48*(3), 358-377. doi:10.1207/s15506878jobem4803_2
- Lazard, A. J., Saffer, A. J., Wilcox, G. B., Chung, A.D., Mackert, M. S., & Bernhardt, J. M. (2016). E-Cigarette social media messages: A text mining analysis of marketing and consumer conversations on Twitter. *JMIR Public Health and Surveillance, 2*(2), e171. doi:10.2196/publichealth.6551
- Link, A. R., Cawkwell, P. B., Shelley, D. R., & Sherman, S. E. (2015). An exploration of online behaviors and social media use among hookah and electronic-cigarette users. *Addictive Behaviors Reports, 2*, 37-40. doi:10.1016/j.abrep.2015.05.006
- Linke, A., & Zerfass, A. (2012). Future trends in social media use for strategic organisation communication: Results of a Delphi study. *Public Communication Review, 2*(2), 17-29. doi:10.5130/pcr.v2i2.2736
- Lombard, M., Snyder-Duch, J., & Bracken, C. C. (2002). Content analysis in mass communication: Assessment and reporting of intercoder reliability. *Human Communication Research, 28*(4), 587-604. doi:10.1111/j.1468-2958.2002.tb00826.x
- Luo, C., Zheng, X., Zeng, D. D., & Leischow, S. (2014). Portrayal of electronic cigarettes on YouTube. *BMC Public Health, 14*(1), 1028. doi:10.1186/1471-2458-14-1028
- Mackey, T. K., Miner, A., & Cuomo, R. E. (2015). Exploring the e-cigarette e-commerce marketplace: Identifying Internet e-cigarette marketing characteristics and regulatory gaps. *Drug and Alcohol Dependence, 156*, 97-103. doi:10.1016/j.drugalcdep.2015.08.032
- Mantey, D. S., Cooper, M. R., Clendennen, S. L., Pasch, K. E., & Perry, C. L. (2016). E-cigarette marketing exposure is associated with e-cigarette use among US youth. *Journal of Adolescent Health, 58*(6), 686-690. doi:10.1016/j.jadohealth.2016.03.003
- Marozzo, F., & Bessi, A. (2018). Analyzing polarization of social media users and news sites during political campaigns. *Social Network Analysis and Mining, 8*(1), 1-17. doi:10.1007/s13278-017-0479-5
- Moan, I. S. V., & Rise, J. (2006). Predicting smoking reduction among adolescents using an extended version of the theory of planned behaviour. *Psychology and Health, 21*(6), 717-738. doi:10.1080/14768320600603448
- Moreno, M. A., & Whitehill, J. M. (2014). Influence of social media on alcohol use in adolescents and young adults. *Alcohol Research: Current Reviews, 36*(1), 91-100.
- Neiger, B. L., Thackeray, R., Van Wagenen, S. A., Hanson, C. L., West, J. H., Barnes, M. D., & Fagen, M. C. (2012). Use of social media in health promotion: Purposes, key performance indicators, and evaluation metrics. *Health Promotion Practice, 13*(2), 159-164. doi:10.1177/1524839911433467

- Ott, H. K., Vafeiadis, M., Kumble, S., & Waddell, T. F. (2016). Effect of message interactivity on product attitudes and purchase intentions. *Journal of Promotion Management*, 22(1), 89-106. doi:10.1080/10496491.2015.1107011
- Paredes, V., Cantu, V. C., & Graf, N. M. (2013). The Impact of Reality Television on the Alcohol-Related Beliefs and Behaviors of Hispanic College Students. *Journal of Alcohol and Drug Education*, 57(1), 23-45.
