

# Designing Health Games for Anti-Smoking Advertising Targeting College Students: The Impact of Message Types and Voice-Over

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## ABSTRACT

Video games are an alternative channel for public health authorities constantly striving to reach target audiences and make positive changes. The objective of this research is to address effectiveness of health games as a health promotion technology for anti-smoking communication. This study tested the impact of advertising message types and voice-over relative to anti-smoking persuasion. By using commercial-level custom-made first person shooter (FPS) games, two experimental studies demonstrated usefulness of applying health games to change a player's attitude towards smoking. In particular, an interactive in-game message with a persuasive voice over was the most effective method to change targets' attitude towards smoking. Findings of our research offer meaningful insight on health promotion research and provide possible directions for future anti-smoking communication using health games.

**Key words:** Health Games, Serious Games, Health Promotion, Health Communication, In-Game Advertising

## 1. INTRODUCTION

Globally, there are six million smoking related-disease deaths annually [1], and smoking is responsible for virtually one in five deaths [2]. Despite substantial progress in tobacco control and years of anti-smoking public advertising campaigns, the smoking rate among adults has hardly decreased because 18 to 24-year-old smokers are increasing [3]. To this end, reaching this young audience has become a crucial issue for anti-smoking campaigns [4]. However, with recent media fragmentation, reaching young audiences through conventional media channels has become extremely challenging [4].

Gaming is a big part of youth's mainstream digital leisure. Most teens play video games using various devices (e.g., smartphones, consoles, desktop PCs), and gaming is becoming a major social activity. In 2014, the Entertainment Software Association (ESA) reported that the average household owns at least one dedicated gaming platform. One national survey found that 170 million American consumers play video games, and the average American gamer spends an average of 13 hours per week playing video games [5]. In this context, health promotion via video games can be an effective way of reaching

and communicating this hard to reach demographic [6]. Despite the increasing body of research on the uses and effects of video games, little research has examined health promotion within this emerging technology [6]. In particular, previous studies have not fully explored how the health messages in games work for anti-smoking campaigns. Therefore, the intention of this study is to assess the potential of video games as a health promotion tool that goes beyond traditional media channels. Similar to the persuasive effects of conventional media such as TV and newspaper, this study asserts that video games created to promote health will help young people quit smoking. In particular, the present study looks into how a health game affects college students' attitude and intentions related to smoking.

## 2. LITERATURE REVIEW

### 2.1 The use of interactive media to promote health

To improve awareness, knowledge, and understanding of health issues, public health authorities have employed various media outlets for their public missions. As traditional media struggle to reach and engage audiences, evolving interactive media technologies offer great advantages for health promotion [7]. For example, it is becoming increasingly popular to include health messages in entertaining media, such as video games, social media, wearable devices, and mobile technologies, to

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raise awareness of a health issue. This type of entertainment-education (i.e., edutainment) is effective in positively influencing the knowledge, attitudes, and behavior of a target audience [8].

Interactive media deliver health messages with more personalized, interactive and user-driven characteristics [9] [10]. In particular, tailored communication enabled through interactive channel increases both the effectiveness of an intervention [11] as well as user satisfaction [12]. Among emerging interactive media, video games extensively engage an audience as well as reach a vast and diverse younger population [5]. Additionally, the interactive properties of video games keep a player's attention by enriching engaging stories and stimulating visual-auditory components [13]. The interactive multimedia approach of using video games to promote health enables players to learn in an engaging and entertaining mode [14], and subsequently, players voluntarily access them during their leisure time

## 2.2 The impact of message type on anti-smoking health games

In persuasive games, messaging can occur at many different levels ranging from simple background banners to the virtual item being a part of the narrative [15]. According to Chen and Ringel [15], there are three types of in-game message placements: a. associative, b. illustrative, and c. demonstrative. Associative advertising supports awareness of advertised brands through natural associations in the game. For instance, a brand in a game would play as a background (e.g., brand logo). Illustrative advertising noticeably features the brand message itself when the game is playing (e.g., in-game poster). Finally, demonstrative advertising displays the brand naturally in the game context and invites the player to interact with the product within the context of its real-world application (e.g., drink a sponsor's brand coffee to boost energy). In a health promotion context, the present study investigates illustrative (IL) and demonstrative (DE) integration because the associative type of message placement is rarely used [15].

