

Persistence of attitudes and opinions in games outside the gaming environments in
violent versus non-violent games

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ABSTRACT

This study examined the persistence or occurrence of attitude and opinion change derived from video games outside the gaming environment. The study aimed to determine if this persistence exists and is affected by the incidence of violence in a game. The participants included 70 undergraduate students from the University of Cape Town. The study used a two group experimental design with violence in the game as the independent variable. Participants were trained for game play. They then played an altered map of Delta Force Xtreme. After game play, participants performed a self report measure, the DES-II, the Implicit Association Test (IAT) and the Independent Television Commission Sense of Presence Inventory (ITC-SOPI). As such, information on arousal, the sense of presence and any changes in attitudes and opinions was gathered. A definite gender-condition interaction was found with both the self report measure and the engagement factor of presence. Males were more supportive of violence in general and especially in the violent condition. As such, attitudes and opinions in video games can affect players after game play.

Keywords: video games; attitude; violence; presence; emotion; gender difference

BACKGROUND

The effects of video games on players while in the games have been well documented (Anderson & Bushman, 2001). However, questions around the lingering effects players experience outside the gaming environment after game exposure are still left open. Particularly important are two questions: whether the attitudes and opinions taken on by players in the game persist outside the gaming environment, and given that many games are played under conditions of high arousal brought on by violent content, whether violence plays a role in this. These questions arise due to the controversies around stereotypes and violence apparently stemming from game play. An example is the controversy around the game *Grand Theft Auto: San Andreas* (Rockstar Games, 2004). The game allows players to commit crimes for rewards as part of the greater plot. As such, parents and institutions called for the game to be banned for presenting a positive view of crime and gratuitous violence, and rewarding the committing of these acts (Farrell, 2005).

In addition to the controversies, the video game market is extensive, and so the behaviour of gamers and how to change this behaviour becomes commercially important. The popularity of video games creates the potential for the views expressed in them to gain a wide following. An example of this popularity is the *World Cyber Games*, wherein 700 players from 74 countries compete against each other (Vouvakis, 2007). As such, there is potential to reduce stereotyping and build attitudes that are more positive if these do indeed persist outside the gaming environment. Also, video games could then be used to help develop informed opinions on various issues. There is also chance that the wrong messages can be sent out through the games. Anderson (2005) claims that the game *25 to life* (Eidos, 2006) was promoting disrespect towards law enforcement due to the main character being an escaped convict. It was felt that law enforcement being held as the player's enemy would shape players' opinions regarding law enforcement.

Dangers around the persistence of attitudes and opinions will also be exposed if the persistence exists. Sanford and Madill (2006) purported that one's behaviour in video

games can be used to resist certain world views, but can also lead to the reification of traditional stereotypes. The same study also claimed that the resistance helped to form and restructure players' identity formation. Thus, the underlying opinions in games can be transferred onto the player. The study noted a lack of parental guidance concerning the world views presented in the games used. The researchers call for studies on the effects of the bias and values in video games on players.

Media Bias

Babad (2005) notes that media bias in general can influence viewers' opinions of people. The study involved interviewing a person and having the interviewer favour or show contempt toward the person interviewed. The participants watched the interviews and then rated their perception of the person interviewed. The participants showed hostility or favour to the person interviewed depending on the bias the interviewer showed. When the interviewer portrayed the person interviewed in a positive light, participants rated the person interviewed favourably. The reverse was true when the person interviewed was portrayed in a negative light. Therefore, media bias can affect viewer perception. Nelson (2002) showed that brand placement in games (e.g. billboards) led to participants having a positive identification with the brand. The extent of the effects of media bias has been linked to presence.

Presence

Lombard and Ditton (1997) define presence as the "perceptual illusion of non-mediation, i.e. the extent to which a person fails to perceive or acknowledge the existence of a medium during a technologically mediated experience". Nunez and Blake (2006) state that presence is a central element in modern gaming and that people actively seek out presence in their games. Horowitz (2006) conducted a study on how presentation medium affects the effectiveness of political advertisements. He noted more presence when participants viewed the computer advertisements rather than the television advertisements. Participants also experienced more positive affect for the candidates portrayed on the computer advertisements. Therefore, participants' political views (and perhaps voting choices) can be influenced by the medium used, and possibly by the degree of presence experienced during the advertisement. So, if it

is possible to affect perceptions through bias in the media, it may be possible to create a propaganda effect in video games to change player's opinions. It is unclear, however, whether the opinion changes will persist outside the gaming environment if it occurs at all. Furthermore, Schuemie, van der Straaten, Krijn, and van der Mast (2001, p. 187) note that presence can lead to a virtual experience evoking the "same reactions and emotions as a real experience", suggesting that real experience may act as an inoculation against such a propaganda effect. Pfau, Szabo, Anderson, Morrill, Zubric and Wan (2001) suggest that this inoculation confers resistance to persuasion.

More presence in violent video games

Bracken and Skalski (2006) suggest that a player's prior gaming experience may impact his/her level of presence and gaming experience. Furthermore, Nowak, Krcmar and Farrar (2006) found that people that played games more frequently felt more presence. They also found that males experienced more presence while playing video games. Empirical evidence also suggests that there is more presence experienced in violent video games than in non-violent ones (Nowak, Krcmar, & Farrar, 2006). If this is the case, and if it is true, as argued above, that presence is related to attitude change, then violence could be an indirect factor in attitude change during video gaming. Nowak, Krcmar and Farrar (2006) do argue, however, that perceiving violence may be linked to more immersion in a violent story line. Presence may increase the effects of any biases that may appear in the game due to higher engagement in the experience, as such, violent video games would have more of an effect on players regarding the same biases. Why violence is linked to presence is not yet understood.

Contextual violence

In order to affect presence however, the violence in games needs to be contextual. Schneider, Lang, Shin, and Bradley (2004) proposed that first person shooter games with a story lead to more immersion and character identification. In their study, participants played a first person shooter game, (i.e. game with a first person perspective in which the player's main aim is to eliminate/kill the opposition). Some participants played the game contextualized by a story, whereas others played it

without contextualisation. The story condition increased involvement and arousal in the game, suggesting that presence interacts with cognitive processes more complex than simple arousal. Violent games can provide high presence experiences through other mechanisms. Many violent games use a first-person perspective, which has been noted by Scheumie *et al* (2001) as more effective in producing presence than a third person perspective. Persky and Blascovich (2007) further suggest that immersive platforms intensify the content specific effects of violent games. Their study also suggested that this change was limited to violent media and not non-violent media.

Character identification can lead to the player subscribing to similar beliefs as the character and behaving accordingly. This is the Proteus effect, i.e. 'the effect of transformed self-representation on behaviour' (Yee & Bailenson, 2007, p. 3).

Presence also might increase the Proteus effect, as the game presents the virtual world to the player from the physical perspective of the character, and the other virtual characters in the world interact with and respond not to the player, but to the game character.

Group effects in mediated environments

Lee (2004) found that in computer-mediated communication (CMC) uniform virtual appearance of CMC partners triggered depersonalization and conformity behaviour when group identity was salient in an intergroup encounter. Her results showed that depersonalization increased group norm conformity, both directly and indirectly, through group identification. Postmes, Spears, Skakel and de Groot (2001) found that when anonymous, players will be more likely to conform to any priming they may receive in task instruction in CMC or the group. Priming from the group was found when the priming provided was then socially transmitted within the group in the study. However, Sassenberg and Boos (2003) found that if a social category norm was not present, CMC led to lower attitude change than direct communication. Persistence of the attitude beyond the CMC environment was not mentioned. Postmes and Spears' (1998) analyses indicated that groups and individuals conform more to situation-specific norms when they are deindividuated. This could mean that for video games which promote deindividuation and provide a clear social norm, priming for certain could have the same effect on players. This would be especially true for military

themed games (a popular subtype of violent games), which encourage the player to consider themselves as belonging to a particular group, with clear social norms regarding violence and behaviour towards the outgroup (the enemy side).

This deindividuated state is thought to arise more easily under conditions of physiological arousal (Zimbardo, 1969). Anderson and Bushman (2001) note exposure to violent video games increases physiological arousal, and Meehan, Insko, Whitton & Brooks (2002) have noted the presence can be associated with physiological arousal if the virtual environment affords that arousal. A violent game which has clear social norms which leads to both presence and a deindividuated state might then lead to a persistence of those norms outside the game environment. As such, opinions and attitudes may also persist.

