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Presence in a Persuasive Drinking and Driving Message

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ABSTRACT

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In this paper, I argued that the psychological feelings of presence generated from the technology used to disseminate a persuasive drinking and driving message mediated the persuasion process, leading to attitudes consistent with the message. An experiment was conducted with 232 participants placed into one of four conditions (written screenplay, flat video, 3D video, and virtual reality) to test the impact of the condition on spatial, social, and self-presence as well as on drinking and driving attitudes. Results showed that technology largely had no impact on feelings of spatial, social, and self presence, with only two significant differences emerging from the conditions. Further, three mediation analyses were conducted to test the full model, and these indicated that presence mediated the relationship between the technology condition and drinking and driving attitudes, but only in two instances. Spatial presence had a positive impact on attitudes, and self-presence had a negative impact. This examination provided a more complete understanding of how immersive technologies and presence function in persuasive health messages. Practical implications are discussed.

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CHAPTER I: INTRODUCTION

Healthcare communicators have many techniques available to create persuasive health messages. Presenting messages using different types of technology may be an effective way to convince people to adopt different attitudes and beliefs toward promoted health behaviors. In particular, technologies that allow users to experience higher levels of presence—the illusion of nonmediation (Lombard & Ditton, 1997; Westerman & Skalski, 2010)—involve simulated experiences that change people's attitudes toward health behaviors (IJsslsteijn et al., 2006). For example, media representations using virtual reality (VR) technology have been useful for people trying to overcome phobias (Parsons & Rizzo, 2008) and eating disorders (Perpina, Botella, & Banos, 2003). Similar technologies have been used in courtroom reenactments to allow juries to experience crime scenes virtually (Bailenson, Blascovich, Beall, & Noveck, 2006). Commercial advertisements allow users to experience products virtually (Suh & Lee, 2005).

These immersive technologies create compelling feelings of presence, allowing users to feel as if they are physically in a different environment (Biocca, 1997; Nicovich, Boller, & Cornwell, 2005). In fact, researchers have begun to explore if feelings of

presence can lead to persuasion. For example, in a study on the potential for virtual reality technologies to induce presence related to tourism attitudes, Tussyadiah et al. (2018) identified presence as the potential mechanism for attitude change. The argument behind feeling present and having an attitude change stems from the concept of real experience, which play a large role in attitude formation (Fazio & Zanna, 1981). Because humans tend to consider as real experiences that invoke high levels of presence (Tussyadiah & Personen, 2018), such experiences could lead to real attitude change.

Further, presence tends to create a more involving experience; this finding is commensurate with theories of persuasion, which indicate that when a person is highly involved or engaged with a message, persuasion is more likely to occur (Petty & Cacioppo, 1986). In addition, researchers in public health have supported the idea that realism is an important factor often missing from health interventions (Petraglia, 2009). Realism is especially important in mediated experiences designed to motivate individuals to apply knowledge and facilitate behavior change in their lives. Petraglia noted that public health campaign messages compete against an abundance of available health information—messages designed to change health behaviors are lost and thus fade into the background. Even when people pay attention to the health information, they do not always apply the memories they form from the information to their lives (Whitehead, 1929). Petraglia posited that amplifying the realness of a message is a way to differentiate it and make it stand out among the many health behavior change messages—realism may enhance the relevance of the message and hence its applicability.

Thus, presence and the perceived realism it creates may be an important persuasive mechanism worth applying to prosocial health messages. One context that could benefit

from clarifying the use of presence, technology, and persuasive outcomes is the context of preventing drinking and driving. Many public health messages communicate that it is wrong to drink and drive, yet in 2015, nearly one third of all traffic deaths were the result of drinking and driving (Department of Transportation National Highway Traffic Safety Administration [NHTSA], 2015). Further, in the same year 1.1 million people were arrested for drinking and driving, indicating that the behavior to date is widespread (NHTSA, 2015). Invoking a realistic but simulated drinking-and-driving experience may help reduce this behavior.

This dissertation has three goals. The first is to understand if psychological feelings of presence vary among the different types of technology used to present the message. The second is to determine if the technology used to disseminate the persuasive drinking and driving message creates (technologies likely varying in their capacity to induce feelings of presence) attitude scores consistent with the message, through the mechanism of presence. The third goal is to generate knowledge about message design that health campaign designers could use, especially designers who might engage newer technologies for their persuasive messages. Understanding the power of presence in health communication and persuasion could have important applications to other health behaviors. Practitioners could learn how to present messages to create effective changes in public attitudes, ultimately benefiting society.

Presence in Health Persuasion

To understand the impact of presence in health persuasion, healthcare communicators need a full understanding of how users feel presence through technology.

The following discussion includes explanations of the concepts of technology and presence.

Experiences with Technology

Technology is an omnipresent presentation factor that can take on many modalities (e.g., TV, radio, video games, mobile devices, 3D, virtual reality; Lu, Baranowski, Thomson, & Buday, 2012). As a communication factor, technology is separate from the message but functions in tandem with the message (Braddock & Dillard, 2015). Researchers have questioned the impact of technology on persuasive outcomes, especially when combined with a persuasive message (Lu et al., 2012).

Different types of technology may produce different experiences based on the specific features of the technology, along with users' perceptions and interactions with those features—these experiences are called *affordances* (Treem & Leonardi, 2013). It is important to distinguish between features of technology and affordances of technology. Features of technology are generally referred to as structural components of the technology, such as a built-in webcam in a laptop (Evans, Pearce, Vitak, & Treem, 2017). In contrast, affordances include the dynamic interactions users have with the features of the technology, as well as users' perceptions of what they can do with those features (Evans et al., 2017). In the case of the webcam, an affordance may be the ability to make a video call, and an outcome may be talking to and seeing a relative in another country. Based on the different features of the technology, people may perceive different affordances even when presented with the same features (Treem & Leonardi, 2013). For example, people may agree that a laptop has a webcam, which allows someone to video chat; others may view the laptop webcam as a mechanism for hackers to spy on them.

Different technologies offer different affordances. For example, a head-mounted display (HMD) system gives users a virtual reality experience by reacting to body movements and surrounding users with media, thus providing an encompassing audiovisual experience. A television, on the other hand, would not have those same affordances of body movements because users typically control the television with a remote and sedentarily watch programming on a flat screen that does not encompass or surround them with media. In addition, affordances vary depending on the advanced nature of the technology. The effects of these differences produce more or less psychological immersion (i.e., presence; Lombard & Ditton, 1997 and produce feelings of engagement in mediated environments (Biocca, Harms, & Burgoon, 2003).

Presence, Defined

Presence has been conceptualized as a perception of nonmediation—the feeling people have of being in a real environment when they are actually in a mediated environment (Lombard & Ditton, 1997; Steuer, 1995). In real life, the feeling of being "present" in a physical place is something people do not usually notice; instead, they tend to operate with a general understanding that they are physically there in a certain place and can move around and do what they want (Riva, Davide, & IJsselsteijn, 2003). However, sometimes this feeling of being present can occur in a mediated environment. In fact, certain types of technology can replicate the feeling of being present in a physical place without reminding users that they are in a mediated environment. In this case, the perception of presence is attributable to technology rather than to a real environment, which means that technology can be involved in creating feelings of presence.

Not all technology users experience the phenomenon of presence. To experience presence, users need some type of technology, which allows users to feel physically present in another environment; however, feeling present is a psychological phenomenon (Lombard & Jones, 2015). This means that even if a certain technology has affordances that create an immersive, realistic environment, some users may refrain from becoming psychologically immersed in the experience (Lombard & Jones, 2015), perhaps by reminding themselves the experience is mediated. These people would not experience presence. Although technology can aid in the process of feeling presence, because presence itself is a psychological phenomenon, the illusion of presence depends on the person experiencing the mediated environment (Lombard & Ditton, 1997). In fact, presence as a psychological state or perception does not encompass the role of technology in the user's experience (International Society for Presence Research, 2000). Therefore, although technology plays a role, users choose the extent to which they ignore the mediated component and become absorbed in the environment.

Scholars have conceptualized presence in many ways. In addition to technology, Lombard and Jones (2015) outlined two key factors to define in a study about presence: (a) determining if technology plays a role, and (b) defining the origin of the phenomenon. Thus, a discussion of several factors was required to define presence adequately for this study.

First, in this study, technology played a role in establishing a sense of presence, serving as the key manipulation of presence. One type of technology used consisted of virtual reality and head-mounted displays. Virtual reality and HMDs have been shown to increase presence, giving users a sense that they are in another environment (Riva et al.,

2003). In this case, newer technologies create more realistic depictions of the world and allow users to feel higher levels of presence, which contribute to the illusion of nonmediation (Lombard & Ditton, 1997). This nonmediated quality is part of the appeal of such technologies.

As mentioned previously, presence is a psychological experience and thus not tied to any specific type of technology; however, some technologies may be more suited to increasing users' sense of presence. Virtual reality may be more effective in increasing presence—the more life-like the mediated environment, the more consumers of the media experience the mediated world as they do the real world (Spagnolli, Lombard, & Gamberini, 2009). For example, if a technology allows users to experience all five senses in a mediated environment, it would be difficult for users to recognize that the environment is not real—the five senses are the primary way people experience the world (Sundar, Oh, Kang, & Sreenivasan, 2013). If a technology existed that allowed users to see, hear, touch, smell, and even taste things, they would likely be convinced they were in the physical world. Technologies that are more vivid and rich (i.e., cater to more of the five senses) allow users to feel a greater sense of presence than they would viewing traditional television footage, which only allows users to hear and see things (Lombard & Ditton, 1997; Steuer, 1995).

Another important factor to define in this study was how people feel presence. Sheridan (1992) proposed three technology-related categories that determine how users feel presence. First, as described previously, when multiple senses are stimulated, presence increases (Sheridan, 1992). However, it is important to note that people experience sensory stimuli in both the real world and in the mediated world and can

sometimes experience both at the same time. For instance, when people watch television, they may be watching intensely and listening to the TV while ignoring the physical environment; however, the moment someone spills a drink on them, they are immediately paying attention to the physical environment as it becomes more dominant. Therefore, when people have mediated experiences, they may sense things in the mediated world as well as in the physical world. Whichever environment emerges as the most salient or deserving of response becomes the dominant environment (Riva et al., 2003). Consequently, people who feel that the dominant environment is the mediated one do not tend to recognize the mediation (Riva et al., 2003). Because people have limited attentional resources, the real world and the mediated world compete for attention, and people become absorbed into the dominant world (Draper et al., 1999).

Sheridan (1992) proposed that immersive types of media like HMDs or computer monitors that display navigable environments increase presence by giving people control over their sensory mechanisms, allowing them to modify or change their environment. This can occur with any virtual reality or media users consider immersive. For example, immersive storytelling technologies are commonly used to tell stories to make people feel present in the environment of the story (Shin & Biocca, 2017). Telling stories with immersive technologies can be persuasive when people feel as if they are in the events of the story (De la Pena et al., 2010); persuasion likely increases through presence, as discussed later. In sum, virtual reality involves methods of presenting messages that increase presence.

In addition to these key factors that can define presence, it is also important to note that presence is a multidimensional construct that includes self-presence, social

presence, and spatial or physical presence (Biocca, 1997; Heeter, 1992). As mentioned previously, physical presence is users' sense of feeling present in an environment to the extent users forget it is mediated; social presence is essentially noticing that others are also present in the environment, and self-presence occurs when users have a sense of themselves in the environment.

Types of presence. Presence has been categorized into six conceptualizations (Lombard & Ditton, 2006). In this study, I focused on persuasive outcomes; therefore, for this study, only three conceptualizations were explicated: self-presence, social presence, and spatial/physical presence (Sundar et al., 2013).

Self-presence. Users have been able to navigate virtual environments with avatars, defined as computer-generated proxies that serve as customized, visual representations of users (Holzwarth, Janiszewski, & Neumann, 2006). However, avatars are mediated and therefore do not induce a feeling of nonmediation necessary for self-presence. Self-presence has been formally defined as the feeling users have that their bodies are actually in a virtual world (Biocca, 1997). Thus, for self-presence to occur, people cannot use avatars; instead, they must retain a sense of self while experiencing mediated environments. With technological advances, virtual reality (VR) can deliver this feeling (Sundar et al., 2013). In terms of richness, VR offers the most life-like experiences and provides the opportunity to experience the most self-presence possible with current technology (Sundar et al., 2013).

The experience of self-presence relies mainly on accurate or realistic representations in media content. If a technology can produce accurate depictions of things, events, places, and people, then audiences will feel these representations are life-

like and experience a sense of realism (Lombard, Ditton, & Weinstein, 2009). Perceiving realism does not inherently mean that the media content must be nonfiction; however, the content and actors must be plausible. For instance, a science fiction program could be high in realism because although the scenes from the program are unlikely, the actors and props in the program look and sound as viewers would expect if they did exist (Lombard et al., 2009). On the other hand, animated characters in a cartoon show do not look like anything viewers would encounter on the street, thereby reducing levels of perceived realism. Because viewers would not consider these characters realistic, this medium would be considered low in perceptual realism.

Using technology and virtual reality to create a sense of self-presence has implications for persuasion in terms of changing attitudes. Psychologists have found that inducing a sense of self-presence with a VR treatment is more impactful for individuals trying to change their feelings toward phobias and confront traumatic experiences, compared to the impact on individuals trying to work through their phobias with video game versions of the same treatment (Walshe, Lewis, Kim, O'Sullivan, & Wiederhold, 2003). In addition, arachnophobic individuals who touched and held spiders using virtual reality had more positive attitudes toward spiders than did those who did not touch and hold spiders (Garcia-Palacios, Hoffman, Carlin, Furness, & Botella, 2002). In terms of persuasion, this evidence shows that perceptions of self-presence are influential in changing attitudes, even the toughest attitudes. Although these studies were conducted outside of the realm of persuasion, they involved fundamental attitude change and showed how technology has the power to induce self-presence, which in turn affects persuasive outcomes.

