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Media Effects and Health

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Since the beginning of the formal study of message effects on audiences, health information and health-related outcomes have played a crucial role in advancing research on media effects. For instance, public concern in the 1930s that movies were harming children's health led psychologists to design special beds that measured how much children tossed and turned at night after watching different genres of films (Southwell & Thorson, 2015). In the 1950s, psychologists at Yale used messages about oral health in their early tests of the interplay between emotional responses to messages and subsequent behavior change (Janis & Feshbach, 1953). These are only a couple of examples of how issues of health have long been intertwined with the study of media use and its effects on users and on society. As such, it is worthwhile to explore the theoretical perspectives, message features, psychological processes, and individual differences associated with health media effects given that insights into this area can benefit the field as a whole.

Despite their wide relevance to the development of media effects theory and empirical findings, health-related media effects are also notable for the ways in which the context differs from other subfields. First, there may not be an area of media effects research with a more practical link to shaping how humans go about their individual and collective lives. A real applied need exists to generate findings to identify aspects of media that may harm health, as well as to better understand how media can help individuals live healthier, happier lives. Second, health-related media effects deal directly with conceptual issues of personal relevance, uncertainty, and risk more so than some other media effects contexts. If someone does not see the latest blockbuster movie or misses the broadcast of a big sports game, the consequences are not as grave as missing the news story about a new infectious disease in one's geographic area. Perhaps its closest cousins—environment and science-related media effects—also deal with issues of uncertainty and risk, but often do not generate the same level of perceived personal relevance (that is, unless they emphasize the health implications of their topics).

Given that the topic of health has relevance across media effects subfields, as well as unique attributes that separate it from other areas, researchers have a lot to consider when trying to grasp the nature of health-related media effects. What follows is an examination of some of the important issues, typically applied theories, notable studies, current controversies, and emerging trends facing researchers interested in this area of media effects scholarship and its applications

to the real world. By reviewing and engaging with these topics, future work in this area can advance our understanding of the interplay between health and media.

Types of Health Media and Their Effects

Not all health messages share the same goals. Strategic messages aim to persuade audiences to change their health behaviors. Such health messages often come in the form of public communication campaigns, which are

> purposive attempts to inform or influence behaviors in large audiences within a specified time period using an organized set of communication activities and featuring an array of mediated messages in multiple channels generally to produce noncommercial benefits to individuals and society.
>
> (Atkin & Rice, 2013, p. 3)

Advertisements are another, more specific form of strategic health messaging, and are not always noncommercial in nature. For example, the U.S. and New Zealand are two of very few countries in the world that allow direct-to-consumer advertisements for pharmaceuticals (Ventola, 2011). As such, research suggests that advertisements by for-profit pharmaceutical companies can lead audiences to ask their healthcare providers for potentially unnecessary prescriptions (Mintzes et al., 2003).

News reporting typically does not aim to persuade consumers to adopt particular health behaviors, but instead to inform them. Journalists strive to inform audiences about various health topics, and health/medicine has become a common beat at major news outlets across the globe (Myrick, 2014). Besides informing the public about health topics, news coverage of health issues can also influence public support for health-related policies (Coleman, Thorson, & Wilkins, 2011). How effectively health news informs individuals about health topics and health policies is a debatable issue (Schwitzer, 2014), but recent evidence suggests that the quality of coverage of medical interventions (as judged by standards of completeness, accuracy, and usefulness) has generally improved (Walsh-Childers, Braddock, Rabaza, & Schwitzer, 2018).

In addition to strategic campaigns, advertisements, and news reporting about health, entertainment media also serve as a form of health communication. When content creators purposefully integrate health topics into entertainment messages, the practice is known as "entertainment education" and relies on social modeling and narrative persuasion theories to subtly influence audience health behaviors (Singhal & Rogers, 1999). Entertainment media can also shape public opinion when health topics are introduced into a storyline or featured in celebrity news coverage, even if there was no intention to change the public's health-related behaviors. For instance, Quick (2009) analyzed viewers of the popular television drama *Grey's Anatomy*. Based on tenets of cultivation theory, he found that heavy viewers of the show perceived the program as more credible than lighter viewers, and that credibility perceptions were positively associated with viewing real-world doctors as courageous.

