Call of Duty: The Tobacco Wars.

Opposing Effects of Tobacco Glorifying and Prevention Messages in Entertainment Video Games

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Abstract

We explore competing effects of video gaming content on adolescent health attitudes and beliefs, with a particular focus on effects that potentially impact nicotine and tobacco use. We posit that, through "Virtual Transportation," players suspend critical analysis of information they encounter. We draw attention to vivid tobacco imagery found in commercial video games that adolescents play, considering if the ability of games to transport gamers into a compelling, fictional reality might cause these images to influence health cognitions. In a laboratory investigation, we find that by having a game avatar "vape" during play, we can reduce the perceived riskiness of smoking e-cigarettes as a function of the self-reported transportation into the game. We then explored ways health communicators might use the same processes to discourage smoking and other risky behaviors. We placed health messages adapted from actual health campaigns into the background of first-person video games, finding that we can reduce willingness to engage in the associated health risks, also as a function of transportation into the game. Our discussion focuses on the ways that the transporting, fantasy elements of video games might be harnessed by health communicators to promote public health.

Call of Duty: The Tobacco Wars.

The line between the real and the unreal is blurring. In work and play, people are spending increasing amount of time in computer-mediated experiences – virtual realities, augmented realities, and the merging of the two in what is being called mixed reality. As successive generations continue this migration from the real to the unreal, psychological theories will need shift with them. We attempt to do this by considering the way that influence processes change when individuals become fully immersed into virtual worlds, and how those processes can then impact real-world attitudes. Most of the research that has considered this question has applied social learning principles to posit a link between simulated in-game violence and real-world aggression in children (Anderson et al., 2007). This work has come under attack recently, with some arguing that social psychologists working in this tradition have failed to give humans credit for their ability to distinguish reality from fiction (Ferguson & Dyck, 2012).

In the work that follows, we turn this argument on its head. We argue that it is precisely because humans can distinguish reality from fiction that video games can at times have consequential, real-world effects. We explore this possibility as it relates to gaming influence on health decisions, with particular attention on how games might influence nicotine and tobacco use among adolescents who play games. As we show, many of the most popular commercial video games that adolescents play are rich in imagery and storylines that promote nicotine and tobacco use (NTU). Moreover, we argue that it is the obviously *fictional* quality of these presentations that might make them a threat to public health. We then present research suggesting that health communicators should fight fire with fire, by learning how to conduct informative (factual) health campaigns from within immersive (fictional) gaming worlds.

Virtual Transportation

We propose that by immersing players in compelling, life-like simulations, video games can exert powerful and consequential influence on the players' own attitudes and beliefs. We advance this hypothesis from two interrelated lines of research. First is research on persuasion through fiction. History points to many instances in which fictional texts have had consequential effects on public opinion. Historians might point to Harriet Beecher Stowe's *Uncle Tom's Cabin*, which furthered the Abolitionist

cause in the run up to the U.S. Civil war, or to Upton Sinclair's *The Jungle*, which led to changes in the meat-packing industry and promoted public support for food-safety. Social psychology points to research on emulative suicide, which had as its early inspiration documented spikes in suicide that followed publication of Wolfgang von Goethe's novel, *The Sorrows of Young Werther* (Phillips, 1982).

Prentice and Gerrig (1997; Gerrig & Prentice, 1991) argued that in instances such as this, it is possible that stories shaped public opinions and altered personal decisions, not *despite* their fictional nature, but in part *because* of this quality. To enjoy a piece of fiction or to be entertained by the twists and turns in the plot is in some way to accept the "reality" it presents. Stories become exciting to the extent that the one allows the characters and their experiences to feel or be experienced as if they are real (what Coleridge 1817/1906 referred to as the "willing suspension of disbelief", p. 161). This shift in perception might leave the individuals more open to and less critical of the information they encounter in fictional stories, perhaps even information with real-world relevance. In a series of studies, Prentice and Gerrig found support for this proposition. When untrue information was embedded in a story dialogue, it shaped later belief to the extent that it had been embedded in a written text thought to be fictitious (Gerrig & Prentice, 1991), especially if in an unfamiliar setting that would not anchor the story in the reader's own reality (Prentice, Gerrig & Bailis, 1999).