Social presence. Social presence is defined as users' feeling that other people are present in the mediated environment (Biocca et al., 2003). This sense of others being represented in a virtual environment goes beyond spatial presence and involves feeling as if other people are there (Biocca & Harms, 2002). In mediated environments, technological affordances determine how much social presence users feel; depending on how advanced the technology, others can be represented as human forms with text, pictures, three-dimensional figures, or avatars (Biocca et al., 2003). For example, researchers studying a health context demonstrated that increasing feelings of social presence through an interactive agent eased the processing of a persuasive message and created healthy attitudes and behavioral intentions toward blood pressure (Skalski & Tamborini, 2007). As was evident with other conceptualizations of presence, social presence has been shown to affect attitudes, specifically attitudes toward the mediated representation of other users and persuasion (Bailenson, Blascovich, Beall, & Loomis, 2001; Choi, 2000).

Spatial presence. Related to self-presence is the concept of spatial presence, representing users' sense of space in a mediated environment; users feel as if they can move around and navigate in the mediated environment as they would in the physical environment (Sundar et al., 2013). As such, technology that features more navigation affordances and the ability to transverse a mediated environment boosts users' feelings of spatial presence (Balakrishnan & Sundar, 2011). In addition, movement and navigation capabilities in virtual environments enhance feelings of realness; however, these capabilities depend solely on the affordances of the technology available. Balakrishnan

and Sundar (2011) demonstrated virtual environments in which users' lack of ability to navigate (e.g., steering capabilities) reduced users' feelings of spatial presence.

Westerman and Skalski (2007) are very clear that although other types of presence exist, most scholars are referring to these three types of presence when conducting presence studies. Further, it is known that technology and computers impact these three types of presence—when people have mediated interactions they generally feel spatial, self, and social presence (Westerman & Skalski, 2007). Each of these types of presence suggest that people experience virtual environments as non-virtual. In fact, using technology has often been compared to real life, non-virtual experiences, as in the media equation (Reeves & Nass, 1997). The premise of this is that people interact with technology in a way that mimics social experiences in real life (Reeves & Nass, 1997). Social and self presence are closely tied to this long-standing notion and important to virtual experiences. Thus, these three were chosen for the current study. Based on these three conceptualizations of presence, it is possible presentations of one persuasive message using technology with different immersion capabilities (e.g., 360-degree VR, 2D video, and written) would lead users to feel presence differently. In this study, I sought to answer the following research question:

RQ1. Do different technologies affect perceptions of (a) spatial presence, (b) social presence, and (c) self-presence?

Persuasive Technology and Presence

Technology has been shown to affect persuasive outcomes in persuasive messaging appeals (Sundar, 2008; Sundar, Oh, Kang, & Sreenivasan, 2013). In fact, persuasive technologies are defined as any type technology purposefully designed to

integrate the principles of persuasion (e.g., credibility, involvement, trust) into interactive media in order to change an individual's attitude or behavior (de Kort, Midden, Eggen, & Fogg, 2007). To explain persuasion through technology, researchers have pointed to the ability of technology to create feelings of presence through the realistic environments and experiences it provides users, even when those experiences are in fact mediated (Sundar et al., 2013).

Persuasive technologies such as video games, mobile devices, and even websites have been used to change health behaviors such as motivating people to adhere to regimens or engage in physical activity (Baranowski et al., 2008). Persuasive technologies can influence health in three ways: as tools, as media, and as social facilitators (Chatterjee & Price, 2009). As tools, technologies can make behaviors easier and motivate people to perform regimental behaviors, such as technology that provides reminders or calculates daily caloric intake (Bickmore, Mauer, Crespo, & Brown, 2007; Fogg, 2003). As media, technologies can persuade by providing people opportunities to practice behaviors—for example, video games can help children manage their asthma and control their breathing (Vilozni, Barker, Jellouschek, Heimann, & Blau, 2001). Finally, in terms of social facilitation, technologies can connect people with social support networks. Receiving positive social feedback and connecting with others facing similar health situations can motivate patients (Fogg, 2003).

As described earlier, media that offer richer content could be more engaging because of the increased realness, which affects users' attitudes (Sundar et al., 2013). This could be especially useful for public health interventions designed to motivate people to change their behavior. Often, many public health messages are present in the

environment—for example, billboards, radio advertisements, and television commercials. When people repeatedly hear and see messages, they begin to tune them out (Petraglia, 2009). However, when messages seem realistic, people attend to them more. Viewers can learn from the messages because the information is realistically applicable to their own lives (Petraglia, 2009). Thus, viewers form attitudes consistent with the persuasive message because the realism makes the message applicable and more useful. Supporting this notion, Coyle and Thorson (2001) found that people formed more positive attitudes toward websites containing more visual richness, compared to plainer websites, and these positive attitudes lasted longer than did the attitudes among people who viewed less visually rich sites. The concept of creating visually rich, realistic environments coincides with the concept of presence, which represents the final reason to consider technology in health persuasion.

Presence and persuasion. As stated previously, vivid, rich technologies with affordances that cater to many senses contribute to users' illusion of being in a real environment. Fazio and Zanna (1981) noted the importance of this contribution to the overall idea of persuasion, claiming that when users have real experiences, they form stronger and more accessible attitudes. For persuasion scholars, this process denotes the opportunity to achieve stronger persuasive outcomes.

The literature is scarce on the effects of presence on persuasion; most researchers have studied business and advertising, not public health. However, when studying the outcomes of presence on advertisements, scholars have found that people are more likely to adopt brand images and hold attitudes about brands that are consistent with the advertisers' persuasive intent (Coyle & Thorson, 2001). For example, Jin (2010)

presented an ad using technology that allowed people to experience a sense of touch and movement; viewers formed an attitude toward the brand that aligned with the advertisers' objectives, compared to the attitudes of people who received a less rich ad. Thus, experiencing the movement and touch made the experience feel real, gave viewers a feeling of presence, and led to desirable persuasive outcomes (Jin, 2010). Other researchers have supported the notion that presence acts as a mediator, facilitating persuasion. For instance, Fortin and Dholakia (2005) found that presence mediated the relationship between the realistic and interactive features of an advertising message and the message's effectiveness. Because presence produces the illusion of a real experience, and people align their attitudes with their experiences, in this study, I sought to discover if differences in perceptions of presence in prosocial health messages could lead to differences in attitude, as has occurred in advertising.

Virtual reality, persuasion, and presence. As discussed previously, virtual reality (VR) fosters feelings of presence. Some researchers have shown that VR can be used to persuade audiences. In fact, the definition of VR from Blascovich et al. (2002) is similar to the definition for presence. Virtual environments involve "synthetic sensory information that leads to perceptions of environments and their contents as if they were not synthetic" (Blascovich et al. 2002, p. 105). This perception of nonsynthetic environmental stimuli can affect the feeling of having a real experience and shows why virtual reality has been used in health practice and communication to persuade people to change their attitudes and behaviors. Accordingly, VR has been used to achieve persuasion in the context of health behavior change (Fox, Bailenson, & Binney, 2009; Girard, Turcotte, Bouchard, & Girard 2009; IJsselsteijn et al., 2006), prosocial behavior

change (Ahn et al., 2016), and advertising (Li, Daugherty, & Biocca, 2002; Suh & Lee, 2005).

Accordingly, Fox, Christy, and Vang (2014) showed VR plays a role in persuasion because of its psychologically life-like experiences. These experiences are then directly translatable and transferrable into real-world attitudes, which viewers can apply to any circumstance. This finding supported the claims of Petraglia (2009), who indicated that increasing message realism increases the subsequent applicability and adoption of messages. Tussyadiah et al. (2018) supported this notion by noting presence as the key psychological mechanism for VR technologies designed to persuade people. Presence is thus the causal factor in how people process the information they encounter.

The literature has indicated that users can translate the sense of realism or presence felt during the experience to the real world, which leads to behavior change in line with the message. For example, in an eating study, Fox et al. (2009) explored the concept of virtual imitation, or the way in which people might mimic their virtual selves in the real world. Fox et al. studied feelings of presence in a VR world. Their participants saw realistic VR representations of themselves eating either healthy food (e.g., carrots) or unhealthy food (e.g., candy). In one condition, participants saw their bodies gain and lose weight based on food choices, which were designed to be realistic and presence-inducing; in the other condition, their bodies stayed the same (reflecting less presence; Fox et al., 2009). The findings supported the idea that presence affected imitation in real-life eating behaviors (Fox et al., 2009). Specifically, women who felt high levels of presence and saw their bodies change were more likely to suppress their eating behavior and refuse the candy offered after the study (Fox et al., 2009).

Although Fox et al. (2009) used the term *virtual imitation*, the concept of allowing virtual behavior to transfer to real-world behavior is similar to the Proteus effect—the concept that virtual experiences affect people's real experiences (Yee, Bailenson, & Ducheneaut, 2009). In fact, the argument behind the Proteus effect rests on this idea (Yee, et al., 2009). One study of online and offline behavior showed that people take on the expected behaviors of their virtual avatars based on their avatars' appearances (Yee et al, 2009). For example, the height and attractiveness of players' avatars dictated players' real-life performances: Players with taller, more attractive avatars played the game better (Yee et al., 2009). In sum, these studies have shown that virtual reality experiences do in fact translate to real-life behavior and attitude change.

Beyond correlational studies, researchers have found a direct link between presence and attitude change (Tussyadiah et al., 2018). Tussyadiah et al. conducted a study on tourism attitudes toward different destinations and found that a sense of presence felt during a virtual reality experience led to positive attitudes toward the destination, thus confirming the premise that virtual reality is persuasive. A direct effect of presence on attitude change showed that people processed information in virtual environments similarly to the way they processed information in the real world, and this processing affected their preferences and attitudes in terms of likes and interests (Tussyadiah et al., 2018). Specifically, the increased feeling of being there, or presence, resulted in attitudes aligned more strongly with the persuasive message (Tussyadiah et al., 2018).

Persuasion and Attitudes

Attitudes are important to persuasion; such attitudes represent an outcome worth studying because scholars generally accept that attitudes predict behavior, although this link varies in its consistency (see Glasman & Albarracin, 2006). However, examining the three routes of attitude formation—attitudes formed from real experiences, attitudes formed from knowledge consistency and accessibility, and attitudes formed from emotional responses—shows why presence may have a strong effect on attitudes.

First, the attitudes people hold toward other people, places, or things are generally formed from their experiences with those things. Because presence mimics real experience, the effect of presence can be explained in terms of previous research on attitude formation. Slater (1999) stated that when users experience presence, the outcome is similar to real life in the sense that "people remember it as having visited a place rather than just having seen images generated by a computer" (pp. 560–561). Literature on attitude formation has shown that attitudes formed from real experiences are strong; thus, people may process virtual reality experiences as they would real experiences (Tussyadiah et al., 2018).

In addition to real experiences, people's attitudes form based on accessibility of knowledge—people want their knowledge to be accurate and consistent (Festinger, 1957) because inaccurate information leads to problems in daily life (Harman, Brown, & Johnson, 2017). People use easily recalled knowledge more often, compared to knowledge that is not easily recalled, especially to make decisions (O'Reilly, 1982). Harman et al. (2017) applied this concept to a virtual reality experiment and found that VR helped participants improve memory and later recall of information and attitudes,

compared to the recall abilities of people who received the same information on a computer monitor. Those who used the VR headset had better recall and remembered how they felt, thus leading to users' attitudes that were more accessible and usable (Harmon et al., 2017).

Finally, attitudes form based on emotional responses. This idea represents a peripheral route to attitude formation, as described in the elaboration likelihood model in which people form attitudes based on cues (e.g., emotions); stronger emotions elicit stronger attitudes (Petty & Cacioppo, 1986). Researchers tested virtual reality and emotional responses and found that VR created more emotional arousal than did a simple desktop monitor—this finding was likely attributable to the increase in presence participants felt while using the VR system compared to the monitor (Kim et al., 2014). Further, some law practitioners have called for the use of VR in courtrooms (Bailenson et al., 2005). Lawyers could give jury members firsthand experiences of their clients' misfortunes and thereby create a strong emotional response that could sway the jury to find the clients not guilty (Bailenson et al., 2005). Although research in this area is limited, one can see how attitudes emerge from emotional responses, including attitudes formed through VR.

Based on the literature showing a connection between presence and persuasive outcomes regarding attitude change appearing in business and entertainment contexts, in this paper, I present the following hypothesis:

> **H1.** Increased perceptions of presence in a persuasive drinking and driving message (from using presence-inducing technologies) will lead to an increase in attitude scores toward the prosocial message.

Summary

A goal of this dissertation is understanding how to impact drinking and driving attitudes through manipulating feelings of presence in a message using technology. A review of the literature conducted in the first chapter indicates that feelings of presence generated by the user interacting with the technology may impact persuasive outcomes. Understanding how presence impacts persuasion will be beneficial to public health officials who seek to align the public's attitudes with positive health messages. It will also be useful for health communication scholars wishing to further understand the mechanisms of persuasion in this context.

CHAPTER II: METHODOLOGY

In this study, I investigated a persuasive drinking and driving message presented using varied technologies. Drinking and driving is an important health issue that remains unresolved; about 32% of deadly car crashes result from driving while intoxicated (Wilcox, 2015). Mass media campaigns, although somewhat effective, have reduced drinking and driving by only about 13% (Elder et al., 2004). Thus, more work is necessary to determine the most effective drinking and driving messages for mass media campaigns in order to increase message effectiveness.