Previous studies maintain that, while little mental elaboration occurs when information is passive, interactive information triggers greater cognitive elaboration [16]. In gaming, a player actively takes the role of a virtual actor and interacts with other virtual characters, virtual spaces, and in-game advertisements [13]. For a player, the primary focus is on playing (e.g., shooting an enemy). Thus, processing messages within play is a secondary task [17], [18], and the messages in games are processed passively [19]. Since people prioritize processing due to limited mental capacity [20], in-game messages are processed with cognitive resources that they are not using for the primary task [17]. In this sense, the advertising information processed during play should be considered within a low-involvement processing framework [21].

In video gaming, interactivity enables a game player and the game program to interact through a variety of activities [11]. Under low-involvement processing, game players quickly process verbal and nonverbal multisensory inputs that are automatically registered by sensory systems with less elaboration and more heuristics [22], [23]. Although passive

processing of advertised information in games may not trigger effortful processing, extensive interactions with the messages (i.e., DE) in a game may function as a peripheral cue and, thus, increase persuasion effects relative to games with less-interactive messages (i.e., IL). That is, learning through dynamic interactions in virtual environments, which are inherently more cognitively demanding, will lead to stronger mental representations compared to the secondary learning through the mere exposures of graphic messages shown in a passive manner [24]. These extensive interactions facilitate central processing and persuasion [23], [25], [26]. Thus, elaboration of secondary information will be stronger when the messages require more interactions in a game. This study expects the health promotion message delivered in a more interactive manner to be more persuasive compared with passive messages.

**H1** An anti-smoking message delivered in a more interactive manner (i.e., DE) will be more effective in changing attitudes toward smoking compared to exposure to a passive message (i.e., IL).

**H2** An anti-smoking message delivered in a more interactive manner (i.e., DE) will be more effective in changing intentions to quit smoking compared to exposure to a passive message (i.e., IL).

## 3. STUDY 1

Study 1 was designed to explore the effectiveness of in-game advertising messages that may affect anti-smoking persuasion. The experimental study recruited 44 undergraduate students between the ages of 19 and 25 years.

### 3.1 Method

**3.1.1 Pretest:** A pre-test was administered to 34 undergraduate students using an online survey to select the most appropriate in-game poster (i.e., IL) design. A graphic designer created four anti-smoking posters for the test. Attitude toward the poster was assessed using a seven-point semantic differential scale [27]. The responses were averaged to make an attitude index for each poster ( $\alpha = .75$  to  $.92$ ). In addition, a three-item scale assessed perceived congruency of each of the poster designs with a shooting game [19]. Cronbach's alpha for each game-poster congruency index ranged from  $.81$  to  $.97$ . Based on the two criteria (i.e., attitude and congruency), the poster that received the highest evaluation and was perceived as highly congruent with a shooting game was chosen and placed in the stimulus game.

**3.1.2 Participants:** Forty-four participants between the age of 19 and 25 were recruited from a large Midwestern university in the U.S. in exchange for an extra course credit ( $M = 23.71$ ,  $SD = 1.82$ ). Forty-four percent were Caucasian, 24% were Latino, 14% were African-American, 14% were Asian, and the remaining 4% were classed as other. Forty-one percent were seniors, 39% were juniors, 14% were freshmen, and the

remaining 6% were sophomores. Among the samples, 48% were males. Forty-eight percent were current smokers (N=21), and 52% were former smokers (N=23). Participants' video game experience varied from 0 to 23 years

(M = 11.63, SD = 4.81). The study only recruited the participants with smoking experience to see the persuasion effects among our primary targets. According to a national study by the Tobacco Technical Assistance Consortium [28], 29% of college students in the U.S. smoke cigarettes. Furthermore, the majority of lifetime smokers start smoking habits in their early 20s. Consequently, the college years are a critical period in the study of anti-smoking campaigns. Moreover, 70% of college students occasionally play games and are buyers of video games [29]. Therefore, the sampling of college students was justified for the purpose of this study.