Research on persuasion through fiction has inspired a second, broader line of research that explores the role that "narrative transportation" might play in enhancing persuasion and influence. Green & Brock (2000) proposed that, as individuals become "transported" into the storyline of a text (such that they can visualize the story events as if from a lived experience, identify with the narrator or connect emotionally with other story characters), they might become less critical of and more open to the ideas they encounter. In a range of supporting studies, they have found that as transportation into a story narrative increases, the influence of the content of those stories increases in kind (and they found this to be true whether the story was presented as fiction or nonfiction). Follow-up studies suggested that this result occurs, in part, because people engage in less elaborate counter-arguing of the ideas presented from within (Green, Garst & Brock, 2004). This model has clear implications for health communication, where

resistance in its many forms can be an obstacle to persuasion and influence (Brehm, 1966; Knowles & Linn, 2004; Witte, 1992). To the extent that health communicators can fold messages into a story with a compelling narrative, they may exert greater influence on real-world health decisions (see Green, 2006).

These two frameworks provide a basis for predicting that video games might have the potential to have consequential effects on a person's attitudes and beliefs. Not only do many modern games immerse players in a rich narrative that can unfold over time, they have other elements that might heighten immersion into the game – what we term *virtual transportation*, as distinct from narrative transporation.[1] Among features that likely promote this form of immersion are perceiving the simulation to be vivid and life-like (Sollins, 2011), having high levels of interactivity and character identification (Carpenter, Rogers & Barnard, 2015; Lin, 2013; Williams, 2011), as well as in-game consequences for one's in-game choices and actions (Sauer, Drummon, Nova, 2015; Carnagey & Anderson, 2005). By using such gaming features to help players leave their real worlds behind, video games might also help them leave behind some of their real-world resistance to influence, opening them up to ideas that they would otherwise reject. Resistance might be further diminished by the cognitive states that games can promote. Video games, by their nature, generate cognitive load, and players often persist a playing commercial games long past the point of fatigue – factors that can further reduce resistance and increase influence (e.g., Gilbert, 1991; Burkley, 2008). All of this suggests that the compelling fiction of commercial video games might at times break through and become real, by altering the attitudes and opinions of players in ways that will can affect later decisions. Unfortunately, when we look at the influences commercial games are possibly having on public health in general and on adolescent nicotine and tobacco use in particular, there is good reason to suspect that current influences are most typically for the worse.

[1] We term the experience of immersion into a computer simulation as "virtual transportation," as this allows us to draw more clear parallels to past research linking narrative transportation to persuasion and influence. However, this concept is roughly equivalent or no different from earlier concepts of "telepresence" and/or "presence" that are employed by researchers (largely from computer engineering) who study the immersion into computer-mediated realities (see Barfield et al., 1995). We do not wish to contribute to the proliferation of new or interchangeable terms, but in peer review, we found editors and reviewers sharply divided on which term we *had* to use, with the edge going to transportation.

Video Game Effects on Public Health

A large body of research suggests that movie and television storylines that promote or glorify risk can expand the range of risks that individuals themselves are willing to take. Not just the rates of nicotine and tobacco use but also of alcohol use and abuse, unprotected sex, reckless driving, and other risk behaviors can be driven upward by risk glorification (Brown & Witherspoon, 2002; Escobar-Chaves & Anderson, 2008). As the term is commonly operationalized, media "glorifies" risk to the extent that it positively portrays the actions of individuals who knowingly endanger their health and well-being and/or put at risk other positive life outcomes. The most comprehensive support for the hypothesized influence of risk-glorifying media on actual risk-taking can be found in a meta-analysis by Fisher and colleagues (2011). They analyzed 105 independent effect sizes, taken from studies on over 80,000 individuals participating in a range of experimental, cross-sectional, and longitudinal studies. They found sizable Hedge's point estimates for the effects of risk-glorifying media exposure on risk-taking behaviors (g = .41), including smoking (g = 0.44). No studies in their meta-analytic review specifically linked video-game presentation of risk to nicotine or tobacco use, but a longitudinal study by Hull and colleagues is informative. They tracked the media habits and risky behaviors of a sample of adolescents over three waves and four years and found that self-reported exposure to mature-rated video games predicted cigarette smoking (as well as alcohol use, aggression, delinquency, and risky sex). This effect held, controlling for past behavior, as well as a range of demographic, household, and parenting variables. This one study provides a needed longitudinal link to many prior cross-sectional studies that suggested the possibility of a causal effect of video game use on smoking (e.g., Raiff, Jarvis & Rapoza, 2012; Van Rooij, 2014).