Participants

For the sample, I recruited 302 undergraduate students from a large mid-Atlantic university to participate in this study. I selected a college population because they had high involvement in drinking and driving accidents and were similar in demographics to the characters portrayed in the persuasive message, potentially making the message more relatable (Wechsler, Lee, Nelson, & Lee, 2003). To determine the minimum sample size required to find a significant effect at the $p < .05$ level, I used G*Power (Erdfelder, Faul, & Buchner, 1996). Although no exact or stable effect size metric was used to represent the impact of presence on attitudes, I estimated the expected effect to be small, given past research on the small nature of media effects (Valkenberg & Peter, 2013). An R^2 of .06 was assumed (which I converted to an F of 0.25), considered a small effect size (Cohen, 1988). A G*Power analysis was conducted to determine the sample size needed for an MANCOVA with four conditions (Erdfelder et al., 1996). The calculation indicated that a sample size of 180 was adequate to produce effects at the .05 level. However, I was concerned about participant mortality, given the pretest and posttest design of this study

(Shadish, Cook, & Campbell, 2002). Further, because no previous effect sizes existed to guide the power analysis, and because I had included three covariates in the model, which could have lowered statistical power, I aimed to recruit 200 participants. Therefore, I collected data from 200 participants to ensure enough participants completed both the pretest and posttest and enough data were available to run analyses on all the variables.

To begin cleaning the data, I removed 61 participants because of missing pretest responses[1]. Next, I deleted six participants because of incomplete posttest data. This cleaning reduced the sample size to 235. Next, I examined participants' ages. The message stimulus was selected to appeal to college-aged viewers (the message featured characters no older than 30). In the sample, ages ranged from 18 to 58 (M = 20.43, SD = 3.23). Because of the frequency with which this population has engaged in drinking and driving behavior, it was important to the goals of this study to understand how college-aged people reacted to the drinking and driving message (Wechsler et al., 2003). Therefore, three participants over 30 were removed. Of the remaining 232 participants, 71.6% classified themselves (in an open-ended response format) as female (n = 166), and 28.4% classified themselves as male (n = 66). Ages ranged from 18 to 28 (M = 20.12, SD = 1.61), and about 70% of the population identified themselves (in an open-ended response format) as White/Caucasian (n = 164).

Recruitment occurred through flyers and advertisements on the Communication Studies Department webpage. In addition, instructors in the Communication Studies Department and in the Reed College of Media recruited participants. Participation was

[1] An independent samples t-test was conducted to determine if any potential biases resulted from taking the pretest. Attitude scores for those who took the pretest were compared to those that did not. There was not a significant difference in attitude scores for those who took the test (M = 4.51, SD = .820) and those who did not (M = 4.61, SD = .761); t (294) = -.919, p = .533, Cohen's d = .134).

voluntary; in return for participating, students could receive course credit if their instructor allowed. To participate in the study, participants followed a link to the pretest, which was an online Qualtrics survey. Participants gave their consent and filled out a short questionnaire consisting of an assessment of their attitudes and behaviors toward drinking alcohol (e.g., some control measures). These questions were disguised within a larger questionnaire about their consumption activities using the Diet and Behaviour Scale (DABS; Richards, Malthouse, & Smith, 2015). Thus, participants remained unaware of the study's focus before coming into the lab (Appendix A). After concluding the pretest, participants signed up for an in-person lab session.

When participants arrived at the lab, they were told the study was about examining their reactions to a health-related message. Upon consenting again to be in the study, participants were randomly assigned (via random number generator) to one of four conditions designed to manipulate feelings of presence: (a) written screenplay, (b) two-dimensional (2D) video, (c) three-dimensional (3D) YouTube video, and (d) virtual reality (VR) video. This study represented an experimental design with presence manipulated via technology. After viewing a video or written script, participants took a survey to assess their reactions.

Materials

For this study, I selected a persuasive message entitled *Decisions,* produced in virtual reality and for YouTube 3D (Diageo, 2016). DRINKiQ presented the video, sponsored by the parent company Diageo. DRINKiQ designed the video to depict the consequences of people's decision to drink and drive. The video follows three groups of people: a girl in her mid-20s going to a dinner meeting, a group of friends out for a night

on the town, and a married couple going to dinner while a babysitter watched their child. After her meeting, the girl gets into her car, visibly intoxicated, and tries to call a friend. On the phone, she explains that the people she met with had unexpectedly provided a bottle service, and she had had a lot to drink. After hanging up the phone, she begins to drive home; however, annoyed with other drivers on the road, she begins driving erratically. Meanwhile, the other two groups are in cars on their way home from their respective evenings. The girl who had been drinking caused a large car crash with the other two cars.

The viewer sees the crash from the girl's perspective as she crawls out of the wreckage covered in blood. She stands up and looks around to survey the damage. She finds out that she has killed the passengers of the other two vehicles; she is the sole survivor. Finally, the viewer sees the car of the young married couple, who are clearly dead; their phone begins to ring. Their babysitter leaves a voicemail wondering why they are out much later than expected. Watching a virtual reality video allowed viewers to experience a car crash as a passenger in the car of a drunk driver. DRINKiQ designers hoped that the experience would influence viewers and encourage them to make responsible decisions while drinking (Diageo, 2016).

Based on the success of *Decisions,* Diageo indicated that the organization was expanding the *Decisions* video into a virtual reality series. The future series will tackle other issues beyond drinking and driving, such as binge drinking (Diageo, 2018). Diageo claimed that the original *Decisions* video (used in the current study) was successful in achieving a change in drinking and driving perceptions. To date, the video had received almost 14 million views; Diageo claimed watching the video changed viewers'

perceptions: 73% of viewers indicated that they would stop others from drinking and driving, and 75% reported they would arrange for a designated driver themselves (Diageo, 2018). As of this writing, Diageo has not released information on the survey or methodology of the data collection.

Conditions

The first condition consisted of a written screenplay. This condition, designed to create the least amount of presence, consisted of a text-only presentation of the message. In the first condition, I asked participants to read the screenplay of the *Decisions* video (Appendix B). To ensure the written condition was as similar as possible to the video conditions, the dialogue was drawn directly from the video. I transcribed the video word for word and provided brief descriptions of the scene and nonverbal expressions of the characters. This endeavor produced a written product that looked like a screenplay with both dialogue and descriptions of the scene and characters. For the sake of control to ensure the most similarity as possible across conditions, the written version of the *Decisions* screenplay took about as long to read as the video version took to play (4 minutes, 41 seconds). I pretested the script with outside volunteers to gauge the reading time. Further, because the other three conditions used an iPad Air 2 to present the video, the written screenplay was presented on an iPad Air 2 as well, mounted on a stand.

The second condition was the 2D version of the *Decisions* message. The 2D version of the video was meant to create increased feelings of presence, compared to the written message, because it used both audio and video; however, this condition was still expected to generate less presence, compared to the conditions presenting 3D and VR versions. This condition presented the video in a 2D format similar to what viewers

would see when watching YouTube on an iPad. Participants received an iPad mounted on a stand and headphones to watch the video. The mobile tablet and headphones were selected to create the most consistency between the video conditions and the VR condition, wherein a mobile device was used with an integrated headset and headphones. Participants were told to press the play button when they were ready to begin. The 2D video was the same video as the videos shown in the YouTube 3D condition and the virtual reality condition. However, this video was more static in the sense that participants were not instructed to move their fingers to look around the video, and the display was securely mounted. The video ran for 4 minutes and 41 seconds, the same length as in the 3D video and VR conditions (the third and fourth conditions).

In the third condition, the YouTube 3D interface was used to present the 3D version of the *Decisions* video. This condition was designed to create more feelings of presence, compared to the first and second conditions, by providing a three-dimensional audiovisual presentation, but less presence than was provided by the VR condition. Participants were given an iPad mounted on a stand and headphones to view this video. Using YouTube, participants were told they had the option to touch and swipe the video to rotate their perspective and see more of the surroundings and scene while the video played. Thus, while characters were speaking, participants could look directly at them or look at the activity happening around the characters. All participants were made aware that they could click and scroll around the video to see a 360-degree view of the scene after pressing the play button.

In the fourth condition, participants were able to view a virtual reality version of the *Decisions* video. This condition was meant to create the strongest feelings of

presence, attributable to the way the VR video surrounded viewers, allowing bodily movements and control and making viewers feel as if they were in a real, unmediated environment. Participants were given a BOBOVR Z24 virtual reality headset containing a sixth-generation Apple iTouch. To view the video, participants first put on the headset, which had attached headphones. Wearing the headset, viewers were able to move their heads to look around the environment of the video. They had to continue looking around while the video played because the action was happening all around them. Participants were free to look wherever they wanted while the video was playing.

Measures

Pretest and posttest surveys were created using Qualtrics. The posttest was designed to measure participants' reactions to the *Decisions* message, and the pretest was designed to collect data regarding two control variables: familiarity with drinking and driving, and drinking behaviors. Participants received identical surveys to record responses to the message. The pretest and posttest survey took roughly 10 minutes to complete; I determined the duration of the survey during pretesting.

Presence. I measured the construct of presence using a portion of Lombard et al.'s (2009) Temple Presence Inventory (TPI) scale to measure dimensions of presence (Appendix C). The dimensions measured were spatial presence, social presence, and self-presence. Participants could respond on a 5-point Likert-type scale ranging from *never* to *always*, indicating the amount of presence they felt for each dimension. Spatial presence was measured with eight items, consisting of questions such as "How much did it seem as if you could reach out and touch the objects and people you saw and heard?" I measured the internal consistency of the scale using Cronbach's alpha (M = 3.22, SD = .721, α =

.798). Even though this Cronbach's alpha was relatively low in terms of internal consistency, this finding was consistent with previous findings. The developers of the scale found alphas as low as .75 (Lombard, Weinstein, & Ditton, 2011).

Social presence was measured with six items designed to assess the types of social interactions people felt while viewing the video. For example, one item read, "How often did you want to or try to make eye contact with someone you saw or heard?" (M = 2.59, SD = .820, α = .812). Finally, self-presence was assessed with five items, including questions such as "Overall, how much did the things and people in the environment you saw/heard look as they would if you had experienced them directly?" (M = 2.87, SD = .896, α = .802). Because these three factors measured certain types of presence, I expected that spatial, self, and social presence would correlate, but only moderately, because they were different constructs. Correlations among the three factors were indeed moderate, showing they were separate but related constructs and should not be combined into one single indicator of presence, as shown in Table 1.

Table 1

Correlations among Presence Constructs

Variables	1	2	3
1. Spatial Presence	-		
2. Social Presence	0.622 (p <.001)	-	
3. Self-Presence	0.523 (p <.001)	0.567 (p <.001)	-
M	3.22	2.59	2.87
SD	0.720	0.820	0.895

Attitudes toward drinking and driving. Attitudes toward drinking and driving were measured with a modified version of the Drinking and Driving Scale (Snortum & Berger, 1989). Kraha (2013) provided an exploratory factor analysis of the scale and discovered four factors: (a) drinking and driving behaviors, (b) attitudes toward the morality of drinking and driving, (c) attitudes toward accidents, and (d) attitudes toward punishment of those who drink and drive.

Because attitudes related to factors b and d could be affected by persuasive video, the 10 items for these two factors were included to assess participants' attitudes after they watched the video. I chose these elements because the video focused heavily on generating feelings of guilt by the girl who drove while intoxicated and killed other people. These attitudes were largely reflected in the morality factor of this scale. Determining if viewers held attitudes of morality and guilt consistent with the video was expected to show if the video was effective. Second, the attitudes toward the punishment of those who drink and drive were consistent with the attitudes portrayed in the video. The video allowed the viewers to hear the police scanner report of the accident, watch the girl's reaction, and listen to a voicemail left by the babysitter of the child who was orphaned. Viewers may have had conflicting feelings after forming connections with both the drunk driver and the characters who were killed. I expected that assessing viewers' attitudes regarding the repercussions they believed drunk drivers should face would be useful in determining the impact of the video. This factor also contained items related to morality, such as "It is morally wrong to drive after 4+ drinks" and questions about punishing those who drink and drive. Therefore, this factor was included in the posttest.

The other two factors were not included in this study. The third factor related to participant knowledge regarding drinking, driving, and number of car accidents experienced. Because the participants' number of car accidents and their familiarity with drinking and driving were measured in the pretest, this factor was excluded. Finally, the first factor involved participants' intentions to drink and drive in the next year; this factor measured behavioral intentions rather than attitudes and thus was excluded from the attitudes measures. Participants responded on a 5-point Likert-type scale or wrote in their responses, depending on the nature of the question (Appendix C).

Items regarding the morality of drinking-and-driving portion of the survey included statements such as "It is just wrong to drive while intoxicated" and "I would be embarrassed if people found out I was arrested for driving slightly intoxicated" (M = 4.51, SD = .823, α = .914). Items assessing attitudes toward the punishment of drunk drivers included four statements, including "Drunk drivers should be convicted and jailed on a first conviction" (M = 4.11, SD = .800, α = .714). This measure had a relatively low Cronbach's alpha, indicating that the internal consistency was not good. An informally agreed-upon cutoff for a satisfactory scale reliability is a Cronbach's alpha of .70 (Nunally, 1978). However, Nunally (1978) noted that a satisfactory alpha depends on the investigator's focus and the newness of the concept. For novel or unknown concepts, lower reliabilities are acceptable, but for applied research (such as this study), even alphas in the .80 range are not high enough (Nunally, 1978, p. 245). Because there was another measure of attitudes in this study with a higher alpha (α = .914), this measure of attitudes toward the punishment of those who drink and drive was dropped from analysis. Thus, the sole attitude measure reflected the morality of drinking and driving.

Control variables. In addition to the measures of the variables discussed previously, I included several control measures. Identification was the only control measure included in the posttest. Drinking behaviors and familiarity were included in the pretest so that the stimulus of the study did not bias participants' answers toward their own behaviors and familiarity.