Across these different types of health messages, the effects on audiences can vary in a number of important ways. Health message effects can be either personal or public (i.e., focused on individual-level or society-level change), they can be either intended and purposeful or unintended and accidental, and they can be beneficial or damaging to health (Brown & Walsh-Childers, 2009). Any one health message could potentially have multiple types of effects.

For instance, a news story informing readers about the importance of their own dietary choices could also persuade legislators to develop policies encouraging fruit and vegetable consumption, thereby having both personal and public influence. Furthermore, one person could read the same news article and start eating more vegetables—a beneficial change to her health—whereas another could read the same article, dismiss the content, and decide to eat fewer vegetables just to spite the people who insist they're so important—a harmful behavioral change. The actions of the person who dismisses the news story were likely not an intended outcome of the journalist who wrote it, whereas educating the individual who did change, and maybe even educating the legislator, could have been desired, intentional outcomes. Across the various health message types and their effects, theories have helped researchers better understand and predict outcomes associated with health messages. Below, theories popular in this area of research are reviewed.

Theoretical Perspectives

Much of the theory that is applied to health message effects research did not originate with communication scholars. That is, social psychological and health behavior theories form an important constituency of the conceptual frameworks applied to health-related media effects studies. Of these theories, three in particular stand out. First, Bandura's social cognitive theory (SCT), an outgrowth of social learning theory, has a number of components arguing that personal, behavioral, and environmental factors are interrelated and reciprocally influence each other to determine human behavior (Bandura, 1986; see Chapter 7 in this volume). However, the aspects of SCT typically applied to health media effects research are the propositions that (a) one's self-efficacy, or confidence in one's ability to perform a behavior, and (b) one's belief that more positive than negative outcomes will occur (outcome expectations) both predict the likelihood of performing a behavior (Bandura, 2004a). SCT has also been applied to contexts where real-life celebrities or fictional characters model health-related behavior via messages, and when viewers see that behavior as rewarded, they may be more likely to copy the behavior than when they see it being punished (Bandura, 2004b).

Another prominent health behavior theory applied to media effects research is the health belief model (HBM) (Janz & Becker, 1984; Rosenstock, 1974). In this model, the likelihood of engaging in a health-related behavior is predicted by multiple variables: perceived benefits of and barriers to enacting the behavior, perceived threat, and perceived self-efficacy. Additionally, the HBM posits that additional "cues to action" can motivate behavior, one such cue being media. Work in health communication applying the HBM typically assumes that messages that emphasize the threat, benefits for enacting a behavior, ways to overcome barriers to that behavior, and self-efficacy information for enacting the behavior will persuade audiences to take action. However, it is less clear how each of these message components should be ordered in a message, and, conceptually, if perceptions of these four variables all mediate, or if some moderate, effects on post-message attitudes, intentions, and behaviors (Jones et al., 2015).

The third health behavior theory frequently applied to explanations of health message effects is actually a group of theories with similar variables and proposed interrelationships. Originally conceptualized as the theory of reasoned action (Ajzen, 2011; Ajzen & Fishbein, 1980), scholars now often apply the "reasoned action approach" (RAA) to their work, with this framework including the theory of planned behavior (TPB) and the integrated behavioral model (IM) (Head & Noar, 2013). The most recent iteration of these related theories, the IM argues that although behavioral intentions are the most immediate precursor to behavior, the intentions–behavior link can be

moderated by environmental factors such as skills, abilities, and/or environmental constraints (Fishbein, 2008). Moreover, the TPB and IM state that attitudes, self-efficacy, and social norms (both injunctive and descriptive) each predict intentions. Fishbein and Yzer (2003) state that in order to effectively apply the IM to health interventions, researchers must first identify the target population's beliefs that undergird their attitudes, self-efficacy, and social norms. Once appropriate beliefs are identified, messages can help change those beliefs and, through their impacts on attitudes, self-efficacy, and social norms, shift intentions that should influence behavior (depending on audience abilities and their environment).

Together, these three health behavior theories (SCT, HBM, and IM) are frequently applied to the crafting of persuasive health messages and campaigns. Yet, additional theories from communication scholars have also influenced the field. One of note is the extended parallel process model (EPPM). Witte (1992) proposed the EPPM as a merger of two previous theories related to fear appeal effects: the parallel process model (Leventhal, 1971) and protection motivation theory (Rogers, 1975). Whereas previous models focused on cognitive responses to fear appeals, the EPPM also included the emotion of fear. According to the EPPM, after audiences assess the topic of the message as threatening (i.e., the audience perceives a severe threat to which they are susceptible), they then experience fear.