A common interpretation of risk glorification effects on health risk behavior is that, by promoting counter-normative or socially "deviant" actions, risky media in general, and now video games in particular, might promote norm-violating behaviors, including norm-violating health-risks. This interpretation focuses attention on the mature-themed nature of many of today's games, which often involve violence, crime and other adult themes. The presentation of risky behaviors such as crime and

violence is in games is well documented, and indeed the subject of many game genres, but there may be more going on behind the gaming scenes. Many of the most popular commercial video games that are played by adolescents and young adults also contain a level of overt and covert promotion of nicotine and tobacco products that we suspect is unknown by many parents and public health researchers.

We recently administered an elicitation survey to a large sample of adolescents, age 18 – 24, drawn from college students (participant pool) and the community (Mecanical Turk). We had them complete an open-ended survey describing the types of tobacco imagery and promotion they have witnessed in commercial games, and they provided many dramatic examples. Consider the following: a version of *Guitar Hero* (a game that is rated appropriate for Teens to play) at times places players in front of large audiences of bar patrons who are smoking. Players of popular games such as *Call of Duty*, *Mass Effect 3*, and *Medal of Honor* directly interact with and team up with heroic, glamorized characters who smoke cigars and cigarettes. Players in *Grand Theft Auto* and *Assassin's Creed* can purchase and sell cigarettes for profit (and must do so if they wish to advance in the game). Those in *Grand Theft Auto* are exposed to in-game tobacco marketing that glamorizes a fictitious brand of cigarettes (*Redwood Cigarettes*), and players in *Grand Theft Auto, Fallout*, *Guns of the Patriot*, *Bioshock*, and *Red Dead Redemption 2* can elect to have their characters smoke or "vape" and from these simulated acts, be rewarded in the game by having increased character energy, attention, perception, and/or agility.

The sheer volume of tobacco content in commercial games caused us to reconsider some of the findings in the study by Hull and colleagues. Perhaps with regards to tobacco promotion specifically, the most consequential "risk" that is being glorified is nicotine and tobacco use. Realize that the American Surgeon General (2014) has already concluded that there is sufficient evidence to assume a causal and consequential effect of positive tobacco imagery from movies on adolescent smoking. In our view, movie promotion of tobacco imagery pales in comparison to what can be found in commercial video games that adolescents play, and when combined with the "transporting" qualities of games, it seems quite plausible that this type of imagery will exert even stronger influence on adolescent decision-making than anything yet encountered. However, we know of only one study that has examined exposure to tobacco imagery in

games as a risk factor. Cranwell and colleagues (2016) coded the content of video games played by a sample of 1,094 adolescents aged 11 – 17 and found that those who played games with tobacco and alcohol content were more likely to experiment with these substances. The cross-sectional nature of their study leaves their finding open to interpretation, however.

To get some clarity on this question, we decided to perform a laboratory test of the influence of gaming content on health cognitions. At the start of the semester, we (Blanton, Burrows & Regan, 2019) had participants in our university participant pool make baseline ratings of their attitudes towards "vaping" (e-cigarette smoking). Over the course of the semester, we then recruited students into a study that was presented to them as an investigation into factors shaping video game enjoyment. All played a skateboarding video game that we had designed from the ground up, using the Unity game engine. Players of our game navigated three-dimensional scenes on a skateboard – from a nightline cityscape to a colorful casino showroom. To maintain enjoyment, they could jump over ramps and off buildings while performing tricks and collecting objects to run up their point totals. What they were not told was that we included a single, subtle manipulation of their character. All participants played a character that matched their own gender but based on random assignment, this character either smoked an e-cigarette while skateboarding or it did not. If the character was smoking, players could hear the character at times inhaling smoke into the device, after which a smoke-puff "vape trail" would be left behind them. After playing this game, we then had participants rate their level of transportation into the game and then through use of a bogus "two study" procedure, asked them to make a number of seemingly unrelated ratings, including one page of ratings that assessed the perceived risk of smoking e-cigarettes.