Identification. Cohen (2001) defined identification as the process of audience members temporarily losing their own personal identities while consuming a story and instead taking on the identities of the characters—in a sense "becoming" the characters (at least, during the experience). Identification increases persuasive outcomes by reducing counterarguing (Cohen, 2001) and increasing perceived vulnerability (Moyer- Gusé, 2008). Because absorption is one component of identification (e.g., viewers lose themselves and become the characters), counterarguing is reduced when viewers lose themselves in the characters (Cohen, 2001).

It is important to note that the stimulus used in this study was a video with characters reproducing a drunk-driving accident. Because much of the message focused on these characters, they could play a role in persuasion. Although I did not seek to manipulate character identification specifically, it was an important construct to control for because increased identification has been shown to increase persuasive outcomes (Cohen, 2001), and I expected people's levels of character identification to vary naturally.

A 10-item measure of identification was included in the study. Participants responded on a 5-point Likert scale based on their level of agreement with each statement, modified to reflect the message (Appendix C). Items included statements such

as “I was able to understand the events in the message similar to how the character understands them.” Identification was measured toward the main character: the girl who drinks and drives (M = 3.55, SD = .826, α = .876).

Drinking behaviors. Assessments of participants’ attitudes toward drinking alcohol and their familiarity with drinking and driving were necessary control variables because they could affect people’s perceptions of the message. The FAST alcohol screening test was selected to gain an understanding of participants’ drinking behaviors (Hodgson, Alwyn, John, Thom, & Smith, 2002). The FAST alcohol screening test was based on the Alcohol Use Disorders Identification Test but designed to be a quicker (4-item) way to measure alcohol use in clinical settings (Hodgson et al., 2002). The scale measured what was meant by one alcoholic drink and required participants to rate the frequency of each event; scores greater than 3 on a 5-point scale indicated a potential drinking problem (M = 1.58, SD = .586, α = .750; Appendix A).

Familiarity. Rimal and Mollen (2013) examined familiarity with alcohol consumption. Based on their work, I used two similar items to assess participants’ familiarity with drinking and driving. Familiarity is important because higher familiarity behaviors may increase the likelihood that people have direct experience with or knowledge of those behaviors (Rimal & Mollen, 2013). Therefore, familiarity was measured with a 5-point Likert scale assessing participants’ level of agreement with the following two statements: (a) I am quite knowledgeable about how often people typically drink and drive, and (b) I believe I have a pretty good idea about where and when people drink and drive. These questions were hidden among three others describing knowledge of health-related consumption behaviors (M = 4.97, SD = 1.348). A Spearman Brown

coefficient of .727 was found, representing a measure of reliability for this 2-item scale (Eisinga, te Grotenhuis, & Pelzer, 2013). This scale was included in the pretest (Appendix A).

Summary

This chapter discussed the methodology used to assess the research question and hypothesis. First, college students were asked to take a pretest online that assessed their drinking behaviors and drinking and driving familiarity before entering into the lab. There, they were assigned to one of four conditions (written, flat video, 3D video, and virtual reality) and were exposed to the drinking and driving message before taking the posttest which assessed presence, attitudes, and identification. This chapter also included an overview of the stimulus, an overview of the scales used to assess participants, and an overview of participants' demographic information.

CHAPTER III: RESULTS

Results were analyzed based on the research question and the hypothesis posited in the literature review. However, before the results were analyzed, a check was done to ensure that participants were assigned to each condition appropriately.

Randomization Check

To confirm that random assignment to each experimental condition successfully produced an equal number of participants in each condition, a chi-square distribution analysis was conducted on the frequency of participants assigned to each condition. The result of this analysis was a nonsignificant chi-square value, $\chi 2$ (3) = 4.172, p = .243, ϕ = .095, which indicated that random assignment was successful as shown in Table 2.

Table 2

Random Assignment of Participants

Condition	Observed *N*
Written	58
Flat Video	69
3D Video	58
Virtual Reality	47
Total	232

Note. $\chi 2$ *(3) = 4.172,* p *= .24,* ϕ = .095.

Analysis of Research Question 1

I asked the research question to determine whether four experimental conditions using different technology affected spatial, social, and self-presence, as described in the literature. I selected a multivariate analysis of covariance (MANCOVA) to compare the

mean scores on the related measures of (a) spatial presence, (b) social presence, and (c) self-presence among the four experimental conditions (written screenplay, flat video, 3D video, and virtual reality), using character identification (Cohen, 2001), drinking behaviors (Hodgson et al., 2002), and familiarity with drinking and driving (Rimal & Mollen, 2013) as covariates.

Before the MANCOVA was conducted, however, other tests were done to ensure that the statistical assumptions of MANCOVA were not violated. Linearity was tested using Pearson correlations to ensure that the three dependent variables were moderately correlated (Cohen, 1988). They were in fact moderately correlated, as reported in Table 1, and this result indicated that MANCOVA was an appropriate test for these dependent variables.

Normality is the assumption that ensures the dependent variables are normally distributed (D'Agostino, 1986). Tests for univariate normality were run for each of the three dependent variables. A Kolmogorov-Smirnov test was used to test for normality of spatial presence, D (231) = .087, $p < .001$. This test was significant, providing initial evidence that spatial presence scores significantly deviated from normality. Follow-up examinations showed a skewness value of –.382 (*SE* = .158) and a kurtosis value of –.053 (*SE* = .314). Formulas[2] for skewness and kurtosis *z*-scores were computed and compared to the *z*-critical value of 1.96 (Kim, 2013). These tests revealed that none of these values exceeded the critical value, providing evidence that the data were normal. A second Kolmogorov-Smirnov test was used to test for normality of social presence, D (231) = .067, p = .013, which also showed significant deviations from normality. Using

[2] $\frac{skewness\ value}{\sqrt{SE\ skewness}}$ and $\frac{kurtosis\ value}{\sqrt{SE\ kurtosis}}$

the same follow-up procedure, I found a skewness value of .015 (*SE* = .158) and kurtosis value of –.583 (*SE* = .314). Formulas were computed, revealing values that did not exceed the *z*-critical value of 1.96, suggesting normality. Finally, a third Kolmogorov-Smirnov test was used to test for the normality of self-presence, *D* (231) = .064, *p* = .022, indicating that it also significantly deviated from normality. Following up, a skewness value of –.191 (*SE* = .158) was found along with a kurtosis value of –.299 (*SE* = .316), and tests gave the same results as the previous variables, with no value exceeding the critical value of 1.96.

Homogeneity of covariance matrices is another assumption of MANCOVA, which simply means that the variances are equal for each of the dependent variables in the model (Finch, 2005). To test this assumption, a Box's M test was run. The Box's M value of 29.00 was associated with a *p* value of .058, which was nonsignificant. Thus, the covariance matrices between the groups were assumed to be equal for the purposes of the MANCOVA.

The omnibus MANCOVA was conducted and showed an overall significant difference in the four conditions (written, flat video, 3D video, and virtual reality) on the dependent variables collectively (spatial, social, and self-presence) after controlling for the covariates (character identification, drinking behaviors, and familiarity with drinking and driving), Pillai's trace = .133, $F(9, 645) = 3.313$, $p < .001$, partial $\eta 2 = .044$. The covariates were analyzed to reveal that at the multivariate level, identification was significant, Pillai's trace = .154, $F(3, 213) = 3.313$, $p < .001$, partial $\eta 2 = .154$, and drinking and driving familiarity was significant, Pillai's trace = .064, $F(3, 213) = 4.847$, *p*

= .003, partial η2 = .064, but drinking and driving behaviors was not a significant covariate, Pillai's trace = .020, $F(3, 213) = 1.426$, $p = .236$, partial η2 = .020.

Next, after analyzing a between-subjects effect of the conditions, significant effects were found for spatial presence, $F(3, 215) = 3.091$, $p = .028$, partial η2 = .041; social presence, $F(3, 215) = 3.285$, $p = .022$, partial η2 = .044; and self-presence, $F(3, 215) = 2.852$, $p = .038$, partial η2 = .038, while controlling for the covariates.[3]

After I examined the 18 pairwise comparisons using Bonferroni post-hoc mean comparison, only two significant differences between conditions were found (see Table 3). For spatial presence, there were no significant differences between the conditions. For social presence, the only significant difference was between the written and 3D video condition, mean difference = –.403, $p = .035$, 95% CI [–.789, –.018]. For self-presence, the only significant difference was between the written and flat video condition, mean difference = –.451, $p = .026$, 95% CI [–.867, –.035]. Based on these 18 pairwise comparisons, I concluded that although two significant differences existed, technology did not increase presence as previous researchers have suggested, thus answering RQ1.

Overall, when examining the mean presence scores for spatial, social, and self-presence (3.22, 2.59, and 2.87, respectively), I noted they were relatively low across the sample, indicating that presence was not felt to a high degree, regardless of whether the

[3] To follow up these findings, a multivariate analysis of variance (MANOVA) was conducted with the 61 participants that were excluded based on an incomplete pretest. This MANOVA excluded the covariates from the model in order to examine if the technology conditions had an impact on presence once the variance was freed up from the removal of the control variables. The overall MANOVA was significant Pillai's trace = .089, $F(9, 873) = 2.965$, $p = .002$, partial η2 = .030, however, it showed one significant difference for spatial presence $F(3, 295) = 2.198$, $p = .006$, partial η2 = .042, and social presence $F(3, 295) = 2.018$, $p = .032$, partial η2 = .030, but none for self-presence $F(3, 295) = 1.847$, $p = .076$, partial η2 = .023. The post-hoc pairwise comparisons show for spatial presence the mean difference of -.365 between the written and virtual reality conditions is significant ($p = .049$, $SE = .140$) but for social presence none of the mean differences were flagged as significant. These differences reflect the differences found using the MANCOVA.

condition was designed to induce high levels of presence. However, the effects found were explored further in the analysis of the hypothesis.

Table 3

Pairwise Comparisons

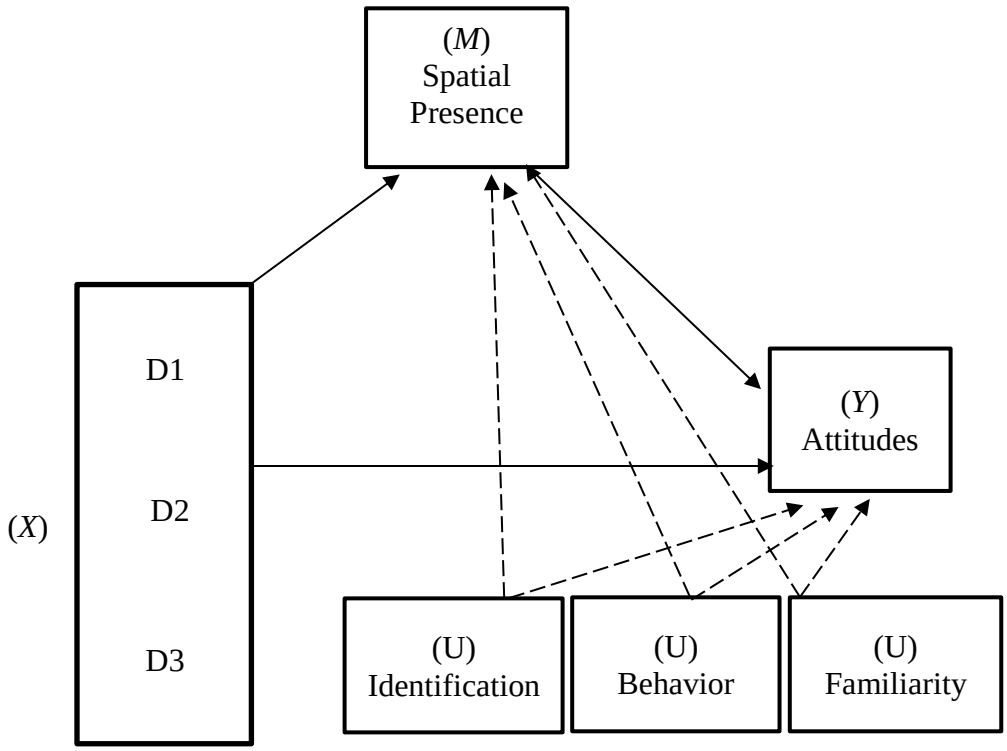
Dependent Variable	(I) Condition	(J) Condition	Mean Diff (I-J)	*SE*	*p*	95% Confidence Interval	
						LLCI	ULCI
Spatial Presence	Written	Flat	.026	.121	1.00	-.296	.348
		3D	-.222	.126	.470	-.557	.112
		Virtual Reality	-.290	.132	.170	-.641	.060
	Flat	3D	-.248	.122	.254	-.572	.076
		Virtual Reality	-.317	.128	.086	-.658	.025
	3D	Virtual Reality	-.068	.133	1.00	-.422	.285
Social Presence	Written	Flat	-.058	.139	1.00	-.430	.313
		3D	.403*	.145	.035	-.789	-.018
		Virtual Reality	-.252	.152	.588	-.655	.152
	Flat	3D	-.345	.140	.088	-.718	.028
		Virtual Reality	-.194	.148	1.00	-.587	.200
	3D	Virtual Reality	.151	.153	1.00	-.256	.559
Self-Presence	Written	Flat	-.451*	.156	.026	-.867	-.035
		3D	-.294	.162	.426	-.726	.138
		Virtual Reality	-.218	.170	1.00	-.670	.234
	Flat	3D	.157	.157	1.00	-.261	.575
		Virtual Reality	.233	.165	.963	-.208	.674
	3D	Virtual Reality	.076	.171	1.00	-.380	.532

Analysis of Hypothesis 1

I hypothesized that using technology to increase perceptions of presence in the message would lead to greater attitude scores toward the prosocial message. This hypothesis required mediation analysis to determine if the different uses of technology in each experimental condition influenced attitudes through spatial, social, and self-presence. I used a technique known as PROCESS (Hayes, 2013) to run three mediation models with each type of presence (spatial, social, and self-presence) mediating the influence of the technology condition (independent variable) on attitudes toward drinking and driving (dependent variable), controlling for identification, drinking and driving familiarity, and drinking behaviors and whichever condition was not serving as the independent variable (Figures 1 through 3, respectively).