A crucial component of the EPPM is determining if the threat appraisals of severity and susceptibility are more or less dominant than corresponding efficacy appraisals of self-efficacy to perform a behavior and response-efficacy that the target behavior will actually work. When threat appraisals are stronger than efficacy appraisals, the model predicts that individuals will seek to diminish their fear through maladaptive behaviors, such as source denigration or rationalization of unhealthy behaviors. However, when efficacy appraisals are stronger than threat appraisals, the EPPM posits that individuals will feel capable of addressing the threat and will then enact adaptive, danger-control behaviors (for a detailed overview of the EPPM and comparisons to prior fear appeal theories as they relate to health messages, see Myrick & Nabi, 2017). The full EPPM comprises 12 propositions, but existing work has yet to support most of them, including a consistent interaction between perceived threat and perceived efficacy (Popova, 2012). Nonetheless, multiple meta-analyses have found a positive and significant linear relationship between fear arousal and persuasive outcomes such as attitudes and behavior change (Mongeau, 1998; Tannenbaum et al., 2015; Witte & Allen, 2000), and the EPPM, as well as extensions of it, continue to form the conceptual basis for many message effects studies.

Another notable theory applied to studies of health message effects is exemplification theory (Zillmann, 2006). This theory posits that the use of exemplars in messages has a stronger impact on audience risk perceptions than do statistics because exemplars activate heuristics related to risk perception. Plus, exemplars are more likely to evoke emotions than are numbers alone. Exemplification theory has helped to effectively predict audiences' risk perceptions about a number of health topics, such as insect-borne illnesses (Gibson & Zillmann, 2000) and skin cancer (Zillmann & Gan, 1996), graphic labels on tobacco products (Bigman, Nagler, & Viswanath, 2016), and to digital weight-loss messages (Knobloch-Westerwick & Sarge, 2013).

Additional Theoretical Perspectives, Notable Programs of Research, and Important Studies

As the broad field of health communication has grown, scholars focusing on the role of the media in shaping health behavior have established important, theoretically informed programs of research.

In some cases, individual studies stand out as points where innovative ideas or compelling empirical evidence caused others to start investigating and theorizing in a specific area of health-related media effects. In other cases, the body of research accrued over time, building a convincing argument for a new way of examining how media influence health behaviors. Below, a few examples of notable programs of theory-based research in this area are described.

Emotions and Health

Emotional appeals are increasingly of interest in health media effects research. Notably, many public communication campaigns rely heavily on emotional appeals, especially fear appeals, in their attempts to sway the public's health behavior. Witte's (1992) work on the EPPM, mentioned above, forms the foundation for much of the health-related fear appeal research. Additional work by Dillard and Peck (2000) helped health communication researchers integrate research on dual-process models of attitude formation with the burgeoning work on the role of emotions in health message effects. This work also examined unique effects for different emotions, motivating increased study of discrete emotions as important responses to health messages. Furthermore, Nabi's conceptualization of the cognitive functional model (Nabi, 1999) and the emotions-as-frames model (Nabi, 2003) nudged the field to think about how different types of emotions impact health information processing and other message outcomes. By emphasizing the ability of emotions to persuade and motivate, these researchers have advanced health media research into an era where message designers know it is not enough to simply inform audiences about health threats, as many already know they exist. Instead, understanding the different types of emotions that lead to selective exposure, message elaboration, and motivation to pursue often difficult health behavior changes is an important development in health media research that continues to grow in popularity (Myrick, 2015).

Adolescents and Sexuality

Another example of a program of research that influenced our understanding of health-related media effects is Brown and her colleagues' work on how adolescents' media use shapes their sexual behaviors. Brown (2000) developed the Media Practice Model with three central features: (1) media use is active; (2) a reciprocal (i.e., non-linear) relationship exists between media use and effects; and (3) identity, sense of self, and aspects of one's psychological development influence media selection, media interaction, and application of lessons from media to one's own life. Brown and her colleagues found in multiple studies that exposure to sexual content in music, movies, television, and magazines accelerated adolescents' sexual activity, with some differences based on demographics (Brown et al., 2006; Pardun, L'Engle, & Brown, 2005). Additional work found that mass media were just as influential on adolescents' sexual behavior as were other socialization factors, such as family, religion, school, and peers (L'Engle, Brown, & Kenneavy, 2006). This body of work contributed a great deal of empirical evidence about the nature of mediated portrayals of health-related behaviors, as well as the role of media use, in socializing adolescents and shaping their views on what is and is not normal, acceptable, or even expected sexual behavior.