Actions according to norms

Sheese & Graziano (2005, p. 354) claim that 'playing violent video games may undermine pro-social motivation and promote exploitive behaviour in social interactions'. Their study put participants in a violent and non-violent version of a game, and found that defection (exploiting one's partner while still trusting them) from the pairs the participants were put in was higher in the violent version. Participants were given the choice to cooperate for mutual gain, withdraw from the interaction, or exploit their partner for the game task. Despite the latter's prevalence in the violent version, participants had more trust in their counterparts than participants in the non-violent version. Their perceptions of others were not altered. After their exploratory interview-based study, Clarke and Duimering (2006) propose that aspects of first person shooter games most salient to gamers are 'those perceived to be most behaviourally relevant to goal attainment, and that the evaluation of various situational stimuli depended on the extent to which they were perceived either to support or to hinder goal attainment'. This could be due to the norms presented in the priming of the game. It is the game that determines the goals one has to pursue and thus one's perspective will be guided by what one's goals are. 'Playing video games is expected to be enjoyable only if there is a sufficient number of successfully completed, competitive situations' (Vorderer, Hartmann, & Klimmt, 2003). It may be possible then, that if the norms were changed, more pro-social behaviour could be

seen by the players, and different norms and attitudes could be perpetuated. It may also be possible to foster these norms outside the gaming environment. As such there is a possible link between opinions presented in the games, presence, and conformity to those opinions. Nonetheless, it is not clear whether these opinions persist outside of the gaming environment.

Gender differences

Krahé and Möller (2004) note males playing more video games and enjoying them more. The measures in their study also found significant relationships between attraction to violent electronic games and the acceptance of norms condoning physical aggression. Bushman (2002) states that partaking in imaginary aggression has been found to be a potent priming activity increasing the accessibility of aggressive thoughts and the probability of subsequent aggressive behaviour. From this, Krahé and Möller (2004) suggest that media socialization from video games presenting physical aggression as enjoyable and appropriate is part of the reason males endorse physical aggression more than females. They did find, however, that normative acceptance of physical aggression increased as a function of exposure to violent games across gender. Anderson and Murphy (2003) suggest that the effect of violent video games on aggression in females might be greater when the player controls a same sex character, and that the effect on aggression was at least partially mediated by increases in revenge motivation. Additionally, Eastin (2006) notes that aggression and presence in females are potentially increased by playing as a same sex character. Hartmann and Klimmt (2006) revealed women's dislike of violent content in their study. The study involved women filling in a questionnaire on their opinions concerning gender role portrayal and violence in video games.

Predictions in the current study

Therefore, the literature has shown that opinions and attitudes in video games can be transferred onto players, but it is not certain if the opinions and attitudes persist outside of the gaming environment. Also, it is unclear if there are any differences in the persistence effects and the incidence of violence in a game. Thus it is proposed that a study be carried out in an attempt to address the abovementioned research gap.

The study will therefore aim to investigate any differences in the persistence of the attitudes and opinions from games in players in violent and non-violent games. The study would test for the existence of any persistence in attitudes and opinions in the players, and if violence in the games is a factor in the persistence. It is hypothesised that the attitudes and opinions games will persist in players outside the gaming environment. It is further hypothesised that this is especially true in violent games.

PROCEDURE

The experiment was run over a period of 4 weeks. One participant was tested at a time. Each participant was welcomed to the venue (ACSENT lab) and randomly assigned to one of the two conditions. We used an adapted map from the first person shooter Delta Force Xtreme (Novalogic, 2005) as our game. Players take the role of an elite Delta Force soldier and go through missions in which they must eliminate hostile forces, rescue prisoners, and prevent further terrorist activity. We used the same one for both conditions with the following difference: The violent condition involved players going through the map being attacked by the artificial intelligence (AI) on the map. They had to use violence to succeed in the task in the level. The non-violent condition had players accomplishing the level task without using violence, and having peaceful (non-reactive) AI spread over the map. The same map and number of computer generated persons was used in both measures. This ensured that violence was the only variable manipulated and was thus the independent variable.

Before entering the map for the main task, the subjects completed a training mission, which involves walking around a small base camp consisting of tents, a firing range and command building. In the violent condition, participants would walk to various waypoints (important points) in the base before using the firing range to test their weapon. In the non-violent condition, participants would also walk to the waypoints, but would use the range to test the smoke grenades they would use as markers in their mission. Also, while the AI in the violent version wore United States army uniforms, the AI in the non-violent version wore United Nations peace keeper uniforms. Training took 5 minutes to complete. Once training was complete, the priming material and mission briefings were provided to the participants.

The priming material given to the participants contained a brief story on whom the participant was portraying in the game and why they joined the organization they represent in the mission. In the violent condition, the participant is a US soldier wanting to help other countries enjoy the freedoms he experiences in the USA. The prime had a definite aggressive tone (See Appendix A). In the non-violent condition, the participant is a UN peacekeeper wanting to aid countries without interfering in their internal affairs. The tone in this prime was peaceful (See Appendix B). The mission briefings instruct the participant to either retrieve a laptop in the violent condition (See Appendix C), or mark all vehicles and communication equipment in the non-violent condition (See Appendix D), before being extracted from the area. The route they needed to take on the map was verbally described, once the participants completed reading the material, they donned headphones and began the mission.

The main mission has the player navigate a valley leading to a helicopter meant to extract them from the area. The participant would go past ruins, bunkers and a base camp before reaching the chemical plant close to the waiting helicopter. Reaching the helicopter ends the mission, but if the mission was not completed within 10 minutes the game was ended manually. In the violent condition, the AI is set to attack the participant, while in the non-violent condition the AI is set to not notice or respond to the participant. Another difference is that in the briefing for the violent mission the participant is instructed to retrieve a laptop from the base camp, whereas in the non-violent mission the participant is only told to mark all vehicles and communication equipment in the valley using the smoke grenades they are carrying. If participants died during the mission they could enter the map again in various points in the map so as to retain the progress they had made, and to control frustration. The researcher remained on hand in case any problems or questions arose. When game play was completed, participants carried out a series of questionnaires.

MEASURES

All measures were completed in English as computer based scales, beginning immediately after the game experience was over. We constructed the Individual and National Violence Attitude Questionnaire (INVAQ), a Likert-scale questionnaire to note the participants' attitudes toward the appropriateness of personal and national violence as a solution to problems (See Appendix E). Participants answered the questions from 1 (strongly disagree) to 7 (strongly agree) to see their support for violence. Examples of questions are: "It is right to use violence to gain resources"; and "It is right to use violence to solve national disputes". Participants' scores on this scale were used as our main dependent variable.

The Differential Emotion Scale, second edition (DES-II) (Izard, 1991) (See Appendix F) was administered so the participants could rate the degree to which they felt certain emotions during the gaming experience. The questions are on a Likert scale with 1 being "not at all" and 7 being "very much". Examples of the emotions described in the scale are "did you feel": alert, down hearted, and surprised. The scale contains 30 items and has been validated and confirmed suitable for research use by Fuenzalida, Emde, Pannabecker and Stenberg (2005).

The Independent Television Commission Sense of Presence Inventory (ITC-SOPI) was administered to participants after game play. The inventory measures spatial presence, engagement, negative effects and naturalness. (See Appendix G). Spatial presence is the participant's feeling of being located in the game world. Engagement relates to the participant's enjoyment and psychological involvement with the game. Negative effects involves any negative physical effects of being in the displayed environment, e.g., eyestrain or nausea. Lastly, naturalness concerns the realism and believability of the content in the displayed environment. Lessiter, Freeman, Keogh and Davidoff (2001) stated that these four factors were likely to be determined by the determinants of presence: media form, media content and user characteristic variables. They also tested the inventory's reliability and validity and noted it satisfactory on both accounts. Scores from each factor measured are analysed individually. This was administered to find out if the participants responded perceptually and psychologically to the game world. Items are scored from 1 (strongly disagree) to 7 (strongly agree). Examples include "I felt I wasn't just watching something" (spatial

presence), “I responded emotionally” (engagement), “The content seemed believable to me” (naturalness), and “I felt nauseas” (negative effects).

