Computers in Human Behavior 56 (2016) 14–20

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

Full length article

Competitively versus cooperatively? An analysis of the effect of game play on levels of stress

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ARTICLE INFO

Article history:
Received 18 September 2015
Received in revised form
7 November 2015
Accepted 11 November 2015
Available online 26 November 2015

Keywords:
Video games
Stress
Competitive
Cooperative
Violence

ABSTRACT

Many gamers report that playing video games, including those with violent content, helps them to reduce stress. However, few studies have examined competitive and cooperative video game play as they relate to stress reduction. The current study employed a design to acutely stress 100 participants before assigning them randomly to play a mildly violent game either competitively or cooperatively with a female confederate. Results indicated stress levels declined over time at equal levels during both competitive and cooperative game play. Participants in the competitive condition held a slightly less positive impression of the confederate following game play, although players held a generally positive impression of the confederate overall.

Few studies have considered the role of competitive and cooperative play in the context of recovering from stressful events. Many gamers report that playing video games, including those with violent content, is a positive force in their lives, reducing stress and increasing socialization. However, much of the research on gaming comes from a perspective of presuming that games are harmful, despite the perspective of gamers themselves. Understanding the phenomenology of user experiences can be valuable in understanding the game experience from the perspective of player, rather than the remote and often artificial perspective of the laboratory (Oswald, Prorock, & Murphy, 2014). Nonetheless, scholars have too often taken the perspective that the perspective of scholarship is sacrosanct, whereas that of players in inherently biased (e.g. Nauroth, Gollwitzer, Bender, & Rothmund, 2014). Although opinions will undoubtedly differ in this regard, we take the perspective that this approach is naturally self-limiting and remote.

At present, over 100 studies have been conducted to look at the potential harmful effects of "violent" video games and whether these are associated with aggressive or anti-social behavior (Ferguson, 2015). Research evidence has not provided clear evidence for a clear link between such games and societally relevant aggression (Ferguson, 2015). Fewer studies have considered the role of competition and cooperative play regarding behavioral outcomes, although data in this area is slowly emerging (Adachi & Willoughby, 2011). Most of the research on competitive and cooperative game play has looked at interactions between these play styles with video game violence. Even fewer studies have examined how style of play might influence stress coping among players, nor whether reactions to games differ between male and female players. This study sought to address this gap in the literature by examining play style, as well as the effects of gender on cooperative and competitive game play in regards to participant stress levels and heart rates.

1. The impact of competition and cooperation in games

In a series of studies by Adachi and Willoughby (2011), the research team looked at differences in aggression potentially caused by violent content or competitiveness in the games. The researchers were concerned that past experiments of video game violence often conflated violent content with competitiveness. These differences were examined through two experiments. In both experiments, using the Hot Sauce paradigm for aggression (in which participants believe they are assigned to give more or less hot sauce to a person who wishes to avoid eating this sauce), the researchers confirmed that competitiveness, not violent content, was a source for aggressive behavior in players. This

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http://dx.doi.org/10.1016/j.chb.2015.11.020
0747-5632/

groundbreaking study provided evidence that much of the data on violent games may need to be reconsidered with a need for better matching between violent and non-violent game conditions. Przybylski, Deci, Rigby, and Ryan (2014) found similar results for frustration, rather than violent content, increasing aggression in players.

Dolgov, Graves, Nearents, Schwark, and Volkman (2014) defined cooperation as a form of "reciprocal altruism in which parties exchange goods or services to further their mutual goal(s)" (p. 50). In their study, the authors manipulated whether participants played a neutral video game (*Wii Sports Tennis* or *Canoeing*) either cooperatively or competitively with a confederate. In the competitive mode (in which players work against each other toward mutually exclusive goals), human players played against each other whereas the cooperative mode put the two human players on the same team and they competed together against a computerized opponent. Players in the cooperative condition subsequently picked up more pencils spilled by a confederate after gameplay. Overall, the study found cooperative gameplay in a formal context led to an increase in spontaneous helping behaviors.

Ewoldsen et al. (2012) found that playing violent video games cooperatively decreased arousal and violent cognitions. The study examined how playing a violent video game (*Halo II*) cooperatively would influence future cooperative behaviors. Results showed that participants in the cooperation condition showed significantly more generous behavior in a coin exchange social task than participants in competition or control conditions.