Figure 1

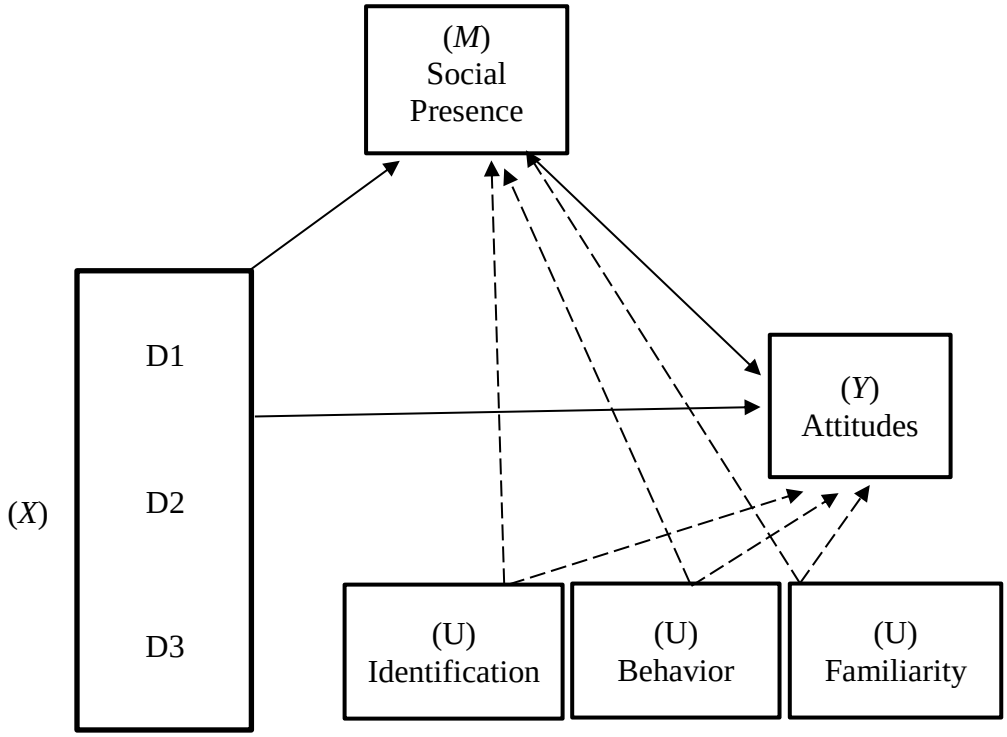
Conceptual Mediation Diagram for Spatial Presence



Note: Each of the conditions was indicator coded and compared to the reference group which is the written condition (D1: flat vs. written, D2: 3D vs. written, and D3: VR vs. written). A separate mediation model was run for each type of presence, spatial, social, and self, with each serving as a mediator. In addition, the covariates of character identification, drinking and driving behavior, and familiarity with drinking and driving are included and controlled for along with the other conditions that are not serving as the independent variable.

Figure 2

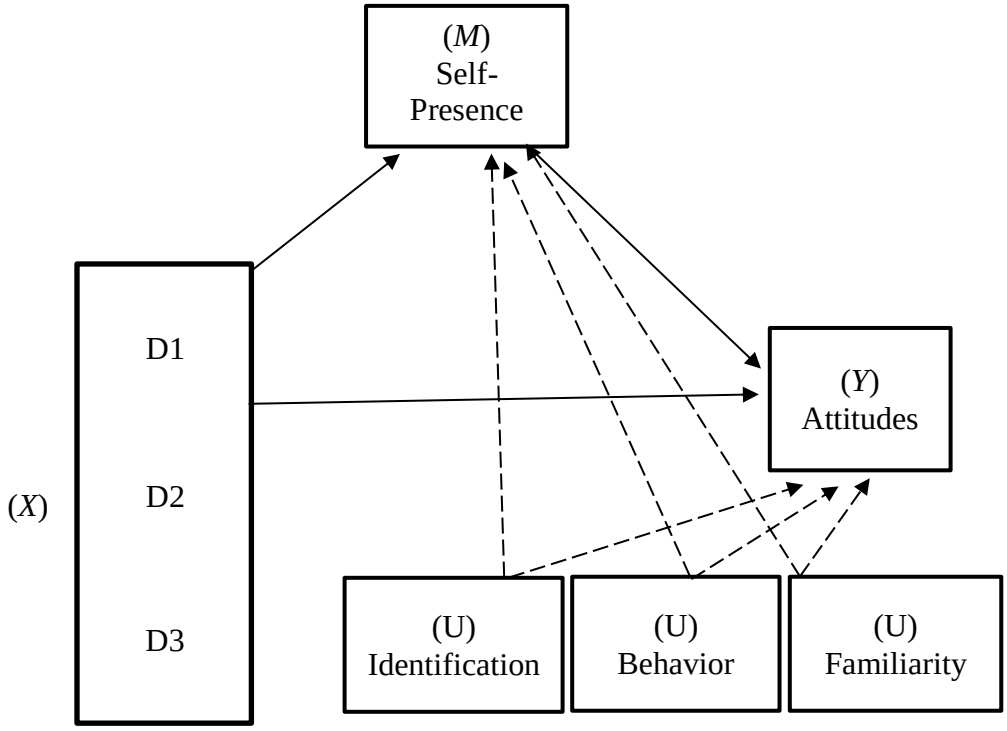
Conceptual Mediation Diagram for Social Presence



Note: Each of the conditions was indicator coded and compared to the reference group which is the written condition (D1: flat vs. written, D2: 3D vs. written, and D3: VR vs. written). A separate mediation model was run for each type of presence, spatial, social, and self, with each serving as a mediator. In addition, the covariates of character identification, drinking and driving behavior, and familiarity with drinking and driving are included and controlled for along with the other conditions that are not serving as the independent variable.

Figure 3

Conceptual Mediation Diagram for Self-Presence



Note: Each of the conditions was indicator coded and compared to the reference group which is the written condition (D1: flat vs. written, D2: 3D vs. written, and D3: VR vs. written). A separate mediation model was run for each type of presence, spatial, social, and self, with each serving as a mediator. In addition, the covariates of character identification, drinking and driving behavior, and familiarity with drinking and driving are included and controlled for along with the other conditions that are not serving as the independent variable.

Each condition was indicator-coded as D1, D2, and D3, with the written condition serving as the reference condition (D1: flat, D2: 3D , D3: VR) This was done because testing mediation using OLS path analysis requires that the independent variable be either a continuous or a dichotomous variable (Cohen, Cohen, West, & Aiken, 2003). Because there were four conditions in this study, the independent variable was categorical; thus, indicator coding was used to transform it to a dichotomous variable, allowing me to compare each condition to the written condition (reference condition). Three indicator codes were formed based on Hayes and Preacher's (2014) recoding technique for multicategorical variables ($k - 1$ indicator codes, with k representing the four conditions). Then, when each coded condition was entered in the model, the other conditions were essentially controlled for as covariates. I interpreted the relative direct and indirect effects to show the relative differences in the outcome (attitudes) of between being in one condition compared to another, through its impact on presence (Hayes & Preacher, 2014). Table 3 shows the coefficients and the relative direct and indirect effects for spatial presence; Table 4 shows the same for social presence, and Table 5 shows the results for self-presence. The calculations used 5,000 bootstrapped samples and 95% bias-corrected confidence intervals (Hayes, 2013).

Results showed mixed findings for the hypothesis. When running the mediation model with spatial presence as the mediator of the effects of experimental condition on attitudes, one case of mediation was found (Table 3). Spatial presence mediated the effect of the 3D video condition, compared to the written condition (D3) on attitudes. Compared to the written condition, the 3D video condition group had an indirect .045 increase in attitude scores through the 3D condition's increase in spatial presence (a_3b =

.045; CI: .002, .144), but not directly (c'_3 = .204, p = .229), indicating mediation. However, spatial presence was not a mediator for any other condition. Thus, H1 was partially supported in this instance with the 3D technology condition (in reference to the written condition), creating greater feelings of spatial presence and leading to an increase in attitudes consistent with the persuasive message.

The remaining findings were not consistent with H1. For the mediation model run with self-presence as the mediator (Figure 3), the flat video condition differed from the reference condition (written) in the sense that it *lowered* attitude scores indirectly (a_1b = –.054; CI: –.146, –.0085) as a result of the condition's increase of self-presence, but not directly (c'_1 = .201, p = .197). This finding reveals an opposite conclusion from the prediction of the hypothesis, which posited that an increase in all types of presence should increase attitude scores. No other effects of experimental conditions were mediated by self-presence on attitudes (Table 5). Finally, in the model that examined the effects of experimental condition on attitudes through social presence (Figure 2), no mediation effects were found (Table 4). In sum, I found a few effects after examining the research question and hypothesis, and a discussion of those effects will follow.

Summary

Based on the results of 18 pairwise comparisons in the MANCOVA, only two significant differences existed; so technology largely did not increase presence, which answered RQ1. Results of the mediation analysis show two important findings in that self-presence acted as a mediator and lowered attitude scores indirectly and spatial presence also acted as a mediator and increased attitude scores indirectly.

Table 4

OLS Path Model Coefficients with Spatial Presence as a Mediator

Models	Coefficient	*SE*	*t*	*p*	LLCI	ULCI
Spatial Presence						
$F(6, 214) = 8.76$, $p < .001$, $R^2 = .19$						
Constant	1.406	.294	4.772	<.001	.825	1.987
Drinking Behaviors	.044	.081	.549	.583	–.115	.204
Drinking & Driving Familiarity	.096	.033	2.902	.004	.030	.161
Identification	.321	.054	5.904	<.001	.214	.429
D1 (a_1)	–.036	.121	–.301	.763	–.276	.203
D2 (a_2)	.228	.127	1.801	.073	–.021	.479
D3 (a_3)	.288	.132	2.177	.030	.027	.549
Attitudes						
$F(7, 213) = 1.211$, $p = .297$, $R^2 = .03$						
Constant	4.031	.392	10.281	<.001	3.258	4.804
Spatial Presence (*b*)	.158	.086	1.833	.068	–.011	.329
Drinking Behaviors	–.121	.102	–1.185	.237	–.324	.080
Drinking and Driving Familiarity	–.011	.042	–.258	.796	–.095	.073
Identification	.027	.074	.363	.716	–.119	.173
D1 (Relative Direct Effect; c'_1)	.153	.153	.996	.320	–.149	.456
D2 (Relative Direct Effect; c'_2)	.075	.161	.467	.641	–.243	.394
D3 (Relative Direct Effect; c'_3)	.204	.169	1.204	.229	–.129	.537
Mediation through Spatial Presence					Bootstrapped CI	
$\vartheta = .004$ (95% CI: -0.000, 0.016)	*ab*	*SE*			LLCI	ULCI
Relative Indirect Effect for D1 *(a_1b)*	–.005	.023			–.070	.028
Relative Indirect Effect for D2 *(a_2b)*	.036	.028			–.000	.120
Relative Indirect Effect for D3 *(a_3b)*	.045	.033			.002	.144

Note. Direct and indirect effects are unstandardized and can be interpreted as an attitude score. For indicator coded groups (D1, D2, D3), coefficients reflect mean differences in attitude scores in comparison with the written condition which is the reference (D1: flat; D2:

3D; D3: VR). ϑ = omnibus test of indirect effect. Bootstrapped confidence intervals that do not include zero show mediated effects.

Table 5

OLS Path Model Coefficients with Social Presence as a Mediator

Models	Coefficient	*SE*	*t*	*p*	LLCI	ULCI
Social Presence						
$F(6, 214) = 6.922$, $p < .001$, $R^2 = .40$						
Constant	.600	.339	1.769	.078	–.068	1.27
Drinking Behaviors	.176	.093	1.998	.060	–.007	.360
Drinking & Driving Familiarity	.096	.038	2.520	.012	.021	.171
Identification	.295	.062	4.709	<.001	.172	.419
D1 (a_1)	.059	.140	.426	.670	–.216	.336
D2 (a_2)	.404	.146	2.764	.006	.116	.692
D3 (a_3)	.248	.152	1.631	.104	–.518	.549
Attitudes						
$F(7, 213) = .794$, $p = .592$, $R^2 = .02$						
Constant	4.286	.378	11.341	<.001	3.541	5.031
Social Presence (*b*)	–.054	.075	–.715	.475	–.202	.094
Drinking Behaviors	–.105	.104	–1.009	.313	–.310	.100
Drinking and Driving Familiarity	.009	.042	.219	.826	–.075	.093
Identification	.094	.072	1.289	.198	–.049	.237
D1 (Relative Direct Effect; c'_1)	.150	.154	.973	.331	–.154	.456
D2 (Relative Direct Effect; c'_2)	.133	.164	.812	.417	–.190	.458
D3 (Relative Direct Effect; c'_3)	.263	.169	1.551	.122	–.071	.597
Mediation through Social Presence					Bootstrapped CI	
ϑ = -.001 (95% CI: -0.011, 0.001)	*ab*	*SE*			LLCI	ULCI
Relative Indirect Effect for D1 *(a_1b)*	–.003	.012			–.048	.009
Relative Indirect Effect for D2 *(a_2b)*	–.021	.026			–.097	.014
Relative Indirect Effect for D3 *(a_3b)*	–.013	.019			–.077	.008

Note. Direct and indirect effects are unstandardized and can be interpreted as an attitude score. For indicator coded groups (D1, D2, D3), coefficients reflect mean differences in

attitude scores in comparison with the written condition which is the reference (D1: flat; D2: 3D; D3: VR). ϑ = omnibus test of indirect effect. Bootstrapped confidence intervals that do not include zero show mediated effects.