- Phua, J., Jin, S. V., & Hahm, J. M. (2017). Celebrity-endorsed e-cigarette brand Instagram advertisements: Effects on young adults' attitudes towards e-cigarettes and smoking intentions. *Journal of Health Psychology*. doi:10.1177/1359105317693912
- Pierce, J. P., & Gilpin, E. A. (2004). How did the Master Settlement Agreement change tobacco industry expenditures for cigarette advertising and promotions? *Health Promotion Practice*, 5(3_suppl), 84S-90S. doi:10.1177/1524839904264600
- Plowman, K. D., & Wilson, C. (2018). Strategy and tactics in strategic communication: Examining their intersection with social media use. *International Journal of Strategic Communication*, 12(2), 125-144. doi:10.1080/1553118X.2018.1428979
- Pokhrel, P., Fagan, P., Kehl, L., & Herzog, T. A. (2015). Receptivity to e-cigarette marketing, harm perceptions, and e-cigarette use. *American Journal of Health Behavior*, 39(1), 121-131. doi:10.5993/AJHB.39.1.13
- Pokhrel, P., Fagan, P., Herzog, T. A., Laestadius, L., Buente, W., Kawamoto, C. T., ... & Unger, J. B. (2018). Social media e-cigarette exposure and e-cigarette expectancies and use among young adults. *Addictive behaviors*, 78, 51-58. doi:10.1016/j.addbeh.2017.10.017
- Pressgrove, G., & Pardun, C. J. (2016). Relationship between personal technology use and the donor/volunteer: A parasocial approach. *Journal of Promotion Management*, 22(1), 137-150. doi:10.1080/10496491.2015.1107012
- Richardson, A., Ganz, O., & Vallone, D. (2014). Tobacco on the web: Surveillance and characterisation of online tobacco and e-cigarette advertising. *Tobacco Control*, 24(4), 341-347. doi:10.1136/tobaccocontrol-2013-051246
- Rifkin, J. (2015, April), E-Cigarettes Are Now More Popular with Young People Than Regular Cigarettes. Retrieved from http://www.huffingtonpost.com/2015/04/16/e-cigarettes-smoking-health_n_7080548.html
- Rodu, B. (2016, August 18). Low-tar cigarettes had merit, said American Cancer Society; So do e-cigarettes [Blog post]. Retrieved from <https://www.rstreet.org/2016/08/18/low-tar-cigarettes-had-merit-said-american-cancer-society-so-do-e-cigarettes/>
- Salloum, R. G., Osman, A., Maziak, W., & Thrasher, J. F. (2015). How popular is waterpipe tobacco smoking? Findings from internet search queries. *Tobacco Control*, 24(5), 509-513. doi:10.1136/tobaccocontrol-2014-051675
- Schripp, T., Markewitz, D., Uhde, E., & Salthammer, T. (2013). Does e-cigarette consumption cause passive vaping? *Indoor Air*, 23(1), 25-31. doi:10.1111/j.1600-0668.2012.00792.x

- Starr, C., & Ferguson, G. (2012). Sexy dolls, sexy grade-schoolers? Media and maternal influences on young girls' self-sexualization. *Sex Roles, 67*(7-8), 463-476. doi:10.1007/s11199-012-0183-x
- Stieglitz, S., & Dang-Xuan, L. (2013). Emotions and information diffusion in social media—sentiment of microblogs and sharing behavior. *Journal of Management Information Systems, 29*(4), 217-248. doi:10.2753/MIS0742-1222290408
- Trtchounian, A., & Talbot, P. (2011). Electronic nicotine delivery systems: Is there a need for regulation? *Tobacco Control, 20*(1), 47-52. doi:10.1136/tc.2010.037259
- U.S. Food and Drug Administration/Center for Drug Evaluation and Research. (2016). FDA's New Regulations for E-Cigarettes, Cigars, and All Other Tobacco Products. Retrieved from <http://www.fda.gov/TobaccoProducts/Labeling/RulesRegulationsGuidance/ucm394909.htm>
- Vance, K., Howe, W., & Dellavalle, R. P. (2009). Social internet sites as a source of public health information. *Dermatologic Clinics, 27*(2), 133-136. doi:10.1016/j.det.2008.11.010
- Vandewater, E. A., Clendennen, S. L., Hébert, E. T., Bigman, G., Jackson, C. D., Wilkinson, A. V., & Perry, C. L. (2018). Whose post is it? Predicting E-cigarette brand from social media posts. *Tobacco Regulatory Science, 4*(2), 30-43. doi:10.18001/TRS.4.2.3
- Yanovitzky, I., & Stryker, J. (2001). Mass media, social norms, and health promotion efforts: A longitudinal study of media effects on youth binge drinking. *Communication Research, 28*(2), 208-239. doi:10.1177/009365001028002004
- Villanti, A., Boulay, M., & Juon, H.S. (2011). Peer, parent and media influences on adolescent smoking by developmental stage. *Addictive Behaviors, 36*(1), 133-136. doi:10.1016/j.addbeh.2010.08.018
- Wagner, C. B., & Sundar, S. S. (2008). The curiosity-arousing function of anti-drug ads. *The Open Communication Journal, 2*, 43-59. doi:10.2174/1874916X00802010043