Using experimental data, Schmierbach (2010) found evidence supporting the idea that cooperative play results in less aggressive cognitions. The study utilized *Halo* on the Xbox console in three distinct modes. Before the study commenced, the participants all completed a ten minute training session, during which they were shown the game and the controller, and were allowed to play against an investigator for practice. This "training" allowed the study to place its participants in experienced and inexperienced categories. The participants were then matched and assigned to time slots based on their respective categories. These pairs of participants were randomly assigned to play one of the three modes: solo, cooperative, or competitive. In solo mode, each participant played the second level of the single player game, in which the player fights a series of battles against a small variety of alien opponents. In the cooperative mode, two players worked together to get through the same level that those did in solo mode. In both cases, no participants successfully made it to the end of the level in the allotted time. In the competitive mode, participants attempted to kill their opponent in a death match in the games longest level played in its default setting. Competitive players showed the highest level of subsequent aggressive cognitions, whereas cooperative players scored much lower. Game mode had no significant effect on arousal, but it did show a marginal effect on affect. The data also showed that solo players, both male and female, were most likely to report feeling angry, whereas competitive players, particularly men, actually felt less angry. Frustration was marginally affected by game mode, such that solo players were actually the most frustrated.

Lim and Lee (2009) concluded from their research that the social aspects of game play are as important, if not more, than the content of the game itself, violent or not. This study used *World of Warcraft* (WoW), a massive multiplayer online role playing game where participants engaged in violent or non-violent tasks, either cooperatively or solo. The violent tasks had participants fighting hostile nonplayer characters. The nonviolent tasks had participants navigating the game to find a destination (mailbox) and send an item. The collaborative condition had participants perform the game tasks with a same-gendered co-player character (the confederate) who played from behind a partition in the lab, unknown to the participant. In the solo condition, participants completed all game tasks alone. Physiological arousal was measured by skin conductance (SC), a measure of activation in the sympathetic nervous systems that indicates how the body prepares itself to become ready for action and deal with external threats. For both nonviolent and violent tasks, collaborative play led to significantly lower levels of arousal than in solo play although this was greater in magnitude for the violent tasks. The research team inferred from this that collaborative play may have decreased arousal for violent tasks by reducing the physical and mental load caused by the tasks, with the co-player serving as a source of support. However, for the nonviolent tasks, having a co-player requires extra care and attention; in most multiplayer games, co-players are required to stick together in order to get around the game world. Accounting for the collaborative context, these otherwise nonchallenging tasks can become psychologically demanding, thereby increasing the intensity of sympathetic activation. Jerabeck and Ferguson (2013) also found that when participants played cooperatively, aggressive behavior decreased regardless of game content. It is possible that the social context of cooperative play is more crucial than the content of the game itself in regards to determining emotional state. Players may be drawn to action games as a means of cooperative bonding, which may actually reduce stress.

2. Influences on stress

From previous research, it is clear that style of game play, whether competitive or cooperative can influence behavioral outcomes. Relatively little research has examined differential effects on stress, however. As one example, however, Reinecke (2009) looked at the correlation between video games as a means of recovery and stress relief. He believed that the content and narratives of games provide an opportunity to take a break from everyday life and to escape stress, problems, and negative affect. He believed that the characteristics of games significantly contributed to the recovery process in humans by eliciting psychological detachment. Video games also offer a unique sense of control and provide a feeling of autonomy (Ryan, Rigby, & Przybylski, 2006) and can alleviate stress by providing and fostering feelings of control during leisure. Reinecke (2009) also looked at how daily hassles impacted levels of stress. He believed that the daily hassles were a significant contributor to individual stress levels, especially psychological distress. The study asked participants to indicate how often they played video games on a 5-point scale, ranging from daily to less than once per month. In most games, players are confronted with opponents or challenges that they need to beat in order to move on from one level to another. The majority of the participants played video games daily, or at least several times a week. It was also found that most of the participants played games after stressful situations for the purpose of recovery.