**3.1.3 Design and stimuli:** We applied a between-subjects design (message type: IL & DE) to test the persuasion effects of a health game for anti-smoking advertising. While the game stayed the same across all conditions, the message type manipulation consisted of two different game versions embedding several types of anti-smoking messages: poster condition and enemy character condition (i.e., professionally created enemy avatars replicating the image of a cigarette) (See the Fig. 1). All participants were randomly assigned to the game conditions.

In the study, a first-person shooter (FPS) game, which is one of the most commercial game genres [30], was used as a stimulus. The stimuli games meet the premise of a typical 3D FPS game, where the player's mission is to kill enemies and get to the end-point (See Fig. 1). This type of a video game was considered appropriate because the FPS game is familiar to college students [30] and the intense interactions with aggressive cigarette shaped enemies closely related to the fear appeal techniques of typical anti-smoking advertising in traditional media [31]. The stimuli game named 'Killer Cigarettes' was similar to commercially available FPS games incorporating 3D graphics, stereo audio, and engaging in-game activities. The game environment consisted of five separate rooms with short hallways connecting each room. In the poster condition, a total of eight in-game signs of the same design were positioned and eight robotic enemies were embedded. In contrast, eight cigarette shaped enemies and empty posters were placed in the enemy character condition.

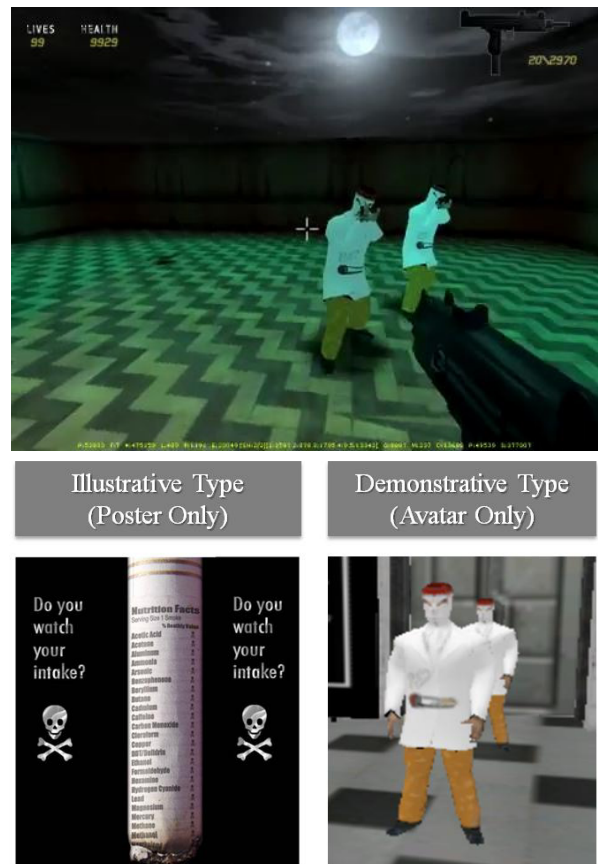


Fig. 1. Health Game and In-game Advertising

**3.1.4 Procedures:** First, using an online survey, participants were asked to answer questions assessing their attitude and intention toward smoking. After completing the first part of the survey in the lab, researchers provided a two-minute training session on how to play the game. Next, participants were randomly assigned to one of the two game conditions (N = 22 per each condition). Following a three-minute gameplay (M=2.43, SD=.68), participants were instructed to indicate their attitudes and intentions toward smoking-related topics. The questions used in the first part of the survey were applied again to measure changes in attitudes/intentions.