Table 6

OLS Path Model Coefficients with Self Presence as a Mediator

Models	Coefficient	*SE*	*t*	*p*	LLCI	ULCI
Self Presence						
$F(6, 215) = 5.86$, $p < .001$, $R^2 = .14$						
Constant	.803	.371	2.165	.031	.072	1.535
Drinking Behaviors	.128	.103	1.23	.217	–.076	.333
Drinking & Driving Familiarity	.146	.042	3.468	<.001	.063	.229
Identification	.239	.069	3.43	<.001	.101	.376
D1 (a_1)	.450	.156	2.887	.004	.143	.758
D2 (a_2)	.294	.162	1.814	.071	–.025	.613
D3 (a_3)	.217	.169	1.284	.200	–.116	.552
Attitudes						
$F(7, 214) = 1.181$, $p = .314$, $R^2 = .03$						
Constant	4.397	.368	11.942	<.001	3.672	5.123
Self Presence (*b*)	–.1198	.067	–1.788	.075	–.251	.012
Drinking Behaviors	–.099	.102	-.967	.334	–.300	.102
Drinking and Driving Familiarity	.014	.042	.345	.730	–.069	.098
Identification	.1012	.0703	1.440	.151	–.300	.102
D1 (Relative Direct Effect; c'_1)	.201	.156	1.291	.197	–.106	.509
D2 (Relative Direct Effect; c'_2)	.164	.160	1.026	.305	–.151	.480
D3 (Relative Direct Effect; c'_3)	.283	.167	1.692	.091	–.046	.612
Mediation through Self Presence					Bootstrapped CI	
ϑ = -.002 (95% CI: -.012, 0.000)	*ab*	*SE*			LLCI	ULCI
Relative Indirect Effect for D1 *(a_1b)*	–.054	.033			–.146	-.008
Relative Indirect Effect for D2 *(a_2b)*	–.035	.028			–.115	.000
Relative Indirect Effect for D3 *(a_3b)*	–.026	.025			–.099	.007

Note. Direct and indirect effects are unstandardized and can be interpreted as an attitude score. For indicator coded groups (D1, D2, D3), coefficients reflect mean differences in

attitude scores in comparison with the written condition which is the reference (D1: flat; D2: 3D; D3: VR). ϑ = omnibus test of indirect effect. Bootstrapped confidence intervals that do not include zero show mediated effects.

CHAPTER IV: DISCUSSION

The first goal of this study was to determine if novel message presentations, using different technological formats would serve as a way to present a drinking and driving message and engage audience members to change their attitudes. Essentially, these technological presentations place the participant as close as possible to a mediated drinking and driving accident. My hope was that the technology would increase their feelings of presence, which would in turn align their drinking and driving attitudes with the persuasive message. Thus, an attitude increase was hypothesized to occur through an increase in presence—that is, the feeling that the viewer was present in the mediated environment—spatially, socially, and as themselves (Lombard & Ditton, 1997; Westerman & Skalski, 2010).

A second goal of this study was to expand the literature on presence into the realm of persuasion and health campaigns. Some preliminary research has indicated that higher levels of presence can change attitudes behaviors toward advertisements (Fortin & Dholakia, 2005; Jin, 2010; Suh & Lee, 2005), tourism attitudes (Tussyadiah et al, 2018), phobias (Parsons & Rizzo, 2008), eating disorders (Perpina et al., 2003), and traumatic events (Walshe et al., 2005); however, promoting higher levels of presence has yet to be applied in a health campaign context.

A third goal of this study was to study the unresolved issue of drinking and driving which still persists in the United States. In 2016, 10,497 people died in accidents caused by drunk driving, amounting to 28% of all traffic-related deaths (Centers for Disease Control and Prevention [CDC], 2016). This issue has been particularly widespread in the college population, with 1 in 5 college students admitting to driving

drunk and 40% of those of college age admitting to knowingly getting in the car with someone who is intoxicated (Mozes, 2010). The question of how health communication practitioners could reduce this behavior within the target population remains unanswered. Often, authors of mass media campaigns face difficulty when targeting behaviors such as drinking and driving (Elder et al., 2004) because it is difficult to achieve a high degree of attitude change. This could be because the same message occurs repeatedly in the media, becoming lost in a sea of messages urging people not to drink and drive (Petraglia, 2009). One potential way to combat this is to use novel message presentations (Petraglia, 2009).

A review and explanation of the results found for the research question and hypothesis is discussed in the following sections.

Discussion of Research Question 1

In the research question, I asked whether the four different technological conditions (written screenplay, flat video, 3D video, and virtual reality) produced different feelings of spatial, social, and self-presence. The current literature has indicated that technology that provides more affordances and sensory experiences (Sheridan, 1992; Spagnolli et al., 2009), such as virtual reality, leads to greater feelings of presence compared to the effects of less advanced technology (Steuer, 1995; Sundar et al., 2013). Based on the results of the current study, there was limited support for the idea that increased technology affordances increased presence. The following section will discuss why this finding in terms of fear appeals, psychological reactance, and self-perceptions.

Spatial presence differences. Of the 18 comparisons of the conditions on feelings of spatial, social, and self-presence, only two significantly differed. In fact, for feelings of spatial presence—the sense that viewers are able to move around and navigate

the mediated environment (Sundar et al., 2013)—there were no differences in condition. This finding prompted me to question why the technology that offered greater affordances and the opportunity for viewers to be spatially immersed in an environment (as in the VR condition) produced no differences in feelings of spatial presence, compared to the written condition, which merely let participants read a script.

One possible answer for this may be that the video did not offer enough features for viewers to feel they were able to navigate the video fully. Even though the 3D and VR conditions allowed more navigation through viewers' body movements, this may not have been enough. Balakrishnan and Sundar (2010) noted that virtual environments that did not provide the capability to navigate effectively produced lower feelings of spatial presence. Further, viewers may not have used the navigability controls offered by the 3D and VR conditions. I noticed when collecting data that many participants in the 3D condition did not use the navigation controls and scroll around while the video played. Instead, they sat back and watched it as if it were a normal video. In addition, in the VR condition, participants sat in a chair that was fixed to the ground so they had to physically turn their body and move in the chair to view the video. Many did not want to move around and instead watched the video with minimal movement. Both of these actions taken by participants would have greatly limited the feelings of spatial presence because they were not using the navigability controls available to them. Because these controls have been specifically shown in the literature to increase feelings of spatial presence, these limitations could explain why spatial presence did not differ between conditions (Balakrishnan & Sundar, 2011).

Social presence differences. For social presence—the feeling that others are present with the user in the mediated environment (Biocca & Harms, 2002)—no significant differences were found among the four technological presentations with the exception of one difference between the written and 3D conditions. Social presence was higher in the 3D video condition compared to the level in the written condition (mean difference = .403). This finding aligned with the concept of social presence: social presence has been defined as the feeling that other people are in the mediated environment with the user (Biocca et al., 2003). Technological affordances determine how much social presence users feel, and depending on the type of technology, other people can be represented as human forms with text, pictures, three-dimensional figures, or avatars (Biocca et al., 2003). In the case of this video, other people were represented as human forms, and in the 3D video condition, these people seemed realistic because they were dimensional.

Other qualities of the 3D video condition may have contributed to this difference in social presence. Participants may have felt as if the other social actors in the video were actually surrounding them because viewers had the opportunity to scroll around and look at everyone in the scenario, rather than at only the person who was speaking. This is different from normal flat videos, in which the point of view remains on the speaker and only moves if another character has a reaction that the producers of the video want the audience to see. The freedom that the 3D video gave viewers to look around may have more closely mimicked a real-life social gathering where people do not simply stare at the speaker while he or she is speaking but instead have the opportunity to look at the rest

of the group of people and see their reactions. This could explain increased feelings of social presence in the 3D video condition.

However, no other differences in social presence were found between the conditions. One potential explanation for this finding is that the way others were represented (in the human form of a character) was the same across all the conditions. The way others are represented (e.g., avatars, pictures, 3D figures) is a determinant of spatial presence (Biocca et al., 2003); therefore, the unchanging representation may have created no further differences. In addition, the characters in the video showed no differences in their levels of interactivity or communication with the participants based on the condition, meaning that those in the VR condition were just as unable to get a response from the characters as were those in the flat video condition. Because interaction and communicative abilities are key determinants of social presence (Biocca et al., 2003; Riva et al., 2003), this could explain the results.

Self-presence differences. For self-presence, similar effects were found. Largely, there were no differences among the conditions except in the flat video condition, which produced significantly higher presence scores compared to the written condition (mean difference = .451). This was consistent with the concept of self-presence, which is the feeling that users' bodies are physically in the mediated environment (Biocca, 1997; Sundar et al., 2013). Compared to the written condition, participants in the flat video condition received a greater number of visual cues given by the video and more affordances that allowed them to imagine they were in the mediated environment, compared to the affordances in the written condition. No differences in self-presence

emerged between the more advanced technological conditions. However, the limitations of the video used in the study may explain this.

Self-presence occurs when users in mediated environments experience a representation of their self, either physically or psychologically imagined (Jin & Park, 2009). The video itself did not offer viewers any opportunities for interaction as themselves or provide visual representation of the self—both of which would likely have produced higher feelings of self-presence (Lee, 2004). Self-presence as a construct may be felt to higher degrees in interactive environments such as video games (Jin & Park, 2009), in which users find it important to feel a self-representation—after all, they are actors in those circumstances, expected to offer input and have strong influence over the environment. This situation contrasted starkly with the video formats used in this study, wherein the viewers simply watched and did not speak or communicate with the mediated environment. Consequently, viewers felt no differences in self-presence.

For messages that are not designed to be interactive, this finding may indicate that as long as the message is in a video format (anything more technologically advanced than written materials), it will produce some feelings of self-presence, but higher scores may not be attainable with less interactive message formats (Cummings & Bailenson, 2016). Based on this conclusion, future researchers may seek to investigate feelings of self-presence in other types of persuasive messages, such as interactive narratives (Sangalang, Quintero Johnson,& Ciancio, 2013) in which the audience can change how the story progresses. These may increase feelings of self-presence, which in turn may align viewers' attitudes with the message.

Further explanations of the few differences. Overall, the differences were small to nonexistent when I analyzed the presence scores among the conditions. This was an unexpected finding based on the technology literature (Steuer, 1995; Sundar et al., 2013). Beyond the reasons already discussed, other reasons for the lack of differences may include the fact that the mean presence scores for spatial, social, and self-presence (3.22, 2.59, and 2.87, respectively) were relatively low across the sample. This finding indicated that presence was not felt to a high degree, regardless of whether the condition was designed to induce high levels of presence. One simple explanation for this is that the content of the video may have been too horrifying, and participants did not want to become immersed in it. Getting into a drunk-driving accident is not pleasant, and participants may have tried to turn away from the content. This is similar to the concept of defensive response known as danger control in the extended parallel processing model (Witte, 1992). When participants are presented with a message designed to invoke fear and the level of fear is too high, they tend to avoid the bad feeling of fear by turning away from the stimulus (Witte & Allen, 2000). When participants turn away from the message, either physically or psychologically, the message has no impact. In this case, the participants might not have wanted to feel present in a fearful environment, as a way to protect themselves from the fearful stimuli since presence is a psychological variable.

Beyond this potential reason, a recent meta-analysis may help clarify how the technology used in the current experiment might have affected presence scores (Cummings & Bailenson, 2016). The authors examined how many immersive features technology should have to generate feelings of presence (Cummings & Bailenson, 2016). This was of particular interest for the current study, because this experimental

manipulation centered on increasing the immersive qualities of the technology, up to the virtual reality condition, which offered the most complete immersion. In their meta-analysis, Cummings and Bailenson found a small to moderate effect of immersive features on presence (r = .316). Interestingly, they found other constructs beyond immersive qualities had a stronger impact on presence. One such construct was tracking level, involving users' freedom and input method (e.g., controller, body movement), along with users' ability to take action in the mediated environment rather than merely viewing it (Cummings & Bailenson, 2016). In the current study, the users could only view the mediated environment and had no controls other than to push the play button. Because tracking or interacting with the mediated environment produces a larger effect on feelings of presence (r = .360), this could explain the low feelings across the study conditions.

Other things that could have affected the low feelings of presence involved the message itself. If viewers felt that it was tacky or unrealistic, they may not have felt present because they were too busy critiquing the quality or the plausibility of the message, both of which have been shown to decrease presence (Lombard et al., 2009).

Second, based on the persuasive nature of the message, another issue that could have influenced the low presence scores across the board was psychological reactance, which is the concept that people have a need for freedom to choose their own attitudes and behaviors (Brehm, 1966). Psychological reactance may have changed participants' focus toward the persuasive undertones of the message and away from feeling present in it. Researchers know that people resist persuasion, and it is difficult to change their attitudes and behaviors (Knowles & Linn, 2004). In fact, people have strong reactions

when they know someone is trying to persuade them (Knowles & Linn, 2004). Even in social norms campaigns where the message is given from peers (as in this study), psychological reactance mediates the relationship between the message and the resulting attitudes, leading to a decrease in message acceptance (Jung, Shin, & Mantaro, 2010). So, even when the message is not from a clear authority figure, but has a clear persuasive intent, the message generates reactance. This pressure for change leads people to put up many barriers to the persuasive message (Brehm & Brehm, 1981), and this is especially true when the persuasive intent of the message is clear, as it was in the current study.