By contrast Hasan, Bègue, and Bushman (2012) believed that violent video games increase stress, regardless of game play. The study measured cardiac coherence (heart rate) as a means to measure the elevated levels of stress through the autonomic nervous system. In the study, participants were randomly assigned to play either a violent or a nonviolent video game. After game play, the participant participated in a partnered task with a confederate, where the participant and the confederate competed against each other, and the winner had the opportunity to blast the loser with noise through headphones. It was hypothesized that those who played the violent video games would have lower cardiac coherence, and that the lower levels of cardiac coherence would be negatively related to aggression. The results showed that cardiac coherence values were lower when the individuals were assigned

to the violent video games and that such individuals were more aggressive in a competitive task.

3. Gender and games

Increasingly both males and females are represented among gamer communities, although males still play more games overall, and more action/violent games specifically than females (Lenhart et al., 2008). Further, evidence suggests that differential patters of interest and motivation between male and female gamers are related to different outcomes related to behavior and cognition (Quaiser-Pohl, Geiser, & Lehmann, 2006). For instance, in one recent study although playing violent games had no influence on either teen girls' or boys' aggressive behavior, girls did evidence an increased stress response following play of action-oriented games (Ferguson et al., in press).

With this in mind, examining or controlling for differential gender reactions to game play conditions is crucial when examining potential video game effects. Given that males and females often respond differently to competitiveness (Cárdenas, Dreber, von Essen, & Ranehill, 2012), it is valuable for studies of video game influences in this realm to carefully consider gender.

4. The need for pre-post designs

Most of the previous literature on video game effects have employed posttest only designs. Avoiding the use of a pretest can have merit insofar as pretests can set up demand characteristics and testing effects. However, in the absence of pretests, observed mean differences between groups at posttest can be hard to interpret (Przybylski et al., 2014). For instance, in aggression studies, should mean differences in aggression be observed following video game play, it is important to understand whether differences are representative of increases in aggression, or *differential declines* in aggression. Indeed some prior work with pretest/posttest designs have found that all games, including violent ones, decrease hostility (Valadez & Ferguson, 2012). Thus, considering the direction of effects over time following gameplay is arguably important for understanding the nature of effects.

At present, the degree to which differing styles of video game play reduce stress remains unclear. The current study was designed to test the hypothesis that cooperative game play decreases stress, in comparison to competitive game play. By inducing frustration in participants the current study design will allow for testing effects on acute stress. The current study thus is designed to test the following hypotheses:

H1. Cooperative, as compared to competitive video game play, will reduce stress more, as indicated by heart rate, blood pressure and self-reported stress.

H2. Participants will have a more positive attitude toward another player in cooperative play relative to competitive play, as indicated by emotionally valenced verbalizations and behaviors and ratings of the confederate gathered post-play.

5. Method

5.1. Participants

The present study utilized 100 undergraduate students (44 male, 56 female) from a small, liberal arts university in the South. Student participants were young adults, ranging in age from 18 to 25, and were randomly assigned into two game play groups (50 competitive, 50 cooperative).

5.2. Measures and technology

5.2.1. Paced Auditory Serial Addition Task (PASAT)

Initially used as a measure of assessing short term memory loss in brain trauma patients, the PASAT has since grown into a reliable lab-based stressor. For this study, the computerized version of the Paced Auditory Serial Addition Task (PASAT-C; Lejuez, Kahler, & Brown, 2003) was used on practice mode. The PASAT-C was used as a lab-based stressor to give all participants a baseline level of stress (see Deary et al., 1994; Roman, Edwall, Buchanan, & Patton, 1991). The PASAT induces stress due to requiring participants to mentally calculate addition problems while simultaneously providing distracting information in a timed format. Holdwick and Wingenfeld (1999) found that the PASAT had a negative effect on mood, with increased ratings of anxiety, sadness, and hostility following testing.

5.2.2. Video game conditions

For the purposes of the study, *Lego: Marvel Superheroes* was used as it was a mildly "violent" video game, with options for competitive and cooperative play. The game was used in two modes: Story mode for cooperative play, Free Play mode for competitive play. In story/cooperative mode, participants completed two of the games fifteen levels within the time frame of forty-five-minutes with the assistance of our confederate. Participants who played in free play/competitive mode were allowed to roam the streets of New York in the game freely, but were instructed to enter a shooting match if the confederate and the participants ran into each other. The participant and the confederate were also encouraged to track each other with the guide map at the bottom of the screen. *Lego: Marvel Superheroes* allows player characters to destroy each other's characters particular with certain weapons (lasers, bombs). All players played with/against a female confederate who was skilled in *Lego: Marvel Superheroes*. All games were played on an XBOX One console. Using two modes of the same game helps to reduce the potential for introducing confounds due to mismatched game conditions. We do note that it is difficult to match game conditions perfectly, and story and free play modes certainly differ in terms of objectives. However, using the same game allowed for control of basic game mechanics, setting, characters, pace of action and difficulty.