The Implicit Association Test (IAT) was used to measure the strengths of associations of the participants concerning the issues relevant to the game. It is considered able to overcome response biases. Greenwald (2006) describes the IAT as having two concept discrimination categories (e.g., kisses versus rats) and two attribute discrimination categories (e.g., pleasant versus unpleasant). Participants respond rapidly with a right-hand key press to items representing one concept and one attribute (e.g. rats and pleasant), and with a left-hand key press to items from the remaining two categories (e.g. kisses and unpleasant). This is repeated with the key assignments one of the pairs switched (e.g. kisses and pleasant). The IAT assumes that subject response time will be faster when the concept and attribute are strongly associated (e.g., flowers and pleasant) than when they are weakly associated (e.g., insects and pleasant). The categories in the IAT concerned military and civilian pictures for the concepts, and pleasant and unpleasant words as the attribute. The test is based on reaction time and so is not subject to subject desirability effects. Nosek, Greenwald and Banaji (2007) note that the test has high internal, construct and predictive validity and is thus a successful research tool. They do, however, note that there are still unresolved issues around the IAT’s nature.

RESULTS

Gaming behaviour and experience

Out of the 79 participants, 8 were male. Male participants were found to play more video games ($F = 10.108$; $p = 0.002$; Multiple $R^2 = 0.15$) and more violent video games ($F = 15.008$; $p = 0.002$; $R^2 = 0.17$) than their female counterparts (See Table 1). Male participants were also noted as enjoying violent video games more than female participants ($F = 17.134$; $p = 0.0009$; Multiple $R^2 = 0.19$).

The expected positive correlation between how often video games were played and enjoyment of violent video games appeared ($r = 0.40$). A stronger correlation was found between how often violent video games were played and enjoyment of violent

video games ($r = 0.54$). Unexpectedly, the correlations in males were both insignificant ($r = 0.05$; $r = 0.12$).

INVAQ results

The INVAQ was found to be reliable (Cronbach's Alpha = 0.860) but was found to have low validity against the IAT ($r = 0.03$). All items in the questionnaire were retained and averaged into a Violence score. No significant difference was found between conditions when analyzed using one way analysis of variance (ANOVA) ($F = 0.351$; $p = 0.554$; $R^2 = 0.0045$). However, there was a definite gender effect on the violence score ($F = 5.907$; $p = 0.017$; $R^2 = 0.14$) (See Figure 1). Post-hoc Fisher's LSD tests showed significant differences between males and females in the violent condition ($p < 0.0008$), males in the violent condition and females in the non-violent condition ($p < 0.001$), and males in the violent and non-violent conditions ($p < 0.014$). Males also answered higher on violence scale than females as a main effect ($F = 5.883$; $p = 0.176$; $R^2 = 0.07$) (See Figure 2).

IAT results

No significant differences were found between conditions ($F = 0.00003$; $p = 0.995$; $R^2 = 0.0000004$) or gender ($F = 0.414$; $p = 0.521$; $R^2 = 0.053$) in the IAT.

Factorizing the DES-II

The DES-II was factor analyzed using a varimax standardized rotation with items which had a factor loading higher than 0.7 being considered to produce 2 factors. The 2 factors are positive emotion and negative emotion. The resulting factor structure (See Table 2) supports the theoretical distinction between positive and negative emotion (Izard, 1991). The negative emotion factor explains 0.423 of the total variance (eigenvalue 12.692), while the positive factor explains 0.089 of the total variance (eigenvalue 2.696).

DES-II results

ANOVA showed no significant differences in male participants regarding negative emotion across conditions ($F=5.342$, $p=0.06$); nor were there any in female participants ($F<0.001$, $p=0.990$). Female participants were found to have experienced more negative emotion as a main effect ($F = 8.277$; $p = 0.005$; $R^2 = 0.09$) (See Figure 3). A significant negative correlation was found between negative emotion and how often video games were played by females ($r = -0.33$). A similar correlation was found with how often violent video games were played ($r = -0.26$). The same correlations in males produced $r = -0.22$ and $r = 0.05$ respectively. Those correlations were not significant.

Presence

As predicted, there were no significant differences found in the Spatial ($F=2.349$, $p=0.13$; $R^2 = 0.0000001$) and Naturalness ($F=0.00$, $p=0.996$; $R^2 = 0.000004$) factors of the ITC-SOPI, and there was a significant difference in Engagement between conditions ($F=8.339$; $p = 0.005$; $R^2 = 0.10$). More Engagement was experienced in the violent condition (See Tables 3-5, and Figure 4).

A significant gender effect was also found ($F = 6.052$; $p = 0.016$; $R^2 = 0.10$) with male participants feeling less engagement in non-violent condition than in the violent condition (Fisher's LSD; $p < 0.006$), while female participants experienced no significant differences in engagement (See Figure 5).

Female participants, however did experience more negative effects of presence compared to male participants ($F = 8.034$; $p = 0.005$; $R^2 = 0.11$), but these were low enough to have little interference with the presence experience (See Figure 6). There was a positive correlation between the negative effects of presence and negative emotion. It was significant across gender ($r = 0.58$), and in females particularly ($r = 0.53$). The male correlation was not held as significant ($r = 0.66$). When a larger sample is gathered this may become significant. Similar correlations were found between negative emotion and engagement ($r = 0.23$), with a significant female correlation ($r = 0.25$), and a non-significant male correlation ($r = 0.23$). Positive correlations were also found between positive emotion and engagement ($r = 0.26$), and between positive emotion and enjoyment of violent video games ($r = 0.22$).

Finally, engagement and INVAQ scores showed a non significant positive correlation ($r = 0.21$).

DISCUSSION

Postmes, Spears, Skakel and de Groot (2001), Yee and Bailenson (2006), and Nelson support attitude change being able to occur during game play, but so far it has not been established whether the change will persist outside of the gaming environment. This study aimed to determine if this persistence exists and if it occurs more in violent video games.

Gender differences in gaming experience

In support of Krahé and Möller's (2004) findings, males were seen to have more gaming experience with games in general and with violent video games. To add to this they enjoyed violent video games more than the female participants. Understandably, female participants experienced more negative emotion during the experience. If one does not enjoy video games, particularly violent video games one may experience feelings of distaste or revulsion due to the content. Results suggest a significant negative correlation between previous gaming experience and negative emotion in female participants. This adheres to Bracken and Skalski's (2006) suggestion that prior gaming experience may impact on a player's current gaming experience. Hartmann and Klimmt (2006) are also supported in their observation of female participants disliking violent content. Additionally, female participants experienced more negative effects of presence, and it is possible that this could be due to a lack of gaming experience. A positive correlation was found between negative emotion and the negative effects of presence, as well as a negative correlation with how often they played video games. A negative correlation was also found with how often they played violent video games.

Differences in engagement

Male participants were also found to have experienced less engagement in the non-violent condition than in the violent condition. This coupled with the fact they enjoy

violent video games points to Nowak, Krcmar and Farrar (2006) being correct in stating that more presence is experienced in violent video games than in non-violent video games, and that people that play more video games tend to experience more presence. The significance of engagement as a factor of presence is that even though participants had similar spatial and naturalness experiences in the gaming environment, the males seemed to attribute different meanings to the stimuli across conditions, i.e. they would engage with the content. Spatial factor differences were not expected due to the immersion factors being kept constant in the conditions. This supports Scheumie *et al's* (2001) proposition that a first-person perspective is more effective in producing presence than a third person perspective.

Males experiencing more engagement was also expected because they seemed to enjoy playing violent video games more than females. Males would already know how to respond to the violent stimuli due to past gaming experience, and would thus gain more engagement from the experience. The lack of violence in the non-violent condition, therefore, would not produce any significant gender differences (Nunez, 2007). Eastin (2006) suggests that engagement and presence were lower due to females playing a male character in the game. The higher engagement in the violent condition in the presence of priming material adheres to Schneider, Lang, Shin, and Bradley's (2004) suggestion of greater immersion and character identification when a first person shooter has a story.