**3.1.5 Measures:** Adapted from Higgins and Conner [32], the questionnaire measuring components of the Theory of Planned Behavior (TPB) [31] about smoking was applied in the present study. First, attitude toward smoking was assessed on a five-item, seven-point semantic differential scale. The items were averaged to make an attitude index. The index showed good reliability in the pre-survey ( $\alpha = .80$ ) as well as in the post-survey ( $\alpha = .81$ ). Intention to quit smoking was assessed using three items [32] on a seven-point scales. The intention items yielded a reliable index in the pre-survey ( $\alpha = .93$ ) as well as in the post-survey ( $\alpha = .94$ ). Utilizing the before and after design, the health game intervention effects were calculated by subtracting the attitude and intention scores measured after the health gaming from the scores measured before the gaming [34].

To control individual gameplay experience differences, game experience and gameplay frequency were included as covariates [35]. The game experience assessed the number of years they have played ( $M = 8.12$ ,  $SD = 6.01$ ). In addition, game frequency was measured by asking participants to indicate their frequency of game play during the past months (1 for “rarely” and 7 for “often”) ( $M = 3.23$ ,  $SD = 1.87$ ). Furthermore, due to the use of an FPS, which is played by a male dominated audience, gender was covariated [30]. Lastly, participants’ smoking category (i.e., current-smoker and former-smoker) was used as a covariate.

#### 4. RESULTS

A Multivariate Analysis of Covariance (MANCOVA) was performed to test the persuasion effects of message type on attitude toward smoking after controlling for participant’s game experience,  $F(1, 38) = 2.36$ ,  $p > .05$ , game play intensity,  $F(1, 38) = 3.69$ ,  $p > .05$ , gender,  $F(1, 38) = 6.51$ ,  $p < .05$ , and smoking category,  $F(1, 38) = 5.72$ ,  $p < .05$ . The effect of message types was significant,  $F(1, 38) = 8.69$ ,  $p < .05$ ,  $\eta^2 = .33$ . The results showed that DE generated significantly higher attitude change ( $M = .73$ ,  $SD = .72$ ) in comparison to IL ( $M = .42$ ,  $SD = .52$ ). Thus, the data supported hypothesis 1. Again, a MANCOVA was used for testing the effects on intention to smoke after controlling for participant’s game experience,  $F(1, 38) = 1.75$ ,  $p > .05$ , game play intensity,  $F(1, 38) = 2.61$ ,  $p > .05$ , gender,  $F(1, 38) = .47$ ,  $p > .05$ , and smoking category,  $F(1, 38) = 2.12$ ,  $p > .05$ . Data did not indicate a significant difference among the message types on intention change,  $F(1, 38) = 1.32$ ,  $p > .05$ ,  $\eta^2 = .04$ : DE ( $M = .19$ ,  $SD = .46$ ) and IL ( $M = .12$ ,  $SD = .32$ ). Therefore, the data rejected hypothesis 2. Overall, the analysis revealed a significant difference in the hypothesis of attitude change only.

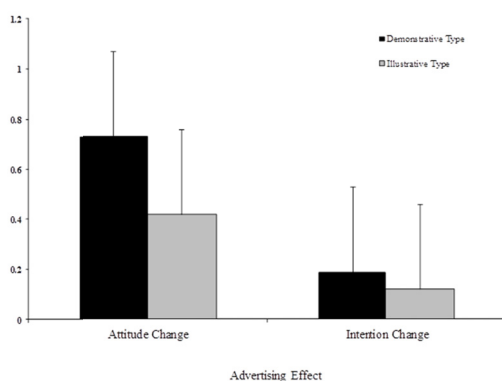


Fig. 2. The Effect of The Type of Message in the Health Game on Attitudes and Intentions Toward Smoking

#### 5. DISCUSSION

Study 1 found that the players’ attitudes toward smoking were significantly influenced by the advertising message type.

In particular, DE outperformed IL and generated more negative attitudes toward smoking. To further understand the potential of health games, Study 2 examined the persuasion effects of an in-game voice-over message and tested hypothesis 3 and 4.