In the current analyses, we did not employ a no-game control. Previous research (Ferguson & Rueda, 2010) has indicated that video games, whether violent or not, are successful in reducing acute stress. Thus, although some regression in stress symptoms is naturally expected as a simply influence of time, our interest was in examining whether competitive or cooperative play were more effective in reducing stress.

5.2.3. Psychological Stress Measures Questionnaire (PSM; Lemyre & Tessier, 2002)

An abridged version of the PSM was used (PSM-9) before and after game play to monitor self-report stress levels. Questions ranged from "I feel stressed" to "I feel calm" and were rated on a 7 point likert scale. The PSM-9 was administered after pre and post blood pressure and heart rate were monitored. Coefficient alpha reliability at pretest was .81 and at posttest .86.

5.2.4. Blood pressure cuff/heart rate monitor

To monitor blood pressure and heart rate, the study used a standard store bought average sized cuff (an Omron, HEM-432C). For the best chances of obtaining blood pressure and heart rate levels, the cuff was inflated to 200, and then left to deflate until scores were observed. Blood pressure and heart rate were obtained for each participant, providing their arm fit in the cuff, after the

PASAT-C was administered, and then directly following game play. Our approach to using blood pressure is similar to other studies examining blood pressure as a measure of emotional reaction to video game play (e.g. Ballard, Visser, & Jocoy, 2012).

5.2.5. One-way mirror and audio recordings of verbal responses

After the first PSM-9 was completed the lead researcher left the room after explaining that the participant and confederate would be playing either cooperatively or competitively. Upon exiting the lab, the lead researcher entered the adjoining room and turned on the audio recording device. Physical behaviors and verbal cues were monitored through means of the mirror and recording device, and were later scored for stress behavior. Participants were not aware of the one-way mirror. Positively and negatively valenced behaviors were tallied at the end to see if there was a correlation between pre/post blood pressure/heart rate and the number of stress behaviors (negatively valenced) emitted. Non-stress (positively valenced) verbal cues ranged from friendly chit chat to laughter, and positively valenced physical behavior was marked by a comfortable position in the chair (slouched in, with controller in the lap); while negatively valenced behavior verbal cues ranged from yelling at the screen to cursing and other vulgarities. Negatively valenced physical behavior cues ranged from hunching over in the chair, tensing, and shaking the controller.

The intent of this facet of the analysis was to employ a secondary source of information separate from self-ratings in a context similar to a behavioral rating scale such as those often used in clinical psychology (e.g. Hurley, Lambert, Epstein, & Stevens, 2015). We acknowledge that such an approach has its own limitations regarding potential experimenter bias, but comparisons with self-ratings can provide for an examination of sources of bias. Although the use of behavior rating scales, particularly with only one coder, have obvious limitations, they can be helpful in providing data, particularly in conjunction with other sources of information such as self-report (Sanson-Fisher & Mulligan, 1977). Thus they are employed here as an alternate piece of data to examine H2 alongside self-report.

5.2.6. Experiences survey and ratings of the confederate

An experiences survey was administered to gain knowledge of overall experiences and to see if participants liked the confederate more depending on what condition they were assigned to. Questions were measured on a likert scale of 1–5, and questions ranged from "please rate your overall experiences in the lab" to "please rate the helpfulness of your partner". This final variable regarding the helpfulness of the confederate was used to examine favorable impressions of the confederate. The ratings were obtained in survey form without the confederate present. Participants were informed that the confederate would not see the ratings. The use of such confederate ratings as an outcome variable have been in use for some time (e.g. Berkowitz, 1965).