Emotion, game play and engagement

As expected, positive correlations between positive emotion and enjoyment of violent video games were found. Positive correlations were also found between positive emotion and engagement. Considering that engagement involves physical enjoyment and fun, this is likely. However, a positive correlation was also found between negative emotion and engagement. This was especially true in females. It is possible that in feeling negative emotion arousal was increased and hence they engaged more with the content.

Support for violence after game play

Males were more violent regardless of condition. While there were no significant differences in male and female INVAQ scores in the non-violent condition, it was found that males had higher scores in the violent condition. Males in the violent condition also had significantly higher scores than males in the non-violent conditions, i.e. their aggression responded to the game content. Women did not respond in this way. It can be argued that this is partly due to them playing a male character (Anderson and Murphy, 2003). Considering that the violence in the violent condition was contextualized by the priming material and the mission briefing, Schneider, Lang, Shin, and Bradley (2004) are supported in suggesting that first person shooter games with a story lead to more immersion and character identification. The Proteus effect (Yee & Bailenson, 2006) can also be reported as being seen in this study. The correlation between engagement and the INVAQ score points to the priming material being a mediator of the differences between conditions. This is in line with Nowak, Krmar and Farrar's (2006) argument that people socialized to perceive violence might also become more immersed in a violent story line.

Future study

Considering the gender effect found in the results, a sample of just males would need to be tested to further this study. Males are the target population for violent video games, and tend to enjoy them more, and so the study would have high social relevance. Also, the differences between the conditions can be better explored in males with a larger sample. For instance, the insignificant correlation between enjoyment of violent video games and how often they are played may be significant with a larger sample. Also, physiological data taken from a heart rate monitor can be used instead of the IAT. The physiological data will be a better indicator of arousal effects. This could help confirm or refute Meehan *et al's* (2002) proposition that presence can be associated with physiological arousal if the virtual environment affords that arousal. Also, as there is doubt as to the nature of the IAT it should be used when its nature has been better determined. Deindividuation could also be investigated from the arousal data. Additionally, a pre-test measure can be introduced to establish what the participants' attitudes toward violence are before game play. The INVAQ can be split into a pre- and post-measure to this end. Female characters can

be introduced to try to increase female presence and aggression (Eastin, 2006). Also, the priming materials can be removed to see if the Proteus effect still occurs with the content of the game being the only difference.

Conclusion

Though further study is needed on the topic, it would seem that attitudes and opinions in video games can affect the player after game play. This seems to be more apparent in males, who are the target population for most games, and as such the findings of future studies may have a great bearing on the gaming industry. The effects of higher engagement in females may also be of relevance to the gaming industry.

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APPENDIX A: Violent condition priming material

I joined the Army just after 9/11. I had heard about terrorism, seen it in the movies, how some dictator in Africa or the middle east somewhere would train fanatics to kill innocent people. I don't really understand why they are doing it – probably because they envy our freedom and our way of life – but I decided that day to stop talking about it and get involved.



Army life was hard. I was good at it, so I was promoted to corporal quickly. As soon as I could, I volunteered to go to Afghanistan for a year, and I saw combat there. Those poor people, living basically in mud huts, were being oppressed by the Taliban. We sorted them out. Now they have a primitive democracy and some of the freedoms we have. That year made me realize I could help people all over the world gain their



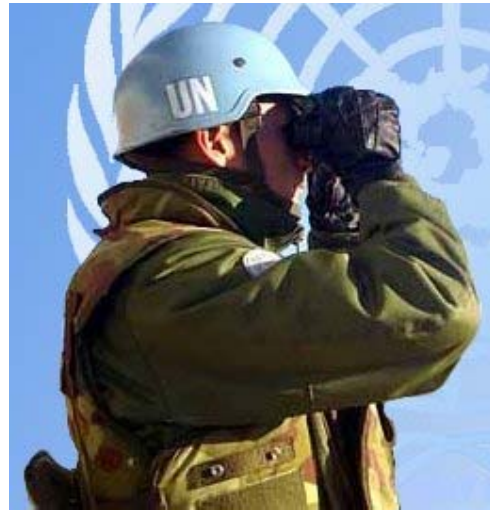
freedom. I volunteered for Iraq.

Iraq is different. Unlike Afghanistan, these people don't know how to appreciate our help. Women and children will hide insurgents and smuggle weapons. It is extremely dangerous to even walk down the street. The Afghans are good people, but the Iraqis don't seem to realize that we are trying to give them a better life. Good thing for them, we know better - we will create a free and democratic Iraq even if we have to stay here 50 years. We will crush the insurgency, one suicide bomber at a time.



APPENDIX B: Non-violent priming material

I joined the Royal Dutch Army when I finished school in Amsterdam. It was during the Bosnian war, and the Dutch army was doing a lot of peacekeeping – making sure people had food and medicine, protecting international observers. I thought that this was a way I could really make a difference, to make the world a better place.



We trained in various parts of Europe – we got to meet people of different countries, learn languages, and how to



interact with people without imposing our culture on theirs. We also learnt how to deal with weapons, of course, but we have been trained to only use violence as a last resort. Our mission is to ensure peace and the rule of international law, not to invade other countries.

For the last few months, we have been deployed in Iraq – the Iraqi resistance want to appeal to the UN to help end the war, so they have been letting us inspect their bases and installations so that they can present an independent audit of their forces to the security council. It is important work, but very tense. We generally do not carry weapons, and both the Iraqis and Americans are skeptical about us. But ultimately, peaceful negotiations are the only way this war is going to end, so we will keep doing this as long as we have to.



APPENDIX C: Violent mission briefing

TOP SECRET

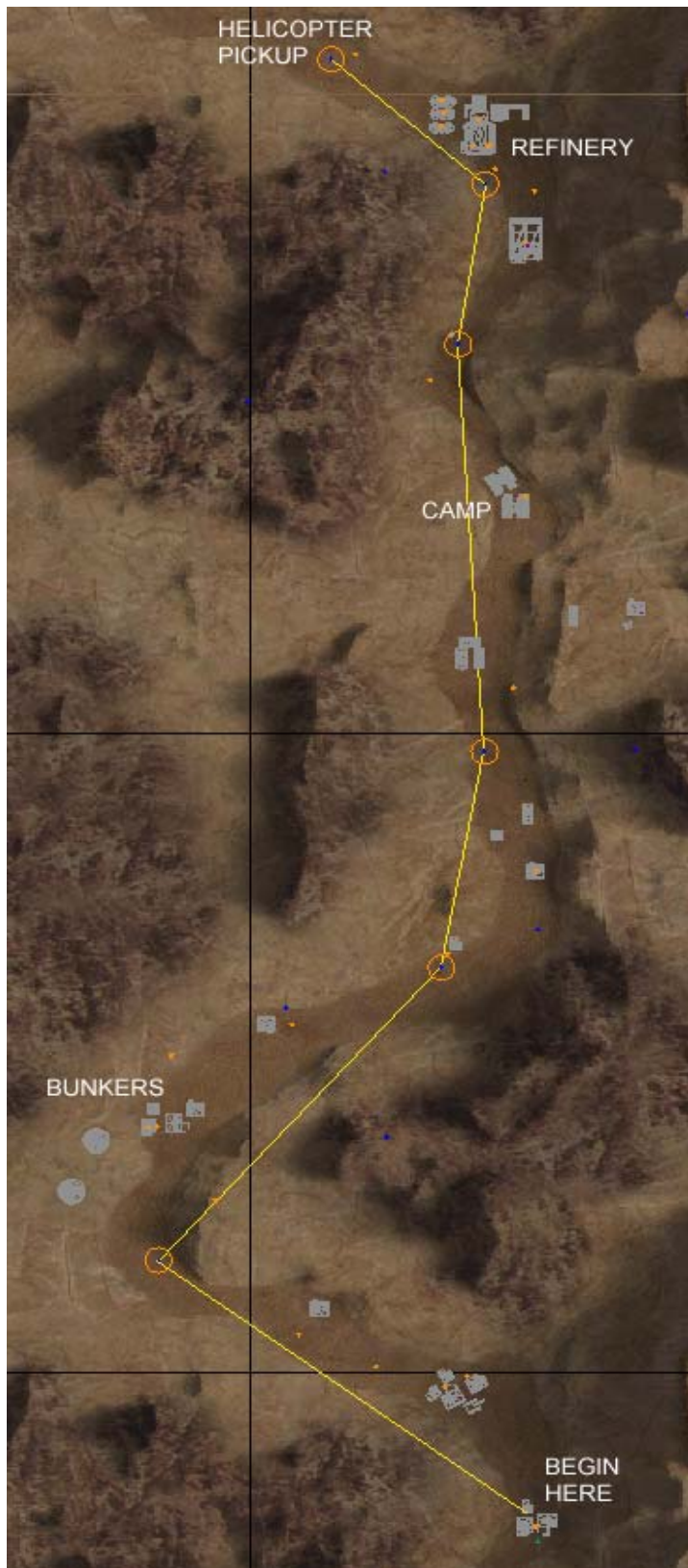


Your mission is to retrieve a laptop that contains the enemy's plans for a new offensive in our area. It is extremely important that you succeed – the enemy's strength in the area is such that we cannot oppose them without these plans.