Entertainment

Research on the effects of entertainment media on health outcomes is another important area of study. Slater and Rouner (2002) developed an extended version of the elaboration likelihood

model (E-ELM) to explain how entertainment messages influence viewers beyond modeling of rewarded behaviors or avoidance of punished behaviors. The E-ELM focuses on the absorption potential of a narrative and posits that entertainment messages can be particularly influential when audiences are immersed in a narrative, thereby making them less likely to counter-argue and more likely to shift their attitudes than if they were consuming non-entertainment media. The entertainment overcoming resistance model (EORM) has also been proposed as a conceptual framework for understanding how entertainment messages influence attitudes and behavioral outcomes, including health-related outcomes (Moyer-Gusé, 2008). The EORM integrates multiple theoretical perspectives on audience involvement (including the E-ELM and social cognitive theory) to provide a comprehensive explanation as to why entertainment messages can shift behaviors. Together, this work linking entertainment media to health outcomes helped spur increased interest in entertainment education and the effects of narratives related to health.

Social Norms

In the mid-2000s, a conceptual article (Lapinski & Rimal, 2005) and an empirical test of the theory of normative social behavior (Rimal & Real, 2005) turned many health communication scholars' attention to the role of social norms in shaping health message effects. Rimal and his colleagues demonstrated that descriptive norms, or our beliefs about how common a behavior is in our social network, influence behavior, but are also moderated by norms of social approval, outcome expectations, and group identity. In a later update to their initial theorizing about the role of social norms, Rimal and Lapinski (2015) noted that additional moderators may impact the role of social norms on health behaviors (e.g., involvement, group proximity) and that studying specific attributes of target behaviors is crucial for continuing to advance our understanding of how social dynamics shape message effects.

Psychological Reactance

Another concept that became prominent in the health communication literature during the mid-2000s was that of reactance. Dillard and Shen (2005) published a multi-study paper describing the nature of reactance and how reactance theory can be applied to health communication contexts. Building on work by Brehm (1966) defining reactance as a threat to one's freedom, Dillard and Shen demonstrated that both anger as well as negative cognitions were important components of reactance. They found that messages that included threats to freedom evoked greater anger and negative cognitions, which in turn influenced attitudes and intentions (related to flossing and alcohol consumption). Shen (2010) later investigated ways to mitigate reactance, finding that inducing state empathy is a helpful tactic. Together, this work on reactance helped advance the field's understanding of when and why persuasive health messages may backfire with some audience members. Since health messages typically focus on threats, the research on reactance reminds scholars that persuasion and post-message health behavior change is not as simple as telling audiences that a threat exists. Instead, audience resistance to the message and the messenger, as well as to the target behavior, must also be considered when investigating health message effects.

Limitations and Controversies

The programs of research and notable studies mentioned above are all evidence of the rich quality of scholarship in this area of media effects research. However, the subfield is not without

its limitations and ongoing controversies. More broadly, health communication scholarship has been criticized for its frequent lack of attention to or advancement of theory (Beck et al., 2004; Freimuth, Massett, & Meltzer, 2006). One contributing factor is the interdisciplinary nature of much of the work on health media effects, whereby communication scholars partner with researchers from public health and medical sciences who are often less concerned with theory than they are with practical outcomes and securing grants to achieve those outcomes (Hannawa et al., 2013). However, even when theory is applied, it is sometimes done incompletely or without careful attention to the dynamics of media and audiences.

For example, most studies that apply SCT focus on the role of self-efficacy in predicting message outcomes while ignoring the role of outcome expectations, another central part of the theory. When researchers do add outcome expectations to work applying SCT in health contexts, the explanatory power of their models increases (Noar et al., 2015), making a case for the need to more thoroughly apply existing theories in order to improve our ability to predict health message effects. In another example, Nabi and Clark (2008) found that some audiences may still model negatively reinforced behaviors performed by mediated characters, even though SCT would predict that people would not want to try behaviors they saw as punishable. That is, audience expectations related to scripted television dramas resulted in an outcome opposite to the original tenets of SCT, which should motivate additional work in this area to better understand when and why SCT does or does not predict health message effects.