#### 6. STUDY 2

The advantages of capturing audiences’ attention derived from interactive gaming experiences have been discussed [e.g., 3 6]. Although interactive message types are an effective advertising strategy, players may still have difficulties understanding the sender’s message intentions. Meaning, the interpretation of embedded messages, may be superficial in the dynamic setting of video games because there is not enough time or preference to elaborate on the messages [37], [38]. In particular, interactive message types, which increase information processing, may also distract from advertised messages in a game, reducing the capability to process the health message thoroughly. For example, a recent study demonstrated that auditory distraction negatively impacts brand memory, while visual distractions create no significant effect, and the sensory distractions effect was only significant for familiar brands [39].

If so, how can we help a player process anti-smoking advertising messages in a video game? Traditionally, voice-over (i.e., off-camera narrator) has been widely used in public service announcements (PSAs) [39], and voice-over has also been widely used in video games of any genres. The technique in PSAs brings clarity in public health campaigns by clearly communicating the negative outcomes (e.g., smoking can cause lung cancer.) of undesirable behavior [40]. Our auditory and visual sensory mechanisms function separately in parallel while working in an interconnected manner [41]. That is, sensory systems detect PSA messages from attention demanding environments and activate mental representations [42]. Furthermore, the use of a human voice in a virtual interface facilitates an emotional partnership by enabling learners to perceive computer interactions just like in a human-to-human conversation [43]. Thus, persuasion may be enhanced when an anti-smoking PSA voice-over announcement is placed in a video game to promote health.

**H3** A video game embedding voice-overs will be more effective in terms of decreasing attitude toward smoking than a game without the voice-overs.

**H4** A video game embedding voice-overs will be more effective in terms of increasing intentions to quit smoking than a game without the voice-overs.

##### 6.1 Method

**6.1.1 Procedure:** In Study 2, the demonstrative message condition was applied. Subjects with smoking experience were recruited and asked to play a video game in a lab setting. Anti-smoking voice-over messages were embedded in a game. Thus, hypothesis 3 and hypothesis 4 were tested. Study 2 consisted of 41 participants from a large Midwestern university in the U.S.

Among the samples, 61% were males. Forty-four percent were Caucasian, 24% were Latino, 14% were African-American, 14% were Asian, and the remaining 2% were categorized as other. Most respondents were between the ages of 18 and 27 ( $M = 21.71$ ,  $SD = 1.94$ ). Forty-six percent were seniors, 31% were juniors, 14% were freshmen, and the remaining 7% were sophomores. Twenty-nine percent were current smokers ( $N=12$ ) and 70% were former smokers ( $N=29$ ). Participants' video game experience varied from 0 to 23 years ( $M = 11.63$ ,  $SD = 5.93$ ).

**6.1.2 Experimental design and stimuli:** The same video game of the interactive message type condition (i.e., DE) applied in Study 1 was used for study 2. To test the effects from an in-game voice-over, the game was reprogrammed and anti-smoking voice over, "Quit smoking. It kills you. Be smart. Don't start smoking", was announced at the beginning and at the end of the game.

The voice-over was developed professionally, and the copy for the announcers (i.e., a male and a female announcer) was chosen through a series of tests and auditions. The tone of voice-over reflected the urgency of the matter. In the game, the gender of the announcer was randomly assigned to eliminate possible confounding effects. Regarding the gender schema theory [44], gender schema is automatically activated when a certain gender is salient in communication. The voice-over was announced twice during game play (i.e., at the beginning and at the end).