The laptop is located somewhere inside a small valley where the enemy has set a small camp near to a petroleum refinery. Enemy resistance will be high. Follow the waypoints on your GPS, and search each building for the items.

You will be dropped off in a ruined village at the South end of the valley. At the North end of the valley (past the refinery) a helicopter will be waiting to pick you up once you have completed your mission. Good Luck.

APPENDIX D: Non-violent mission briefing



TOP SECRET

Your mission is to audit the number of vehicles and communications equipment fielded by one of the groups in this conflict. We need to have an exact count of the strength of this group, so that we can set up a peace proposal for the area. The forces in the area will be aware of your mission, and will not interfere with your work.

You are to mark all vehicles and helicopters (whether in working order or destroyed) as well as communications equipment by marking them with a smoke grenade. If the equipment is inside a building, drop the smoke grenade outside the building. Follow the waypoints in your GPS to guide you through the camps in the valley.

You will be dropped off in a ruined village at the South end of the valley. At the North end of the valley (past the refinery) a helicopter will be waiting to pick you up once you have completed your mission. Good Luck

APPENDIX E: The Individual and National Violence Attitude Questionnaire (INVAQ)

E.1 Overview

This is a 20 item scale measuring support for individual and national violence. Questions are answered on a 7 point scale (1 = Strongly disagree, 7 = Strongly agree). The questionnaire had a Cronbach's alpha of 0.860.

E.2 Presentation

The INVAQ was presented electronically. Subjects were presented with the statement and 7 check boxes for a response. They then clicked on the "Next" tab to proceed to the next statement, and could not return to previous questions once they moved on. The order of the questions was the same for all participants.

E.3 Items

1. While walking alone at night, notice someone suspicious walking behind you.
It would be right to use violence before you were possibly attacked.
2. While walking alone at night, notice someone suspicious walking behind you.
It would be right to use violence if attacked to protect yourself.
3. While walking alone at night, notice someone suspicious walking behind you.
It would be right to use violence as retaliation if the attacker was seen at a later stage after having attacked you.
4. It is right to use violence to protect others who cannot protect themselves.
5. It is right to use violence to protect others who can protect themselves but do not.
6. It is right to use violence to protect your property.
7. It is right to use violence in the name of your country.
8. It is right to use violence in the name of your religion.
9. It is right to use violence to calm your anger.
10. It is right to use violence to promote obedience.
11. It is right to use violence to gain or preserve your freedom.
12. It is right to use violence as part of tradition in the form of rituals or initiation
13. It is right to use violence to gain information that could save a life or lives.

14. It is right to use violence in the advancement of mankind in the form of experimentation
15. It is right to use violence to secure resources.
16. It is right to use violence to get a point across.
17. It is right to use violence for fun.
18. It is right to use violence to solve national disputes.
19. It is right to use violence against yourself.
20. There are instances where the use of violence is justified.

APPENDIX F: The Differential Emotion Scale, Second Edition (DES-II)

F.1 Overview

This is the second edition of Izard's differential emotions scale, the DES-II (Izard, 1991). This scale contains 30 items, each either a word or phrase describing an emotion; subjects are asked to rate the degree to which they felt that emotion during the experience on a seven point scale (1 = Not at all, 7 = Very much). The Izard DES-II has been recently validated and psychometrically evaluated for research use (Fuenzalida *et al.*, 2005).

F.2 Presentation

The DES-II was presented electronically. Subjects were shown the instruction "During your experience in the displayed environment, did you feel..." underneath which appeared the item, and under that seven checkboxes for response. Subjects chose when to see the next item (by clicking a "next" button), but could not go back to previously completed items. The order of item presentation was randomized for each subject.

F.3 Items

The following 30 items comprise the DES-II. The 19 highlighted items represent those used in the study following the factor analysis (those with a factor loading higher than 0.7). Green items formed the positive factor, red items for the negative factor.

Alert	Sheepish	<i>Afraid</i>
<i>A feeling of distaste</i>	<i>Joyful</i>	<i>Mad</i>
<i>Blameworthy</i>	<i>Delighted</i>	Attentive
Enraged	<i>Downhearted</i>	<i>Scared</i>
<i>Guilty</i>	<i>Angry</i>	<i>A feeling of revulsion</i>
<i>Disgusted</i>	Surprise	Bashful
<i>Disdainful</i>	Astonished	<i>Contemptuous</i>
<i>Happy</i>	Discouraged	<i>Sad</i>
You were concentrating	Shy	<i>Scornful</i>
<i>Fearful</i>	Amazed	<i>Repentant</i>

APPENDIX G: The Independent Television Commission's Sense of Presence Inventory (ITC-SOPI)

G.1 Overview

This instrument is a cross-media measure which has been thoroughly evaluated in terms of validity and reliability (Lessiter *et al.*, 2001). The scale was developed by factor-analyzing 63 Likert-type items created from a review of the literature, which led to four factors (in decreasing eigenvalue order):

1. *Sense of physical space (spatial presence)*: The degree to which the subject has a sense of being in the space of the VE, and that the objects and characters in the VE occupy the space as the subject.
2. *Engagement*: A sense of psychological involvement with and enjoyment of the VE content.
3. *Naturalness (Ecological validity)*: The sense that the VE and its content are lifelike or realistic.
4. *Negative effects*: Measures negative physiological effects (such as dizziness and eyestrain) – this factor is negatively correlated with the other three factors.

The final form of the scale retained only 44 of the original 63 items over the four factors (physical space: 19 items; engagement: 13 items; naturalness: 5 items; negative effects: 6 items). The four factors are conceptually independent, so that a single presence value cannot be produced by the scale – rather, each measure produces four independent values which are supposed to measure separate aspects of the experience (although in practice the first three factors often correlate significantly with each other (Lessiter *et al.*, 2001; Nunez & Blake, 2006). Further details of this scale can be found in section 2.4.1.4 in Chapter 2.

G.2 Presentation of items

In all studies reported, the items were presented in the order given by Lessiter *et al.* (2001), namely: a1, a2, a3, a4, a5, a6, b1, b2, b3, b4, b5, b7, b8, b9, b10, b11, b12, b13, b14, b15, b16, b17, b18, b19, b20, b21, b22, b24, b25, b26, b27, b28, b29, b30, b31, b32, b33, b34, b35, b36, b37, b38.

All items were presented with a seven point Likert response scale, anchored by “Strongly disagree” on the left (scoring 1) and “Strongly agree” on the right (scoring 7), as suggested by Lessiter *et al.* (2001).

G.3 Items in each factor

G.3.1 Sense of physical space (spatial presence)

<i>Item number</i>	<i>Item stem</i>
b12	I felt I wasn't <i>just</i> watching something.
b13	I had the sensation that I moved in response to parts of the displayed environment
b18	I had a sense of being in the scenes displayed.
b19	I felt that I could move objects (in the displayed environment).
b22	I could almost smell different features of the displayed environment.
b24	I had a strong sense of sounds coming from different directions within the displayed environment.
b25	I felt surrounded by the displayed environment
b28	I felt I could have reached out and touched things (in the displayed environment)
b29	I sensed that the temperature changed to match the scenes in the displayed environment.
b31	I felt that <i>all</i> my senses were stimulated at the same time.
b33	I felt able to change the course of events in the displayed environment.
b34	I felt as though I was in the same space as the characters and/or objects.
b35	I had the sensation that parts of the displayed environment (e.g. characters or objects) were responding to me.
b36	It felt realistic to move things in the displayed environment.
b38	I felt as though I was participating in the displayed environment.
b4	I felt I could interact with the displayed environment.
b7	I felt that the characters and/or objects could almost touch me.