Further, studies on psychological reactance have showed that if the level of fear in the message is too high, significantly higher amounts of psychological reactance will occur (Zhang, 2014). As the content of the message used in the current study is fearful, this could have generated reactance, given that the levels of presence in this study were rather moderate. Thus, if participants in this study felt the message had too much of a persuasive agenda, or too much fear, they may have been reactive toward it, which could have stopped them or distracted them from feeling present.

Taken together, these explanations for the lowered feelings of presence in this study and the overall lack of differences between conditions led me to conclude that the technology did not have the large impact on presence that previous researchers had predicted, at least in this circumstance. However, for the few differences I found, I followed up with a test of H1.

Discussion of Hypothesis 1

Because in this study, I sought to understand how attitudes toward drinking and driving may have been increased as levels of presence increased, I tested the first

hypothesis. I predicted that the experimental conditions would increase attitude scores through an increase in each type of presence. Three mediation analyses (for spatial, social, and self-presence) produced conflicting results and led to mixed support for H1. An explanation of the findings is provided in the following sections.

Spatial presence mediation model. Partial support was found with the mediation model that tested the impact of the experimental conditions on attitudes through spatial presence. Spatial presence was found to mediate the effect on attitudes of the 3D video condition (compared to the written condition; D3). There was a .045 increase in attitude scores based on the difference between conditions, through the increase in spatial presence. This effect was consistent with findings in the presence literature.

Spatial presence allows users to feel a sense of space, as if they can move in a mediated environment the way they move in a physical environment; this sense of space contributes greatly to a sense of realism (Sundar et al., 2013). Technology such as 3D video, which features more navigation affordances and the ability to move around a mediated environment, has increased feelings of spatial presence (Balakrishnan & Sundar, 2011). Therefore, this finding was logical in the context of the experimental stimulus. Those who felt more spatially present watching 3D videos, compared to the referent condition, might actually have experienced the wreckage of the car crash around them and felt as if they were in the same space as the people who died from the drinking and driving crash. This would have been a very powerful feeling, likely encoded in the brain as a real experience (Fazio & Zanna, 1981). This encoding could affect viewers' attitudes toward drinking and driving. Thus, if participants felt as if they were there, witnessing the event as if they were in real life, then they may have had increased

negative feelings about drinking and driving because they had real experiences with it. This finding was consistent with other evidence that has shown increases in presence through realistic environments. In short, experiences created by technology may be persuasive (Sundar et al., 2013).

This finding is also supported by evidence surrounding the Proteus effect. This is the concept that one's virtual behavior could transfer to the real world, and at least for short period of time, affect one's real life experiences (Yee, Bailenson, & Ducheneaut, 2009). This effect has been shown useful in health communication, as one study explored how normal sized avatars increased overweight children's motivation to exercise using a Wii (Li, Lwin, & Jung, 2014). In the exercise study, participants might have felt like the avatar set goals for them, but in a non-threatening, non-sterotypical way and this translated to real life attitude and motivation.

In addition, this finding lends experimental support to some of the correlational conclusions of studies examining the impact of presence on attitudes (Tussyadiah et al., 2018). The experimental design of the current study facilitated claims of causality between the 3D video condition, presence, and attitude outcomes, indicating that the rise in spatial presence caused by the 3D video increased attitudes.

Practical implications. The findings of this study may lead to important applications for health communication scholars or those in public health who are attempting to change drinking and driving attitudes. Campaign designers should focus on increasing spatial presence through technology using tools such as 3D videos. This tactic was shown in the current study to be useful for attaining a small increase in attitudes toward the drinking and driving message. However, this increase in attitudes was small,

given that viewers' attitudes regarding this issue are already largely formed—messages about drinking and driving are ubiquitous (Petraglia, 2009). Thus, these attitudes may be particularly difficult to change, and any change could be meaningful.

In mass media campaigns, generating any small change is usually considered a success (Elder et al., 2004); changing the opinions of a mass population is difficult. Future researchers should observe whether the same small increases in attitudes appear for other issues similar in nature to drinking-and-driving attitudes that are already formed and steady or for issues in which the messages appear repeatedly in the environment. One example of this could be smoking.

Self-presence mediation model. When testing a mediation model with self-presence as the mediator of the effect of experimental condition on attitudes, opposite results were generated, and H1 was not supported. The increase in self-presence between the written and flat video condition (D1) caused an increase in self-presence, which *lowered* attitude scores by .054. Stated simply, the flat video condition increased levels of self-presence, which negatively affected participants' attitude scores. This finding was opposite of the predictions of H1, which posited that an increase in all types of presence would increase attitude scores.

In prior research, feelings of self-presence have been shown to change attitudes of those with phobias (Garcia-Palacios et al., 2002) and those confronting traumatic experiences (Walshe et al., 2003). Self-presence is the powerful feeling defined by the user's own body in the mediated environment (Biocca, 1997). In this study, the flat video realistically portrayed horrific events, which created a life-like experience for participants, and their feelings of self-presence were heightened (Lombard et al., 2009).

However, in this instance, the heightened feelings of self-presence did not positively change viewers' attitudes toward drinking and driving. Explanations of this effect may be found in literature on attitudes and self-judgment (Sedikides & Strube, 1997).

People are motivated to hold good self-opinions; self-enhancement, or the propensity to keep positive self-perceptions, is considered a fundamental motivation of the self (Sedikides & Strube, 1997). Attitudes can serve as defense mechanisms to boost self-esteem, especially when a person is mentally conflicted (Katz, 1960; Shavitt & Nelson, 2002) or experiencing cognitive dissonance (see Festinger, 1957). In this case, participants saw themselves in the car that caused the drunk-driving crash (resulting in heightened self-presence). Given this experience, the participants may have felt low self-esteem or guilt for being part of the accident. These feelings may have threatened their self-perceptions, motivating them to decrease their negative attitudes about drinking and driving to avoid feeling negatively about themselves. Then, when they took the survey that contained the attitude scale based on morality judgments of drunk drivers, they may have changed their attitudes, rating items like "It is wrong to drive while intoxicated" as less bad than they actually thought it was to protect their self-esteem (Shavitt & Nelson, 2002). This type of behavior occurs when people change their attitudes to support their actions and maintain attitudinal and behavioral consistency (Fazio, Chen, McDonel, & Sherman, 1982). They either change their attitude or change their behavior—in this case, they could not change the behavior (being exposed to the message) so they may have changed their attitude.

Social presence mediation model. Running a mediation model with social presence as the mediator of the effects of condition on attitudes generated no direct or

indirect effects. This finding contradicted findings of other studies, including Skalski and Tamborini (2007), who found increasing feelings of social presence through interactive agents eased the processing of a persuasive message and created healthy attitudes. However, in the current study, the agents (characters in the video) were not interactive—they could not converse with the participants or respond in any way to anything the participants did. Knowing that the characters in the video would not respond, participants might not have seen themselves as interactive social agents and therefore experienced lower feelings of social presence, which in turn produced no changes in attitudes.

Further, previous researchers have found that social presence influences attitudes, but *specifically*, attitudes geared toward the mediated representation of other individuals (Bailenson et al., 2001). In the current study, I measured attitudes toward the participants' own behaviors of drinking and driving and not attitudes toward other mediated characters; therefore, social presence would have had no impact on this attitude.

Limitations and Future Directions

As with any study, this study had limitations. First, in the 3D condition, participants did not want to move their fingers constantly around the screen. Many sat back and watched the video as if it were a normal program. This viewing behavior would have limited the feelings of spatial presence because participants were not using the navigability controls that were designed to increase their feelings of spatial presence (Balakrishnan & Sundar, 2011). Further, in the VR condition, participants were reluctant to move around in their chairs. Future researchers would benefit from using swivel chairs on wheels to allow participants to spin their bodies around to view the entire video more comfortably.

Second, in this study, I used existing content designed with its own goals for changing attitudes and behaviors (Diageo, 2016). Using this content may have limited the types of attitudes that were changeable. In addition, viewers may have perceived this video as tacky or unrealistic. Future researchers may benefit from designing and pretesting original content.

As mentioned previously, the organization behind the stimulus video, Diageo, recently released a VR binge-drinking video. The organization's goal is to create an entire VR series. Future researchers should observe whether the same small increases in attitudes appear for other issues, such as binge drinking, or for issues about which messages appear repeatedly in the environment. Creating a partnership with Diageo could help when pretesting the messages and conducting follow-up research to see if the campaign achieved its intended results.

In addition, future researchers could examine messages that provide different content presentations according to the type of technology being used. In the current study, the video was largely the same across conditions; however, users were able to gain some minimal interaction in the 3D condition and to move their heads around to view more in the VR condition. However, the differences in interactive abilities may not have been enough to increase feelings of presence, because in each condition, participants were still merely observers with no input capabilities. Therefore, future researchers may benefit from creating content that provides increased interactive capabilities or uses advanced technology to the greatest degree. For instance, in a virtual reality condition, participants could have options to choose which characters they want to hear from in the video or whose story they wish to view. This technique was used in a virtual reality series

entitled *Testimony*, which documented the stories of sexual assault survivors (Goldstein, 2017). Viewers had the ability to choose the stories they wanted to hear, and this freedom may have generated greater feelings of control and realness, which have been shown to increase presence (Balakrishnan & Sundar, 2011). Overall, this technique could foster increased user interaction, and when coupled with the advanced technology presentation such as virtual reality headsets, could represent a stronger technology manipulation.

Similarly, future researchers could employ an interactive narrative (Sangalang et al., 2013) or video, which would allow people to change the outcome and make decisions. This capability could allow people to feel an increased sense of presence through becoming actors in the mediated world who make decisions and affect outcomes. Pressgrove, Bowman, and Knight (2018) found no association between presence and attitudes toward the prosocial messages. However, narrative engagement affected attitudes, which affected viewers' behavioral intentions (Pressgrove et al., 2018). Thus, narratives, particularly interactive ones, may be more engaging, providing the persuasive link among technology, content, and persuasion. This is an area for future research. Further, if practitioners seek to move beyond video content, games could be used as well—some games have been shown to create social change (Alhabash & Wise, 2015). An examination of presence in these games could help explain attitude changes.

Conclusion

In this study, I uncovered important information for health communication scholars who may seek to use expensive, novel technologies such as virtual reality in the creation of health messages. Currently, practitioners believe technologies and techniques such as virtual reality and immersive storytelling are more engaging, compared to other

communication methods (Ahn et al., 2016). However, this study showed the effects on generating feelings of presence and attitude change are small. Further, such technologies are expensive (Cummings & Bailenson, 2016); however, for attitudes related to life or death issues such as drinking and driving, even small changes may be critical enough to outweigh the cost of using these technological tools.

This study also contained a few informative yet curious findings, such as how increases in self-presence may lead to decreases in attitudes. This finding has implications for anyone designing a persuasive message based on guilt. In such cases, it may not be beneficial to increase self-presence; instead, increasing spatial presence may be useful when trying to persuade individuals. These findings provide important conclusions that scholars and practitioners can use when designing health campaigns.

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APPENDIX A: PRETEST

Thank you for showing interest in our study on the presentation of health messages!

We're happy that you are interested in this project, and we hope to have you visit us in the Department of Communication Studies Interaction Lab (2nd Floor, Armstrong Hall) for the study session.

Before we can enroll you in the study, we need to ask you a few questions first. You will be asked to read a detailed consent form that provides details about the study (both this portion and the in-person study session). Should you agree to be in our study, we will then ask you a few questions about yourself and some of your consumption habits--data that we will use later on in the study. Finally, you will be asked to provide us your e-mail address so that we can contact you to schedule the study session in the Interaction Lab.

We do not expect this process to last more than 10 minutes total. If you are ready, please click the "Next Page" button below, and we will begin!

Only Minimal Risk
Consent Information Form (without HIPAA) Principal Investigator: Jennifer Knight, Department of Communication Studies Department: Communication Studies Protocol Number: 1712888890
Study Title: Presentation of Health Messages Co-Investigator(s): Nicholas David Bowman, Ph.D. (Communication Studies)
Contact Persons Jennifer Knight Nicholas David Bowman, Ph.D. In the event you experience any side effects or injury related to this research, you should contact Jennifer Knight at (304) 293-3905 or jmknight@mix.wvu.edu. If you have any questions, concerns, or complaints about this research, you can contact Jennifer directly or her supervisor Dr. Nicholas Bowman at (304) 293-3905 or Nicholas.Bowman@mail.wvu.edu. . For information regarding your rights as a research subject, to discuss problems, concerns, or suggestions related to the research, to obtain information or offer input about the research, contact the Office of Research Integrity & Compliance at (304) 293-7073. WVU IRB approval is on file, Protocol #1712888890. In addition, if you would like to discuss problems, concerns, have suggestions related to research, or would like to offer input about the research, contact the Office of Research Integrity and Compliance at 304-293-7073.
Introduction This study is being conducted by Jennifer Knight in the Department of Communication Studies at West Virginia University, along with Dr. Nicholas Bowman (Communication Studies). You have been asked to participate in this research study, which has been explained to you by Jennifer or one of her co-investigators (Dr. Bowman). This project is not funded by any outside organization.
Purpose(s) of the Study The purpose of this study is to better understand how presentation of health messages can impact people’s reactions to the people and scenarios in the messages themselves.

Description of Procedures This study involves two parts: (1) taking a brief online survey about your consumption behaviors and scheduling a study session in the Interaction Lab (2nd Floor, Armstrong Hall, 221) and (2) at the Interaction Lab, watching a video from our collection and answering a few questions about your feelings toward it. The total amount of time for participation in this study is estimated at 30 minutes, 10 minutes for the online survey and 20 minutes for the in-person laboratory visit.