We found that the more positively participants felt towards e-cigarettes at the start of the semester, the more "transported" they reported feeling into the game as a function of "virtual vaping." This finding suggests that there may be some marketing synergy between the promotion of nicotine and tobacco products by the tobacco industry and the promotion of video games by the gaming industry. To the extent that tobacco marketing promotes youth interest in nicotine and tobacco products, it might also promote enjoyment of games that allow them to simulate nicotine and tobacco use. Gaming companies

can thus benefit from including nicotine and tobacco imagery in their games, to the extent that nicotine and tobacco promotion is effective. More important for the influence of games on health decisions, we also found evidence that the gaming experience helped crystalize attitudes towards e-cigarettes. We found that the more transported participants were into the game, the lower the perceived risk of vaping among those who played the e-cigarette version of the game, and this was particularly true of those who had some initially positive attitudes towards e-cigarettes.

These findings generate from just one study and it requires further replication and extension and careful pairing with longitudinal analyses before any strong a conclusion should be drawn, but this one result suggests troubling influence of commercial gaming health-risk content on adolescent health cognitions. The majority of adult smokers began experimenting during adolescence (US Surgeon General, 2014) and gaming is at near saturation levels in this same age group (Entertainment Software Association, 2014). This suggests to us that attention should be turned to ask questions about how this new source of media influence might be shaping adolescent attitudes in ways that promote nicotine and tobacco use.

Tobacco (Gaming) Regulation?

If it appears that the Surgeon General's analysis of movie effects on adolescent smoking extends to video gaming effects, we can anticipate one class of counter-measures that will appeal to some. This is to adopt new tobacco-control regulations designed to protect youth from nicotine-and-tobacco glorifying imagery. One might, for instance, add warning labels to games that contain nicotine and/or tobacco content. Alternatively, the presence of nicotine and tobacco use could be deemed sufficient to make a game lose its E (for "Everyone") or T (for "Teen") rating, moving such games up to "M" (for mature), making it harder for adolescents to purchase the game.

However good intentioned, regulatory approaches are likely to have limited impact on adolescent gaming or health choices, as they are currently failing. It so happens that the Entertainment Software Rating Board (ESRB), the self-regulatory organization that assigns age and content ratings to American consumers, is meant to code games for the presence of "tobacco references" in the gaming content. However, we accessed their online database and looked up all of the aforementioned games that contained

often vivid examples of tobacco and nicotine use and not one of these games was so labeled.[2] Complicating matters, if warning labels were to more accurately convey the actual content of games, this might increase the appeal of such games to players looking for risky/adult simulations (see Bushman, 2006). Also worth noting, most parents have limited understanding of the meaning of ESRB ratings and so have limited ability to use them to control access (Harris Interactive, 2013), and it is unclear how many would view nicotine and tobacco content as a concern. Although we think there can be a role for regulations to guide parents who wish to be involved in the gaming decisions of their children, we think health communicators should consider more creative approaches if they wish to play a part.

In fact, we suggest that health communicators continue to do what they have always done, fighting fire with fire. The tobacco industry has long benefited from the presence of a media industry that often helps them promote their products, and health communicators have long responded to this threat by creating their own media campaigns that advance their own counter-messaging. Those concerned about the influence of media on adolescent smoking have waged war against the imagery found in movies and televisions, but now with the rise of video games that contain even stronger content, those who wish to respond will need to shift the fight to a new (virtual) battlefield. By making this change, health communicators can also benefit from the transporting qualities of games, using these features of the gaming environment as a lever to reduce forms of message resistance they encounter conducting campaigns in the real world.

A Virtual Transportation Model of Health Communication

In a series of studies (Burrows & Blanton, 2016; 2018), we tested whether 'Virtual Transportation' might be harnessed to increase the influence of prevention messages embedded in the background of video gaming scenes. As a first step in this work, we sought to design an immersive, first-person video game, in the hopes that we might engage and entertain players to such an extent that we

[2] The ESRB is a body formed by the trade association of the commercial video game industry (the Entertainment Software Association) and so arguably has a conflict of interest in assigning labels that will turn parents away.

generated levels of transportation sufficient to alter influence dynamics. We focused our initial energy on building a first-person shooter (FPS) game, where players had to navigate a three-dimensional world from the perspective of an armed individual tasked with shooting armed opponents. We chose to use an FPS for our initial work for three reasons. First, FPS are the most popular format for commercial video games with adolescents (Entertainment Software Association, 2014). Second, games with a fast pace and first-person navigation of a three-dimensional world have key elements that have been shown to magnify the effects of violent games on aggression (e.g., Slater, Lotto, Arnold, & Sanchez-Vives, 2009; Tamborini et al., 2004), and so we thought our game might be sufficiently transporting to magnify the effects of health messaging on health attitudes. Third, and perhaps most importantly, mature-themed games such as these are precisely the ones Hull and colleagues have found might increase risk-taking tendencies in adolescents (Hull, Brunelle, & Prescott, 2014; Hull, Draghici, & Sargent, 2012). We thus pursued a strong test of our hypothesis by trying to use such a game to *reduce* risk-taking attitudes.