G.3.2 Engagement

<i>Item number</i>	<i>Item stem</i>
a1	I felt sad that my experience was over
a3	I had a sense that I had returned from a journey
a4	I would have liked the experience to continue
a5	I vividly remember some parts of the experience
a6	I'd recommend the experience to my friends.
b1	I felt myself being 'drawn in'.
b16	My experience was intense.
b17	I paid more attention to the displayed environment than I did to my own thoughts (e.g., personal preoccupations, daydreams etc.).
b2	I felt involved (in the displayed environment).
b3	I lost track of time.
b30	I responded emotionally
b32	The content appealed to me.
b8	I enjoyed myself.

G.3.3 Naturalness (Ecological Validity)

<i>Item number</i>	<i>Item stem</i>
b11	The content seemed believable to me.
b15	I felt that the displayed environment was part of the real world.
b20	The scenes depicted could really occur in the real world
b27	I had a strong sense that the characters and objects were solid.
b5	The displayed environment seemed natural.

G.3.4 Negative effects

<i>Item number</i>	<i>Item stem</i>
a2	I felt disorientated
b10	I felt tired.
b14	I felt dizzy.
b21	I felt I had eyestrain.
b26	I felt nauseous.
b37	I felt I had a headache.

Table 1: Gaming experience of participants

	Female Mean	Female Std. Dev	Male Mean	Male Std. Dev	F	p	R²
How often video games are played	0.676	0.580	1.375	0.774	10.108	0.002	0.15
How often violent video games are played	0.309	0.532	1.125	0.834	15.008	0.0002	0.17
Enjoyment of violent video games	1.169	0.970	2.625	0.517	17.134	0.00009	0.19