**6.1.3 Procedures and measures:** Participants were given the initial questionnaire, which was used in the first session of Study 1. The designed virtual training room was similar to the testing environment used for Study 1. Next, participants were randomly assigned to one of the two experimental game conditions ( $N=21$  in the voice-over condition and  $N=20$  in no voice-over condition). Upon completion of the gameplay ( $M=2.61$ ,  $SD=.62$ ), the participants were asked to complete the same survey which was applied in the second session of Study 1. As to the measures, the attitude index showed good reliability in the pre-survey ( $M = 2.62$ ,  $SD = 1.01$ ,  $\alpha = .80$ ) as well as in the post-survey ( $M = 1.71$ ,  $SD = .77$ ,  $\alpha = .77$ ), and the alphas for the pre-test and post-test of smoking intentions also showed good reliability in the pre-survey ( $M = 2.85$ ,  $SD = 1.45$ ,  $\alpha = .93$ ) as well as in the post-survey ( $M = 2.60$ ,  $SD = 1.05$ ,  $\alpha = .92$ ). For the statistical analyses, the same covariates used in Study 1 were applied again.

## 7. RESULTS

Following the analysis of Study 1, a MANCOVA was used to test the persuasive effects of voice-over on attitudes toward smoking after controlling for the participants' game experience,  $F(1, 35) = 3.49$ ,  $p > .05$ , game play intensity,  $F(1, 35) = 2.41$ ,  $p > .05$ , gender,  $F(1, 35) = 7.23$ ,  $p < .05$ , and smoking category,  $F(1, 35) = 4.06$ ,  $p < .05$ . The result showed the significant main effect of voice-over,  $F(1, 35) = 7.25$ ,  $p < .05$ ,  $\eta^2 = .21$ . The voice-over condition ( $M = 1.21$ ,  $SD=.56$ ) appeared to generate

more negative attitudes toward smoking than the condition without the voice-over ( $M = .71$ ,  $SD=.66$ ). Again, after controlling for participant's game experience,  $F(1, 35) = 2.96$ ,  $p > .05$ , game play intensity,  $F(1, 35) = 2.67$ ,  $p > .05$ , gender,  $F(1, 35) = .83$ ,  $p > .05$ , and smoking category,  $F(1, 35) = 1.96$ ,  $p > .05$ , a MANCOVA was conducted to test the effects of voice-over on intention toward smoking. For intention to smoke, no main effect of voice-over was detected,  $F(1, 35) = 1.90$ ,  $p > .05$ ,  $\eta^2 = .07$ . The voice-over condition ( $M = .64$ ,  $SD=.59$ ) showed bigger smoking intention change than non-voice-over condition ( $M = .18$ ,  $SD=.59$ ). However, the effect was not significant. Thus, the analysis supported the hypothesis of attitude change only and thus hypothesis 3.

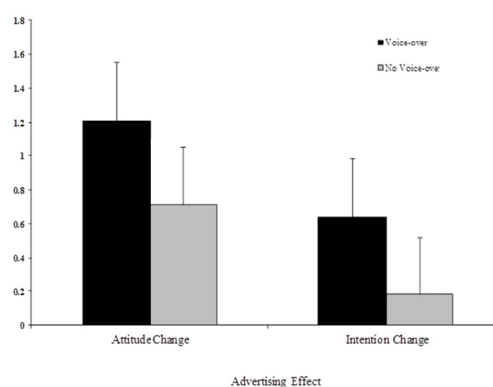


Fig. 3. The Effects of a Voice-Over in the Health Game on Attitudes and Intentions Toward Smoking

## 8. DISCUSSION

Results from the two studies demonstrated that health intervention through gameplay changed an individual's attitude toward smoking. In particular, our interventions were successful in reinforcing negative attitudes about smoking. The findings of the studies showed that the demonstrative type outperformed the illustrative type of advertising in generating negative attitudes toward smoking. This result may be because the demonstrative advertising group processed health messages more thoroughly than the illustrative group. That is, learning from active interaction with enemy avatars was critical in facilitating the effectiveness of embedded health messages through extensive mental operations imposing little or no cognitive effort [25]. Activated networks involve spreading semantic associations and result in meaningful learning of incoming messages. This may be particularly true of video games, which enable higher engagement via interactive audiovisual stimulations. The rich elaboration brought about by an engaging interactive experience facilitates the construction of semantically meaningful mental networks by providing access routes to the communicated messages [45].