As our first test of what we term the *Virtual Transportation Model of Health Communication*, we embedded messages designed to reduce participants' willingness to drive a car under the influence of alcohol (DUI). We focused on this behavior in our initial work because anti-DUI messages are easy to communicate graphically, even in a fast-paced game. Also, we knew that most college students in our research participant pool drove a car and also drank alcohol, making this topic relevant to a large percentage of those we could recruit. In the game we designed, players viewed an animation scene that placed them in a storyline that would explain their actions. They observed a helicopter landing on what was described as a 'government office complex' that had been overtaken by 'space aliens.' They were told that their task was to move floor-to-floor to the basement, shooting the armed aliens they encountered to get to the basement. All participants then shot their way through the different levels of the building, with each floor presented to them the offices of a particular government agency (e.g., a Department of Taxation, Army Recruitment, etc.). All eventually worked their way down to the lowest level, where we introduced our experimental manipulation. This final floor was presented as the former offices of the Division of Motor Vehicles, now overrun by alien humanoids. For half of the players, this room had

posters on the wall with graphic health warnings taken from real-world anti-DUI campaigns, developed by such groups as *Mothers Against Drunk Driving*. For the other half, these images were replaced with landscape paintings. After 30 minutes of play, the game came to an end, and players then completed a measure assessing their transportation into the game (with items asking the extent to which they felt physically present in the game while playing and the degree to which the game felt real to them during play). This was followed by a bogus two-study deception, where a research assistant entered and asked them if they would mind completing a second questionnaire, ostensibly as part of an unrelated study. On the 12th page of this inventory was a series of items asking their willingness to DUI in the future (e.g., how willing they would be to drive after feeling a "slight buzz" from drinking alcohol).

The results pointed to two opposing ways that transportation into the game might magnify influence. When willingness to DUI was regressed on to experimental condition, transportation, and the interaction term, a significant bilinear interaction was revealed. The nature of this interaction was that, in the control condition that exposed participants to landscape art, higher transportation into the game was associated with an *increase* in willingness to DUI. This result offers further support of the findings in Hull's research (Hull, Brunelle, & Prescott, 2014; Hull, Draghici, & Sargent, 2012). It suggests that when players become transported into mature-themed games that glorify risk, the interest in general risk-taking increases. However, it was against the pull of this current that the positive effects of the anti-DUI messages were revealed. Among those who were exposed to anti-DUI messages, transportation resulted in a significant *decrease* in willingness to DUI.

It thus appeared that by transporting players into an immersive game – even though it had risk-promoting elements to it – openness to health-prevention messages increased. A set of replication studies extended these findings in a number of ways. First, we found that transportation effects were largest among those who reported relatively high baseline willingness to DUI (Burrows & Blanton, 2016, Studies 2 and 3). This pattern is consistent with effects of narrative transportation, documented by Green and Brock (2000; Green, Garst & Brock, 2004). It suggests that virtual transportation might increase influence from background health messages by short-circuiting message resistance. This interpretation

follows because, in the absence of transportation, those with the highest baseline risk would typically be the ones most likely to resist prevention messages (e.g., Gerrard, Gibbons, & Warner, 1991).

We also have replicated this effect with both high and low fear messages, using both high and low-fear games. For instance, participants in Burrows and Blanton (2018) played a car-racing game that included background billboards with simple text reminders of the dangers of DUI (e.g., "Drive Sober or Get Pulled Over"). As with the FPS using high-fear messages, transportation into this game was associated with decreased willingness to DUI, controlling for baseline attitudes. And, most important to the current analysis, we have begun adapting these games to deliver anti-smoking messages. In a recent study, we embedded graphic anti-smoking messages (versus control and/or anti-DUI messages) in the background of a treasure-hunt game (where participants navigated a three-dimensional building in search of objects that increased point totals). We found that anti-smoking messages reduced willingness to smoke and anti-DUI messages decreased willingness to DUI, relative to the control condition and as a function of self-reported virtual transportation. Unexpectedly, we also found that the messages were more "leaky" than we would expect with real-world exposure: anti-DUI messages lowered willingness to smoke as a function of transportation, just as anti-smoking messages lowered willingness to DUI. This suggests that, although message resistance is reduced, the level of message processing that occurs is not as deep as one would expect with greater elaboration of the message content.