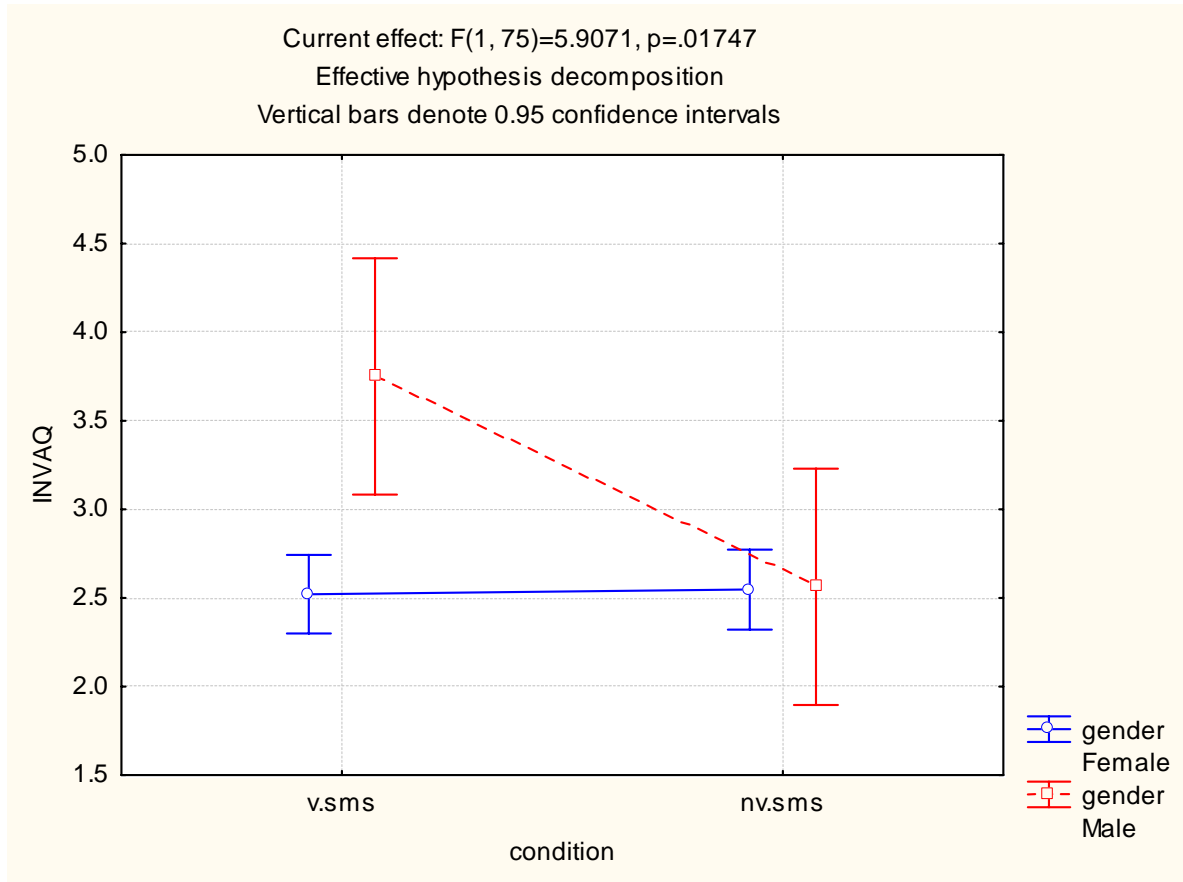


Figure 1: INVAQ across gender and condition

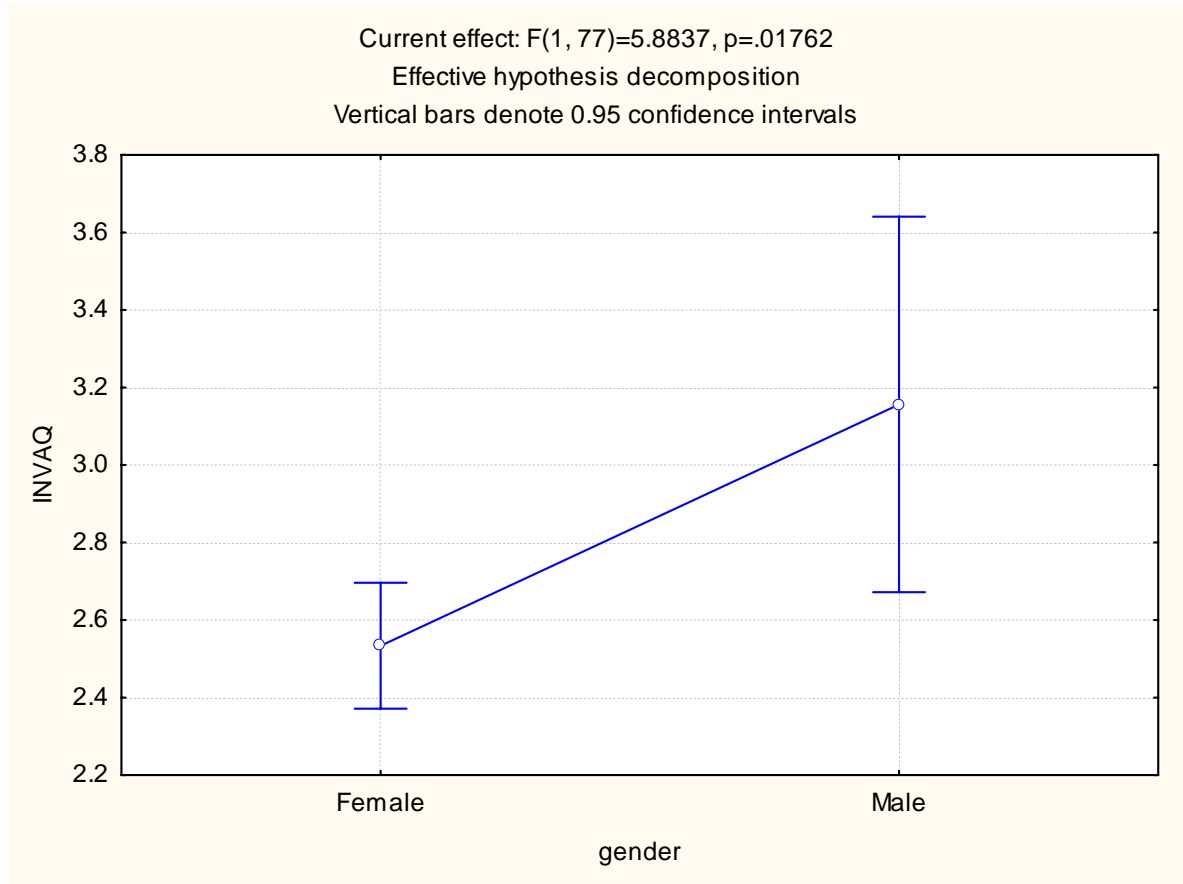


Figure 2: INVAQ across gender

Table 2: DES-II items in the positive and negative emotion factors

Positive Emotion ($R^2 = 0.423$)	Negative Emotion ($R^2 = 0.089$)
Happy (r = 0.74)	Feeling of distaste (r = 0.70)
Joyful (r = 0.85)	Blameworthy (r = 0.74)
Delighted (r = 0.86)	Guilty (r = 0.75)
	Disgusted (r = 0.77)
	Disdainful (r = 0.75)
	Fearful (r = 0.73)
	Downhearted (r = 0.79)
	Angry (r = 0.78)
	Afraid (r = 0.80)
	Mad (r = 0.72)
	Scared (r = 0.78)
	Feeling of revulsion (r = 0.82)
	Contemptuous (r = 0.78)
	Sad (r = 0.74)
	Scornful (r = 0.83)
	Repentant (r = 0.80)

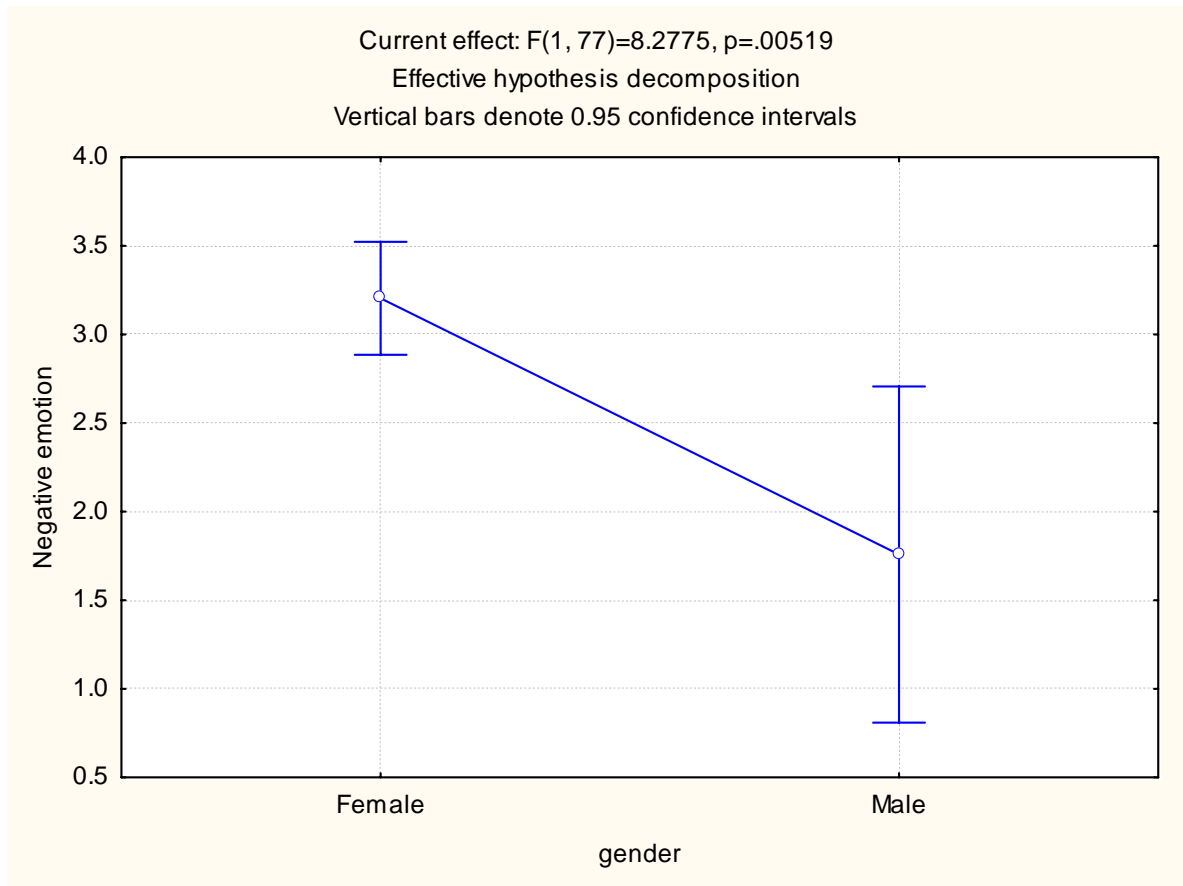


Figure 3: Negative emotion as a main effect

Table 3: ITC-SOPI intercorrelations for males

	Spatial	Engagement	Naturalness	Negative effects
Spatial	1.00	0.79	0.54	0.12
Engagement	0.79	1.00	0.20	0.22
Naturalness	0.54	0.20	1.00	-0.42
Negative effects	0.12	0.22	-0.42	1.00

Table 4: ITC-SOPI intercorrelations for females

	Spatial	Engagement	Naturalness	Negative effects
Spatial	1.00	0.59	0.80	0.31
Engagement	0.59	1.00	0.56	0.13
Naturalness	0.80	0.56	1.00	0.22
Negative effects	0.31	0.13	0.22	1.00

Table 5: ITC-SOPI overall intercorrelations

	Spatial	Engagement	Naturalness	Negative effects
Spatial	1.00	0.61	0.78	0.33
Engagement	0.61	1.00	0.51	0.13
Naturalness	0.78	0.51	1.00	0.19
Negative effects	0.33	0.13	0.19	1.00