O'Keefe (2012) made another case for using caution when applying outside theories to research about the effects of health messages on audiences. He noted how the application of prospect theory (Kahneman & Tversky, 1979) to health-related media effects has been problematic. Specifically, this approach is based on the argument that audiences are more likely to be persuaded to perform disease-preventing behaviors if they see a loss-framed message (i.e., one that emphasizes potential costs) because prevention contexts are low risk. However, audiences will be more likely to be persuaded by gain-framed messages (i.e., ones that emphasize potential benefits) when the target behavior is about detecting a disease, which is a higher risk context than prevention (Rothman & Salovey, 1997). Yet, these suppositions have not been supported by meta-analyses, which find almost no relationships between gain or loss message framing and the type of target behavior (prevention or detection) on message outcomes (O'Keefe & Jensen, 2007, 2009). O'Keefe (2012) suggests that the lack of support for this application of a theory from another field to the health message effects context is likely due to different definitions of key terms: the behavioral economists who developed prospect theory conceptualized risk as uncertainty (with more uncertainty of an outcome indicating greater economic risk), and not as the likelihood of a bad outcome occurring, which is how risk is typically applied in health communication contexts.

Moreover, theoretical propositions as to the role of risk perceptions themselves in shaping health message outcomes have received mixed support. Fishbein and Yzer (2003) note that across applications of different health behavior theories, perceived risk is not a consistent immediate predictor of behavioral outcomes. One potential explanation for the lack of direct connection between perceived risk and behavioral outcomes is that simply putting risk-related information in a message is not necessarily enough to change risk perceptions, and that more work is needed to understand the interplay between message factors and audience identities, beliefs, and personality traits in shaping risk.

Some theory does exist trying to link features of health narratives with risk perceptions. So and Nabi (2013) proposed and tested their risk convergence model, finding that in addition to

perceived personal relevance of a health threat, common psychological processes related to narratives—character identification, parasocial interaction, perceived realism, and transportation—can each influence audiences' social distance with mediated personae facing health threats. Lower social distance, in turn, is positively related to audiences' personal risk perceptions. Future work could apply this model in multiple domains and continue to test the ways in which different message features and psychological processes associated with them impact risk perceptions, and then how risk predicts behavioral change. Additional work could advance our understanding of the role of risk in health message effects by testing risk perceptions as both moderators and mediators of behaviors, not just message outcomes.

Given their connection to risk perceptions, another notable controversy in the field of health-related media effects has been how best to utilize emotional appeals to promote behavior change. As noted above, meta-analyses of EPPM and fear-related message effects have not supported the predicted interactions between perceived threat and perceived efficacy (Popova, 2012). However, meta-analytic evidence does support a positive linear relationship between fear arousal and persuasion (Tannenbaum et al., 2015). Yet, researchers still do not fully understand the moderators or boundary conditions as to when and for whom fear-arousing messages lead to attitude and behavior change. Recently, Dillard and his colleagues have returned to earlier theorizing on fear appeal effects to argue for the importance of looking at within-person shifts in fear arousal to understand its persuasive power, with the fear curve being a better predictor of persuasion than end-message fear (Dillard, Li, Meczkowski, Yang, & Shen, 2017). Although this within-subjects research points to the persuasiveness of fear in laboratory settings, more work is needed to understand the best placement of threat components in a message in order to evoke the ideal fear curve (or curves) for persuasion, and how these shifts in fear compare to messages that do not evoke fear.

Even if fear is positively related to persuasion, ethical concerns arise when using scare tactics to persuade audiences to change their health behaviors, especially when targeting high-risk populations who may not have the resources to effectively deal with the fear aroused by a health message (Hastings, Stead, & Webb, 2004). If fear causes distrust of a message source or if audiences become desensitized to fear-arousing messages, then fear appeals could easily backfire and cause more harm than good. Studying audiences' multiple emotional responses (Dillard, Plotnick, Godblod, Freimuth, & Edgar, 1996), mixed emotional responses (Myrick & Oliver, 2015), coactive affective states (Keene & Lang, 2016), and their shifts in emotional responses across message components (Nabi, 2015) are also encouraging strategies for overcoming current limitations in understanding the role of emotions in health-related media effects.