In addition, the persuasion from the in-game voice-over was also proven effective. As to the development of games for health, practitioners can utilize the benefits of voice-over for their campaign. According to Homer [46], persuasive message-

induced affect influences an individual's attitude directly if the more concrete cognitive processing is taken. The concrete health information delivered via the emotionally arousing voice-over may facilitate the players' clear cognitive processing and strongly affect the players' attitudes toward smoking. As to the development of games for health, practitioners can utilize the benefits of voice-over for their campaign. However, voice-over should be used selectively since player enjoyment is imperative in video games [47]. That is, obvious and repetitive voice-over may backfire on the persuasive effects by decreasing game play enjoyment and leading to negative experiences.

As to the intention change effects of a health game intervention, all the manipulations in both studies were not significantly effective. Our anti-smoking intervention using the health gaming may be not strong enough to change players' intentions to smoking. Since intentions are closer to the desired behavior than attitude [33], and smoking is considered a very strong habitual behavior [48], individuals may resist being persuaded [49]. However, video games generate implicit but strong influences by frequently engaging players in behaviors consistent with the communicator's intent (e.g., kill cigarettes - > hate smoking). Therefore, even the habitual behavior strongly associated with an individual's value system such as smoking can be vulnerable to new persuasive technology such as health games.

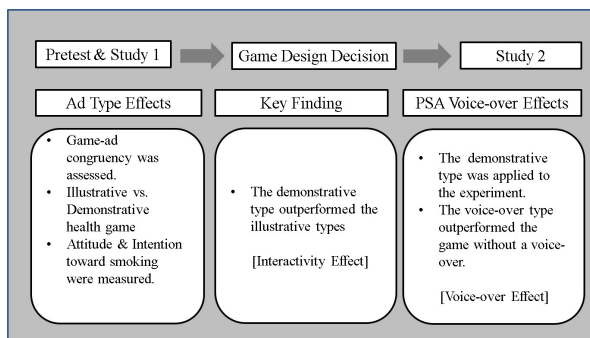


Fig.4. The Study Process and Health Game Design

Health promotion practitioners may consider using commercially available popular video games (e.g., Call of Duty, Halo, Walking Dead) for anti-smoking campaigns by modifying game elements (e.g., replacing enemies with cigarette shaped avatars) to meet their campaign goals. Many educational games, including health games, have been criticized because they are not enjoyable for players [50]. Instead of producing low-end serious games for health promotion, using an engaging commercial-level video game for change with a game company's support will benefit public health while creating a positive image for the corporate sponsor. This is important since commercial-level video games can reach a large audience. In particular, as a social recreational activity, people often enjoy games together and often just watch their friend's game play [51]. To health marketers, such social occasions are excellent health promotion opportunities to reach players and their colleagues at the same time [52]. This is imperative for health promotion considering that social smoking is quite prevalent among college students [53].

## 9. CONCLUSION

Health games have become an important category of serious games for persuasive communication. This research has demonstrated the usefulness of video games in anti-smoking campaigns and has added important insights to the body of research about interactive health promotion. From a managerial standpoint, the effectiveness of a health campaign can be significantly advanced by strategically designing an interactive message and voice-over advertising.

## 10. LIMITATIONS

Although the study has implications for promoting health, future studies on this topic are necessary. Considering the growing number of female smokers internationally [54], future studies should test other types of games (e.g., sports games, role-playing games) other than FPS games as a health promotion option. In addition, the role of a game player's gender and other individual factors such as a player's level of gaming experience and motivations [55] in changing attitudes/intentions should be investigated further. Secondly, to test the real effects of health gaming, future research should be performed over a longer period (e.g., weeks or months) with frequent health game interventions. Lastly, future studies should further examine the same research questions applying the level of smoking experience or intensity (e.g., years of smoking) as a factor since the persuasion effects may differ depending on participants' smoking experiences and its intensity (e.g., heavy smoker, moderate smoker, light smoker).

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