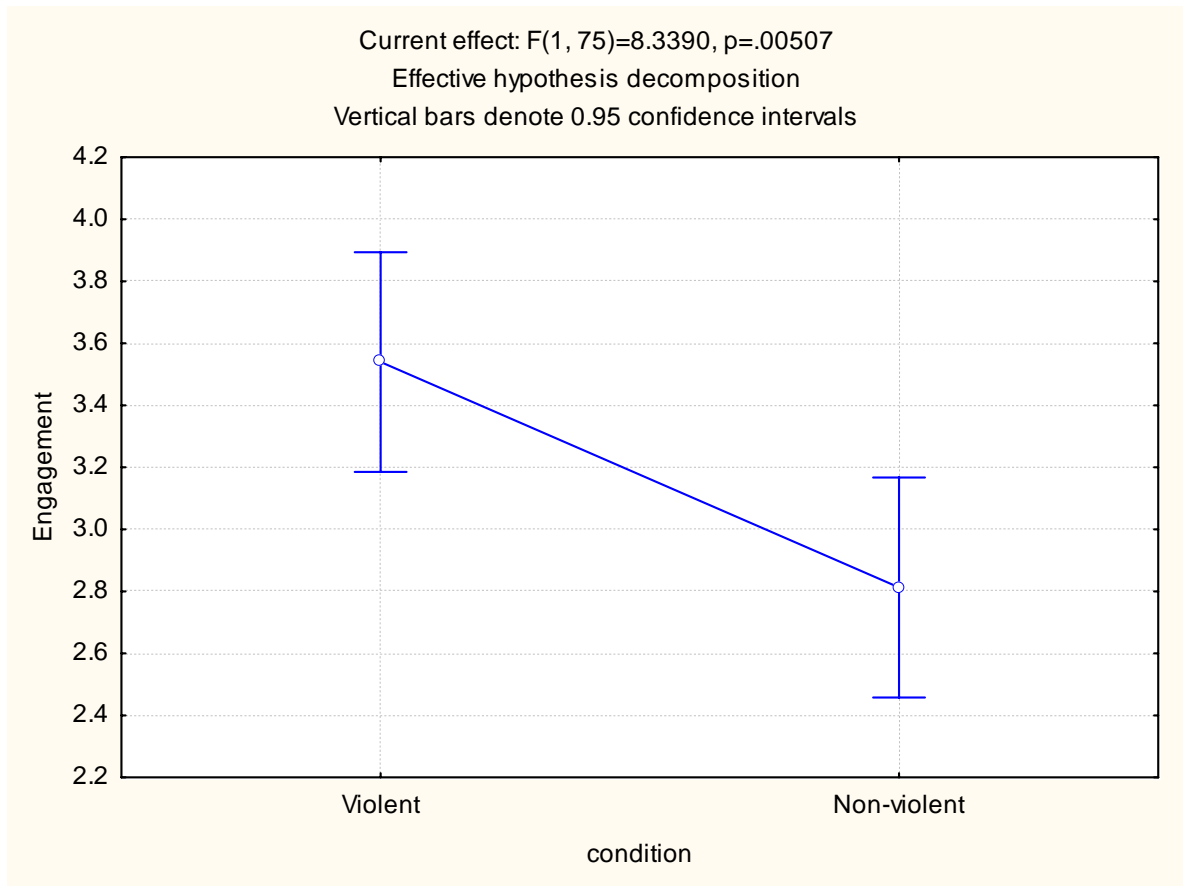


Figure 4: Engagement across conditions

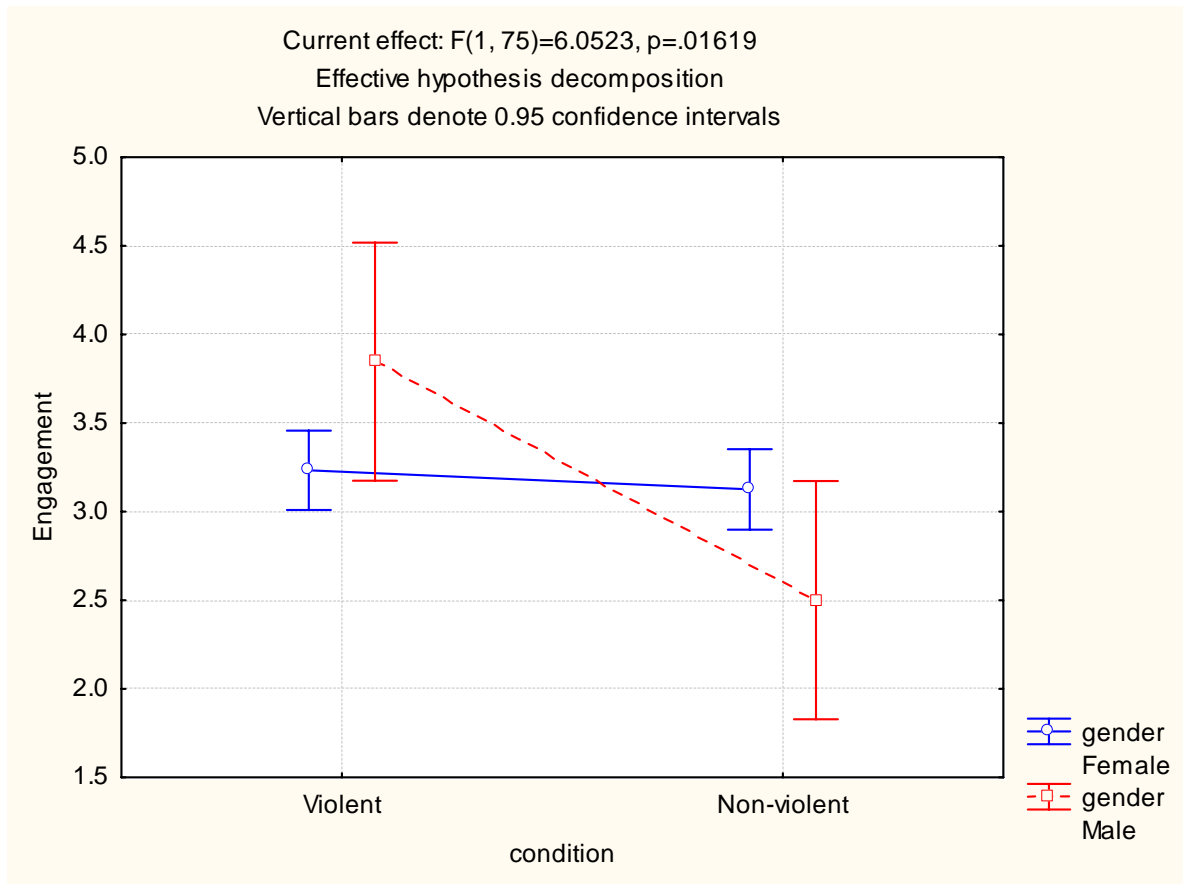


Figure 5: Engagement across gender and conditions

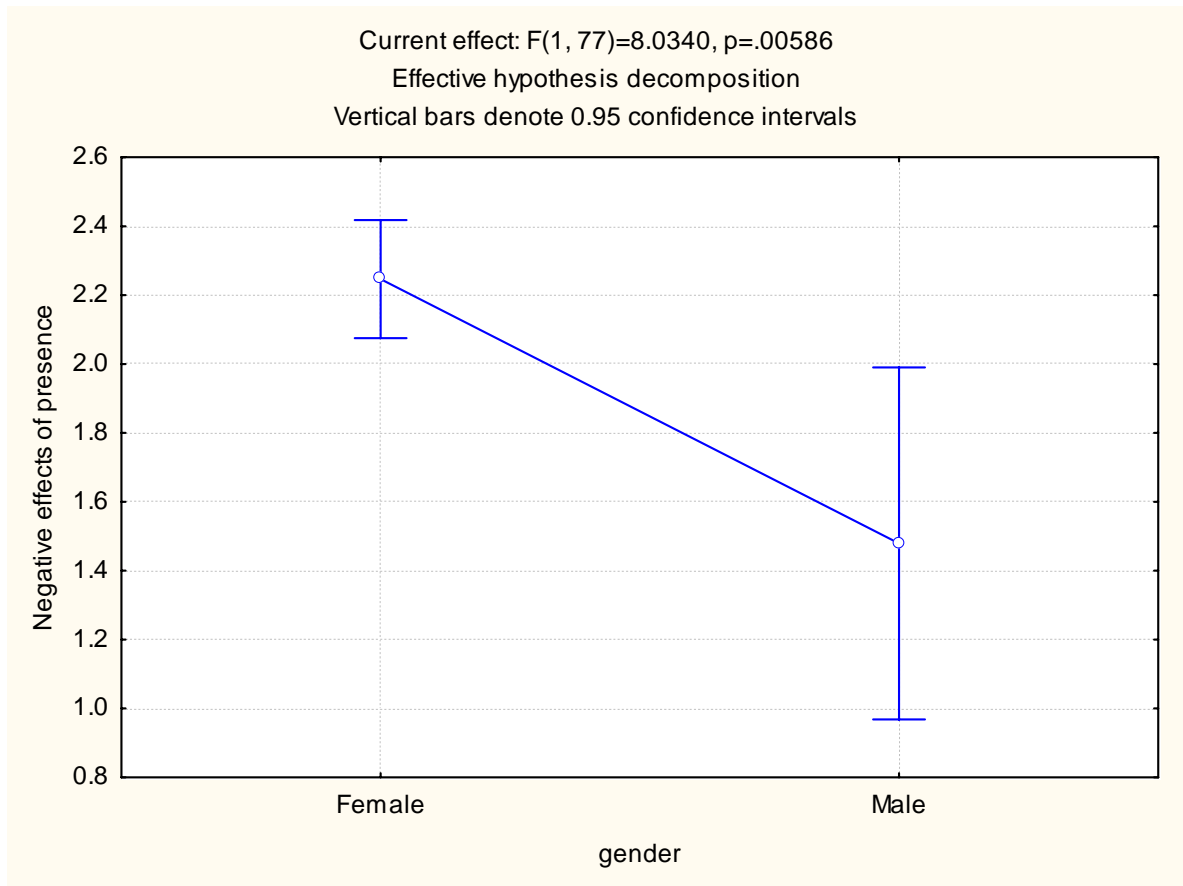


Figure 6: Negative effects of presence across gender

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