Importantly, we have also found that messages we embed in games can exert influence on willingness, whether we forewarn participants of the intent to include persuasive health messages or not. In one study, we explicitly informed participants that we were placing images in the games because we wished to study their impact. Inclusion of a warning like this could cause participants to feel targeted and produce some form of reactance, but we instead observed the same decrease in risk willingness, as a function of transportation. This finding suggests that, much like with consumer advertising – where it is readily apparent to anyone who cares to think about it that the intent is to exert influence – health messages might continue to influence attitudes, even when their inclusion in a game is perceived to be

intentional and strategic.[3] Here, again, however, the influence of messages on willingness was "leaky," in that prevention messages in one domain appeared to influence willingness in another (and see Peña et al., 2018).

Implications and Applications

This research is admittedly in its early stages. We have found encouraging results in the laboratory, suggesting that we can exert momentary, state changes on behavioral willingness by embedding health-promotion messages in immersive games. A next step will be to test real-world extensions, with the goal of exerting longer-term influence on attitudes and impacting real-world behaviors. We currently are pursuing research that will scale up our laboratory work in a number of ways. We are exposing participants to game-based anti-tobacco messaging for longer periods of time and we are measuring their influences immediately and at longer-term follow up. We cannot yet report what level of influence we can hope to exert with subtle in-game messaging, but we will be finding out.

Is this a Game-Based Messaging Feasible?

One concern about our work is that, perhaps, we are studying an intervention approach that can never be implemented on any meaningful scale. The commercial gaming industry is not going to stop designing and distributing mature-themed games (nor would we want them to). And, they will likely continue to market games to adolescents that contain a fair amount of imagery that in various ways glorifies nicotine and tobacco use (even though we do not want them to). In contrast, there is little reason to expect that the industry to leap at the chance to redesign commercially successful games to deliver graphic health warnings. However, we do not count out some level of engagement from commercial gaming companies in the future. A defining feature of game developers is their creativity, and we should not underestimate their ability to and potential interest in adapting subtle messages into games when it fits other objectives. Also, we note that it was through public pressure that studios began to move cigarettes

[3] This result suggests that strategic messaging might be fine but it should be so heavy handed that it reduces transportation. An anti-drug poster in the background of a virtual guidance counselor's office might seem realistic to players, even if the scene is strategically introduced. An anti-drug poster in an alien spaceship might seem not only strategic but also so unrealistic that it could disrupt transportation.

out of scenes and seatbelts in to scenes, and so we may see some similar changes in the future, as this new industry considers ways of increasing public support for its products.

More importantly, health communicators need not always rely on the industry to create games for them. Some popular games are hosted online and allow interested users to create their own variants. For instance, in pilot studies, we have hosted gaming tournaments by having participants compete in teams against one another playing the popular first-person shooter game *Counter-Strike* (an objective-based version of a FPS). Health communicators who wish to deliver health messages through games can thus harness the popularity of such platforms by using them to deliver messages they design.

Of course, it may never be possible for health communicators to distribute their messages at a level that can rival the distribution of nicotine and tobacco imagery in commercial gaming, and many games simply do not allow modification. One possibility that might become of increasing interest will to buy the equivalent of "billboard space" in video games, in much the way that advertising space is purchased in the course of running real-world campaigns. Our work might help to implement effective campaigns from within virtual environments, focusing attention on the best ways to deliver messages in ways that might enhance the fiction created – placing the anti-tobacco messages in the hospital scene, not the alien spaceship. Moreover, with the growth of "e-sports" – where it is estimated that by 2023 as many as 600 million people video game play as a form of entertainment (Tran, 2018) – it also will be relevant for communicators to consider how their virtual messages might impact third parties. Finally, we not that video games represent one of the many ways that people increasingly interact with information and others through computer-mediated realities. We see the challenge ahead is for psychologists to develop a broader science of psychology and influence that can adapt to this new terrain; one that includes research within virtual gaming worlds but that is not limited to it.