Discomforts There are no known or expected risks from participating in this study.

Benefits You may not receive any direct benefit from this study. The knowledge gained from this study may eventually benefit others, such as amateur and professional media producers.

Additionally, if you are enrolled in a COMM course, you may be eligible to receive research credit (extra credit) for participation in this study. To find out if you are eligible, please contact your Instructor and/or your course syllabus. Your course syllabus should also include details regarding how many research credits you may be eligible for (as well as how many research opportunities you can attempt for that class). Students not wishing to volunteer for this study may be able to receive research credit by completing an alternative assignment. For students in eligible classes, your Instructor will provide more information on alternative assignments.

Financial Considerations There are no special fees for participating in this study.

Confidentiality Any information about you that is obtained as a result of your participation in this research will be kept as confidential as legally possible. Your research records and test results, just like hospital records, may be subpoenaed by court order or may be inspected by the study sponsor or federal regulatory authorities without your additional consent. In any publications that result from this research, neither your name nor any information from which you might be identified will be published without your consent.

While the information you provide through this study's surveys will be kept confidential, this study allows for multiple people to participate in a given in-lab research session. This means that you may be in a lab session with other people participating in the study at the same time; because of this it may be possible for others to know that you participated in this study.

Voluntary Participation: Participation in this study is voluntary. You are free to withdraw your consent to participate in this study at any time. Refusal to participate or withdrawal will not affect your class standing or grades and will involve no penalty to you. In the event new information becomes available that may affect your willingness to participate in this study, this information will be given to you so that you can make an informed decision about whether or not to continue your participation. You have been given the opportunity to ask questions about the research, and you have received answers concerning areas you did not understand. Upon signing this form, you will receive a copy. ***NOTE: You will be given a physical (paper) copy of this form when you visit the Innovation Center for your scheduled study session.***

○ Yes, I consent to participate in this study. (1)

○ No, I do not consent to participate in this study. (2)

We would like to ask you a few questions about yourself. These questions will give us a sense of the types of people who participated in our study, which is important for how we discuss our project. We will not ask you any personally identifying information, and your answers will be kept confidential. As will all of our questions, you may choose to skip any that you are not comfortable answering.

What is your age, in years?

What is your gender?

What is your ethnicity?

As part of our project on health messages, we would like to ask you a few questions about your own consumption behaviors.

To answer these questions, please note that:
1 Drink = 1/2 pint of beer, 1 glass of wine, or 1 single liquor

Please read each statement below, and answer using the response options on the right.

	Never (1)	Less than Monthly (2)	Monthly (3)	Almost Daily (4)	Daily (5)
Men: How often do you have EIGHT or more drinks on one occasion? OR Women: How often do you have SIX or more drinks on one occasion? (1)	○	○	○	○	○
How often during the last year have you been unable to remember what happened the night before because you have been drinking? (2)	○	○	○	○	○
How often during the last year have you failed to do what was normally expected of you because you had been drinking? (3)	○	○	○	○	○
How often In the last year has a relative or friend or a doctor or other health care worker been concerned	○	○	○	○	○

about your drinking, or suggested you cut down? (4)

People consume a lot of other foods and beverages, and we would like to get a sense of your other consumption behaviors.

Please read each of the statements below, and choose one of the answers on the right to indicate your answer. **Be sure to read whether the question is asking you the amount per day or per week!**

	Amount
Cans of energy drinks per week (1)	
Cans of cola per week (2)	
Cups of coffee per week (3)	
Cups of tea per week (4)	
Packets of potato chips per week (5)	
Bars of chocolate per week (6)	
Burgers/hot dogs per week (7)	
Packs of chewing gum per week (8)	
Pieces of fruit per day (9)	
Portions of vegetables per day (10)	
Glasses of water per day (11)	

For our final set of questions, we want to ask you about your knowledge of a variety of different behaviors and actions that could affect one's health. Please indicate level of knowledge or familiarity you have of these. As always, remember that there are no "right" or "wrong" answers -- your answers are confidential.

	Strongly Disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (18)	Strongly agree (19)
I am knowledgeable about how to maintain a well-rounded diet (1)	○	○	○	○	○	○	○
I am knowledgeable about how often people typically drink and drive (2)	○	○	○	○	○	○	○
I have a good idea of how many glasses of water per day I should consume (3)	○	○	○	○	○	○	○
I am knowledgeable about safe weight loss behaviors (4)	○	○	○	○	○	○	○
I believe I have a good idea about when and where people drink and drive (5)	○	○	○	○	○	○	○

That's it for now -- thank you for answering those questions!

APPENDIX B: SAMPLE OF THE SCREENPLAY SCRIPT

Black Screen: ***The average American spends 101 minutes per day in the car. It's where we start new careers…***

FIRST CAR INTERIOR- DAY

A faint ringing sound is heard as a SAMANTHA a girl in her mid-twenties with glasses and medium brown hair drives her car. She reaches to answer her phone and hears a man's voice.

SAMANTHA
Hello?

MAN
Hi, Samantha?

SAMANTHA
(hesitantly)
Yes. Whooo's this?

MAN
(enthusiastically)
Dean Nichols from Spector Fashion. Saw your portfolio and loved it. I'm gonna grab a drink with the design team, are you free to stop by the bar?

Black Screen: ***It's where we keep romance alive…***

A SECOND CAR INTERIOR- DAY

A couple in their late twenties sit alone in the front seat a parked car with the man on the drivers' side and the woman in the passenger's seat. They begin to move toward each other affectionately when the woman abruptly stops and discovers she is sitting on an infant's pacifier. The man chuckles and the woman throws it into the back seat, unamused.

Black Screen: ***It's where we laugh with friends…***

A THIRD CAR INTERIOR- DAY

Three people in their mid-twenties are in a car driving down the road. Two males are seen sitting the front of the car. A blonde male with light skin is driving and begins a conversation with the dark-haired male with tan skin. A dark-haired female sits in the back seat looking at her mobile phone, initially not paying attention.

BLONDE MALE

(Checking himself out in the rearview mirror while driving)
Ya know, I'm thinking about letting my beard grow out. I'm talkin' like two years OUT.

DARK-HAIRED MALE
(Smiles, nods)

BLONDE MALE
(Smiling)
Think Stacy would dig that?

FEMALE
(Looks up from her phone, annoyed, rolls her eyes, then laughs)
What do *you* think?

DARK-HAIRED MALE
(nodding)
Dude. That's what I would do.

FEMALE
(incredulously)
Can you even grow facial hair?

Everyone laughs.

Black Screen: ***It's where we make DECISIONS that impact the rest of our lives.***

APPENDIX C: POSTTEST

For Researcher Use: In the fields below, please select the proper options for the experimental conditions below. Do not show this questionnaire to participants until you have entered the information and selected "Next Page" to advance the survey.

What is this participant's WVU MIX ID?
Which condition did this participant receive?

Thank you so much for coming into the lab today, and receiving that health message.

Now, we would like to ask you to answer a few questions about your feelings towards the content of that message.

Please read each of the questions below, follow the directions and prompts on-screen, and let us know if you have any questions, comments, or concerns along the way. First, we would like to ask you to think about the message that you just received.

Please read each of the statements below, and select an answer from the right that best represents how you feel. There are no “right” or “wrong” answers here, so please answer using the first thought that comes to mind.

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
How much did it seem as if the objects and people you saw or heard had come to the place you were? (1)	○	○	○	○	○
How much did it seem as if you could reach out and touch the objects or people you saw or heard? (2)	○	○	○	○	○
How much did it seem when an object appeared to be headed toward you, you wanted to move to get out of its way? (3)	○	○	○	○	○

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
					continued
How much did you experience a sense of being there inside the environment you saw or heard? (4)	○	○	○	○	○
How much did it seem that sounds came from specific different locations? (5)	○	○	○	○	○
How often did you want to or try to touch something you saw or heard? (6)	○	○	○	○	○
How much did the experience seem more like looking at the events/people on a movie screen? (7)	○	○	○	○	○
How much did the experience seem more like looking at the events/people through a window? (8)	○	○	○	○	○

As above, please read each of the statements below, and select an answer from the right that best represents how you feel. There are no “right” or “wrong” answers here.

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)
How often did you have the sensation that people you saw or heard could also see or hear you? (1)	○	○	○	○	○
To what extent did you feel you could interact with the person or people you saw or heard? (2)	○	○	○	○	○
How much did it seem as if you and the people you saw or heard both left the places where you were and went to a new place? (3)	○	○	○	○	○
How much did it seem as if you and the people you saw or heard were together in the same place? (4)	○	○	○	○	○
How often did you want to, or did you, make eye-contact with someone you saw or heard? (5)	○	○	○	○	○
How much control over the interaction with the person or people you saw/heard did you feel you had? (6)	○	○	○	○	○

As with the other questions, please read each of the statements below, and select an answer from the right that best represents how you feel.

	Never (1)	Sometimes (2)	About half the time (3)	Most of the time (4)	Always (5)
To what extent did you feel mentally immersed in the experience? (1)	○	○	○	○	○
How involving was the experience? (2)	○	○	○	○	○
How completely were your senses engaged? (3)	○	○	○	○	○
To what extent did you experience a sensation of reality? (4)	○	○	○	○	○
To what extent was the experience very relaxing? (5)	○	○	○	○	○
To what extent was the experience very exciting? (6)	○	○	○	○	○
To what extent was the story engaging? (7)	○	○	○	○	○

Thinking about the message, which of the following statements best describes your feelings about it?

	1 (0)	2 (1)	3 (2)	4 (3)	5 (4)	6 (5)		
Remote (1)	○	○	○	○	○	○	○	Immediate
Unemotional (2)	○	○	○	○	○	○	○	Emotional
Unresponsive (3)	○	○	○	○	○	○	○	Responsive
Dead (4)	○	○	○	○	○	○	○	Lively
Impersonal (5)	○	○	○	○	○	○	○	Personal
Insensitive (6)	○	○	○	○	○	○	○	Sensitive
Unsociable (7)	○	○	○	○	○	○	○	Sociable

As with the other questions, please read each of the statements below, and select an answer from the right that best represents how you feel. There are no "right" or "wrong" answers here, so please answer using the first thought that comes to mind.

	None at all (1)	A little (2)	A moderate amount (3)	A lot (4)	A great deal (5)
Overall how much did touching the things and people in the environment you saw/heard feel like it would if you had experienced them directly? (1)	○	○	○	○	○
How much did the heat or coolness (temperature) of the environment you saw/heard feel like it would if you had experienced it directly? (2)	○	○	○	○	○
Overall, how much did the things and people in the environment you saw/heard smell like they would had you experienced them directly? (3)	○	○	○	○	○
Overall, how much did the things and people in the environment you saw/heard look they would if you had experience them directly (4)	○	○	○	○	○
Overall, how much did the things and people in the environment you saw/heard sound like	○	○	○	○	○

they would if you had experienced them directly? (5)

For these questions below, we would like you to think about the message and the people involved. With these in mind, please read and respond to the questions below. As a reminder, there are no "right" or "wrong" answers for these items, so please respond with the first answer that comes to mind.

	Strongly agree (1)	Somewhat agree (2)	Neither agree nor disagree (3)	Somewhat disagree (4)	Strongly disagree (5)
While consuming the message, I felt as if I was part of the action. (1)	○	○	○	○	○
While consuming the message, I forgot myself and was fully absorbed. (2)	○	○	○	○	○
I was able to understand the events in the message in a manner similar to that the character understood them (3)	○	○	○	○	○
I think I have a good understanding of the character. (4)	○	○	○	○	○
I tend to understand the reasons why the character does what she does. (5)	○	○	○	○	○
While consuming the narrative message I could feel the emotions the character portrayed. (6)	○	○	○	○	○
During consuming the message, I felt I could really get inside the character's head (7)	○	○	○	○	○
At key moments in the message, I felt I knew exactly what the character was going through (8)	○	○	○	○	○
While consuming the message, I wanted the character to succeed in achieving her goals. (9)	○	○	○	○	○

When the character succeeded, I felt joy, but when she failed, I was sad. (10)	○	○	○	○	○

For the questions below, we would like you to think about your own thoughts and feelings toward the statements regarding drinking and driving. As a reminder, there are no "right" or "wrong" answers for these, so please respond with the first answer that comes to mind. Your answers are confidential.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
I would feel guilty if I drove intoxicated, even if no one found out (1)	○	○	○	○	○
It is just wrong to drive while slightly intoxicated (2)	○	○	○	○	○
I would be embarrassed if people found out I was arrested for driving slightly intoxicated (3)	○	○	○	○	○
My feelings of guilt from drinking and driving would hurt me (4)	○	○	○	○	○
I would lose respect from my loved one(s) if I drove while slightly intoxicated (5)	○	○	○	○	○
That lost respect from my loved ones would hurt me (6)	○	○	○	○	○

Please answer the following questions. Remember, your answers are confidential.

How many traffic accidents have you been in, either as a driver or passenger? (1)
In your opinion, what is the maximum number of drinks that a person your age and build can drink in a two hour period and still be able to drive safely? (2)
How many accidents have you been in where at least one of the drivers had been drinking? (3)

Please rate your feelings toward the following statements.

	Strongly disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Drivers convicted of drunk driving should be jailed on a first conviction (1)	○	○	○	○	○
Drivers convicted of drunk driving should lose their license on a first conviction (2)	○	○	○	○	○
I support random breath testing of drivers for alcohol (3)	○	○	○	○	○
It is morally wrong to drive after 4+ drinks (4)	○	○	○	○	○

That’s it! Thank you for answering all of those questions for us!

Before leaving today, please enter your e-mail address to confirm your participation in the study. This should be the same e-mail address that you used for the initial survey.

If you are participating in this study for course credit, please enter your instructor's last name and the course name below.