The above examples all demonstrate the need for media effects researchers interested in health-related message effects to develop deeper understandings of the other fields from which they draw theory and to then critically analyze the role of media and media affordances in applying those theories. Health messages have had unintended negative effects on audiences, potentially due to a lack or misspecification of theory. For instance, multiple anti-drug public service announcements have been found to be perceived as ineffective by the target audience (Fishbein, Hall-Jamieson, Zimmer, von Haeften, & Nabi, 2002); others have even associated anti-drug campaign exposure with lower intentions to avoid drugs (Hornik, Jacobsohn, Orwin, Piesse, & Kalton, 2008). Increased critical application of theory could help health communication scholars better explain the role of media and audience factors in shaping health outcomes. Moreover, theory could help prevent the dissemination of messages that inadvertently harm public health. The task of better integrating theory into health message design will likely require media

researchers to be persuasive advocates for theory's ability to improve predictive power with both their interdisciplinary colleagues and with funding organizations at early stages of these projects.

Perhaps more than in other subfields of media effects research, message effects on actual behaviors (and not just on attitudes or behavioral intentions) are crucial in the context of health messages. If attitudes or intentions shift but not behaviors, then public investments in large-scale health campaigns may be unwarranted. As noted above, existing theory in health media effects posits a specific relationship between attitudes, intentions, and behaviors, whereby attitudes are one predictor of intentions, which then predict behavior (Fishbein & Yzer, 2003). However, the message design formula suggested by the integrated model may need additional testing and further refinement in order to better encapsulate the dynamic interplay of these variables. For example, Nabi and Myrick (2019) found that feelings of hope and of fear after viewing sun-safety messages predicted both intentions and actual behavior, but neither emotion predicted or even correlated with attitudes toward sun-safety behaviors. They posited that when messages target unpleasant behaviors (e.g., the time-consuming task of putting on sunscreen, which many people also find uncomfortable), attitudes may be less important than motivational factors (like emotions) in shaping behavioral outcomes. Additional research is needed to better assess how audience and message factors determine the interrelationships between attitudes, intentions, and behaviors.

Opportunities for Advancement

The above limitations and controversies offer a number of opportunities for advancement of health-related media effects research. Additionally, many other possibilities exist for researchers to advance this area of work. For instance, health communication as a field has long included both mass communication and interpersonal scholars, making it an area of research that fosters interconnections between these two areas (Kreps, Bonaguro, & Query, 1998). Research on the effectiveness of public health campaigns has recognized the role interpersonal interactions about media messages can have in either promoting or preventing desired message outcomes. Southwell and Yzer (2007) argue that interpersonal communication can directly shape media campaign outcomes, can mediate campaign outcomes by facilitating subsequent behaviors, and can moderate campaign outcomes. Other researchers have applied social network theories and analysis techniques from interpersonal communication contexts to better understand how health interventions disseminate through schools via social talk (Choi, Hecht, & Smith, 2017) and how people support each other, share information, and seek information related to health via online support groups (Kim et al., 2012; Kim, Shah, Namkoong, McTavish, & Gustafson, 2013) and social media platforms (Myrick, Holton, Himelboim, & Love, 2016).

Another area of advancement for health-related media effects research is in increasing our understanding of how messages in one's existing media environment shape responses to subsequent health messages. Hypothetically, while a laboratory experiment may find a particular type of message highly persuasive in convincing the public to get vaccinated against influenza, if the vaccination campaign launches at the same time as news reports about the low levels of effectiveness of the vaccine, then that campaign may not be effective. Additionally, research on the effects of competing political frames and counter-frames could provide guidance to health communication researchers interested in understanding this real-world phenomenon (e.g., Chong & Druckman, 2013). Gaining deeper insights into inter-media effects and the dynamics of exposure to different types of health media content will require creative, multi-method, and longitudinal designs in future research.

Understanding social determinants of health and their interrelationships with message effects was an additional advancement in the field that took place during the mid-2000s and continues to offer opportunities for advancement of media effects research. Viswanath and colleagues demonstrated how social determinants such as race/ethnicity, social class, and neighborhood location or structure could impact the effectiveness of health messages (Viswanath & Emmons, 2006). Niederdeppe, Bu, Borah, Kindig, and Robert (2008) suggest purposeful message framing, use of narratives, and visual images are all promising message design strategies for raising awareness of social determinants of health.