Expanding the model

We have focused our attention on one quality of games, what we term virtual transportation. There are other ways that health communicators can seek to increase influence through immersive games. For one, we think attention should be turned back on *narrative transportation*. Most of the work on the

concept has oriented around story narratives built into written texts. We think new attention should be focused on uses of narrative through gaming. Many of today's video games take players on journeys that can unfold over the span of days, weeks, months or considerably longer. For researchers who wish to use such devices to deliver impactful messages, there will be non-trivial challenges. It will be daunting for researchers to create video games or other virtual experiences that have the types of expansive stories found in modern commercial games. But, current evidence suggests that this investment of time and resources could yield important information on how to impact health decisions from campaigns mounted in virtual environments.

A new science of 'serious games' has begun laying this foundation. Education game designers have begun creating video games that educate players on everything from STEM to world history, through game play. Much of this work focuses on the role of "gamification" (where the puzzle or challenge of the game introduces incentives that motivate learning) and simulation (where aspects of the game provide opportunities to acquire behavioral skills and build feelings of efficacy). We see signs that this work is moving to focus attention on the transporting features of serious games. Educators are considering the importance of adding narrative elements and surprise, as ways to more fully engage learning (Mustaro & Mendonca, 2012; Wouters et al., 2017; De Troyyer, Van Broeckhoven & Vlieghe, 2017). We think by extension, this work should can consider ways that (for better or worse) compelling narratives can open players to subtle forms of influence. Our content analysis of tobacco imagery folded into the complex storylines of commercial games suggests to us that, if anything, this type of influence is currently for the worse and so we think attention should be given to how to introduce counter-narratives.

Another defining feature of modern games is players may identify with their own character or avatars to a far higher degree than they identify with characters in books or movies. In many ways, players of modern games seem to *become* the actor in the game. At the extremes, researchers have even proposed a virtual embodiment phenomenon that might result. Termed the *Proteus Effect* (in reference to the shape-changing Greek god Proteus; Yee, Bailenson & Ducenaut, 2009), researchers propose that the physical features of a gaming avatar can alter player's own behavior. This might cause them to do such

things as slow down when playing an avatar that looks heavy in the game (Peña, Khan, & Alexopoulos, 2016) or elderly (Yoo, Peña, & Drumwright, 2015), or they might otherwise act in ways that suggest they are navigating the "body" of the character they are playing. This research is suggestive of how reactions to in-game events might be altered by fusion of the self with the character being played. Going forward, we see a great deal of promise for health communicators to create new strategies of health education and influence by linking it to the concerns of the characters that adolescents play.

Rethinking Real and Unreal

We began this chapter by positing that technology has perhaps blurred the line between what is real and what is unreal. We moved from this argument to suggesting that it may be the unreal aspects of video games that in some cases promote influence on real-world attitudes and actions. We drew inspiration for this hypothesis from research on fiction and persuasion, and from research on narrative transportation. These lines of research suggest that by embracing a fiction or a storyline, individuals can become more open to new realities. There is an odd contradiction at the heart of our analysis, however. We have hypothesized that openness to influence increases as a linear function of what we term 'virtual transportation.' However, the way we measured virtual transportation was to ask our players how "realistic" they found our games, how much they experienced our video games *as if they were real*. This would seem to suggest that if we continue to increase the realism of our game, we will continue to increase influence (and see Blaschovich et al., 2002 for a similar analysis). However, if realism were to increase until it was total or complete, then our games we design become indistinguishable from reality. It seems plausible that at this point, real-world resistance might return.

This analysis suggests to us that there must be some middle ground of realism and of virtual transportation, where influence from computer-simulated experiences are at their height and where further increases would only diminish influence. Influence would then be at its height when a virtual world is experienced as sufficiently "realistic" that it promotes transportation and immersion in all its different flavors but also as sufficiently "unrealistic" that it continues to be perceived as a fiction; an alternative reality that must be sustained through openness to perception and experience. We are reminded in this

analysis of the “uncanny valley” concept. This is a hypothesized curvilinear relationship between empathy for fictional or simulated “minds” or characters, and their level of realism. When applied to virtual reality, it suggests that the emotional connection player experience when interacting with a simulated being will increase the more realistic this character becomes – up until the point that it becomes so realistic that it elicits feelings of eeriness or other-worldliness (see Stein & Ohler, 2017). Health communicators can build off this idea when they design virtual campaigns. They wish to communicate real-world health information from within a fictional world; one that is sufficiently immersive that they get lost in the experience but not so realistic that their everyday responses come along for the ride.

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