Implications of Newer Communication Technology

The affordances of newer communication technologies offer many additional research opportunities for scholars interested in health-related media effects. Thanks to these technologies, it is now easier than ever for algorithms to create and deliver health messages that are specifically designed for particular individuals. Health communication researchers have repeatedly found such message tailoring to be an effective health behavior-change communication strategy (Kreuter, Farrell, Olevitch, & Brennan, 2000; Rimal & Adkins, 2003). Research suggests that tailored messages are more persuasive than generic ones because tailored messages increase the perceived personal relevance of the content (Jensen, King, Carcioppolo, & Davis, 2012). Notably, though, simply tailoring health messages on demographics or previous behavior may not be the most persuasive approach to message tailoring. A meta-analysis of the effects of print tailored health messages found that tailoring messages based on theory-related variables resulted in stronger effects sizes than did messages tailored on behavior alone (Noar, Benac, & Harris, 2007). This finding accentuates the need to apply theory when studying health media effects and when crafting algorithms to supply tailored health information to individuals.

Another affordance of communication technology is the ability of individuals to search online for health information themselves anytime and anywhere, all without having to visit a trained healthcare professional. Online health information seeking is associated with important health outcomes, from an increased likelihood of making an appointment with a healthcare provider (Eastin & Guinsler, 2006) to gains in knowledge, improved social support, enhanced coping abilities, and stronger self-efficacy (Galarce, Ramanadhan, & Viswanath, 2011; Morahan-Martin, 2004; Shim, Kelly, & Hornik, 2006). In an experimental study of the effects of online health information seeking, a number of important mediators of post-search attitudes and behaviors were found, including how relevant the search seemed to the user and how scared as well as how hopeful they felt once the search was over (Myrick, 2017). Additional work is needed to understand how and why online health information motivates some people to take action while it causes others to avoid information.

While online health information seeking is associated with many positive outcomes, as mentioned above, it has a darker side. The internet is filled with inaccurate health information, myths, and falsehoods, which can spread across social networks faster than ever due to digital technologies and the popularity of social media platforms (Southwell & Thorson, 2015). For instance, even though medical science has repeatedly disavowed the falsely reported link between vaccinations and autism, many websites continue to warn parents away from vaccinating their children (Kata, 2012). In 2014, dangerous untrue rumors spread in west Africa via the social media platform Twitter among communities affected by the Ebola virus (Oyeyemi, Gabarron, & Wynn, 2014). Fortunately, preliminary work suggests that posting corrections to health

misinformation on social media can help correct users' misbeliefs about health threats (Bode & Vraga, 2018). Additional work testing theoretical mechanisms of correction effects and how best to counteract health misinformation, perhaps with tailored counter-messages, is needed.

Furthermore, the affordance of interactivity makes understanding the effects of websites, video games, wearable health/fitness trackers, and mobile applications an important developing area of research. Interactivity can be defined as receiving information or feedback that is contingent upon the previous message or action (Rafaeli, 1988). Users have rated interactive health websites more favorably, and as having more comprehensible material, than websites with fewer interactive features (Lustria, 2007). While each of the aforementioned platforms—websites, games, trackers, and mobile applications—can be interactive, they may differ in other facets that shape how they impact users. For instance, narratives can be interwoven into exergames, which are games designed to increase physical activity (Lu, 2015), whereas it may be more difficult to make an informational website or fitness tracker into a narrative experience. Another consideration is that social cues and design features allow users to compare their tracked exercise with others or seek social support, resulting in a mix of human-computer and computer-mediated health communication. Additional work is needed to continue assessing the psychological mechanisms of interactivity's role in health message design and effects.

Conclusion

We know a great deal about the ways in which media affect individual and public health. We know that there are a number of potential theoretical frameworks to explain message effects in this area, many of them dealing with the role of psychological processes such as threat and efficacy perceptions, emotions, and social norms, to name only a few. We know that newer communication technologies may potentially increase the spread of health misinformation, but they also offer great promise for reaching different populations and motivating sustained behavior change. We know that there is a great deal of impressive research in this area of media effects, but also that much remains to be done. If societies want to use media to combat growing health crises related to poor diets, lack of clean water, increased stress levels, infectious diseases, and other serious threats to health and well-being, then improved application of theory and advances in methodology, as well as creative integrations of the two, are needed to continue to advance health-related media effects research.

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