5.3. Procedures

Participants were randomly assigned to competitive or cooperative game play. Once the participant entered the lab they were asked to complete the PASAT-C, have their blood pressure and heart rate monitored, and complete the PSM-9. Upon completion, the participant was given instructions on how to operate an Xbox One controller and play *LEGO Marvel Superheroes*, which they then played for approximately forty-five minutes alongside the female confederate. During game play the lead researcher observed physical behaviors and verbal responses through means of a one-way mirror, marking them for stress behavior analysis. After game play participants had their blood pressure and heart rate monitored once more, asked to retake the PSM-9, and were also asked to complete the experiences survey. Upon completion, participants were debriefed, and informed of the observations through the two-way mirror. All participants were specifically asked following the debriefing if they still wished their data to be included in the study and all agreed. Participants were then thanked and then dismissed.

5.4. Research design

The study used a 2 × 2 × 2 (gender × group × time) mixed factorial design. Outcome variables consisted of the stress questionnaire, positive/negative valenced scores, the experiences survey ratings of the confederate, and blood pressure/heart rate measures.

6. Results

All results are presented in Table form in Table 1.

6.1. Blood pressure and heart rate

Regarding heart rate, only the time differential from pre to post was statistically significant, with heart rate declining from before ($M = 78.89$, $SD = 14.45$) to after game play ($M = 73.48$, $SD = 11.94$), [$F(1, 89) = 31.67$, $p < .001$, $r = .51$, 95% CI = .35, .64]. No difference was observed due to game condition or gender or their interaction.

Regarding blood pressure, for systolic pressure, blood pressure decreased in all players from pre ($M = 123.19$, $SD = 25.70$) to post

Table 1
Results for main analyses.

IV or interaction	*F*	*p*	*r*
Heart rate			
Group	0.789	.377	.09
Gender	2.072	.154	.15
Time	31.67	<.001	.51
Group × gender	0.936	.336	.10
Time × group	0.144	.705	.04
Time × gender	0.428	.515	.07
Systolic BP			
Group	1.004	.319	.10
Gender	0.572	.451	.08
Time	7.710	.007	.27
Group × gender	0.023	.880	.02
Time × group	3.181	.078	.18
Time × gender	0.223	.638	.05
Diastolic BP			
Group	0.311	.578	.06
Gender	1.901	.171	.14
Time	1.880	.173	.14
Group × gender	0.096	.758	.03
Time × group	2.160	.145	.15
Time × gender	0.088	.78	.03
Self-reported stress			
Group	0.885	.349	.10
Gender	20.937	<.001	.42
Time	56.70	<.001	.61
Group × gender	0.217	.642	.05
Time × group	3.439	.067	.19
Time × gender	0.011	.917	.01
Confederate ratings			
Group	9.444	.003	.30
Gender	0.245	.622	.05
Group × gender	0.083	.774	.03
Negative valence			
Group	0.034	.853	.03
Gender	0.371	.545	.03
Group × gender	1.539	.774	.17

game play (M = 115.04, SD = 36.98), [F (1, 96) = 7.71, p = .007, r = .27, 95% CI = .08, .44]. A non-significant trend was also observed for the interaction between game play and group [F (1, 96) = 3.18, p = .078, r = .18, 95% CI = −.02, .36]. Cooperative players experienced slightly more decrease in systolic blood pressure than diastolic. We report this outcome in interest of full transparency. However, we caution interpretation of this finding given high potential for Type I errors for finding near the p = .05 criterion for "statistical significance." Results for systolic pressure are presented in Fig. 1.

For diastolic blood pressure, no effects for any variables were seen.

6.2. Self-reported stress (PSM)

Self-reported stress declined from pre (M = 31.30, SD = 10.36) to post game play (M = 25.49, SD = 10.21), [F (1, 96) = 56.70, p < .001, r = .61, 95% CI = .47, .72]. The interaction between time and game condition approached, but did not achieve significance [F (1, 96) = 3.44, p = .067, r = .19, 95% CI = −.01, .37]. Although both cooperative and competitive groups reported reduced stress post-game-play, cooperative players reported slightly more (33.02–25.82) reduction in stress than competitive players (29.58–25.16). We report this outcome in interest of full transparency. However, we caution interpretation of this finding given high potential for Type I errors for finding near the p = .05 criterion for "statistical significance." We report these results in our understanding of the importance of reporting exact p-values for all hypotheses relevant findings, and do not take the stance that "trends" should be interpreted similarly to statistically significant results. These results are shown graphically in Fig. 2. There was also a significant gender effect with females reporting more stress at both pre and post than males [F (1, 96) = 20.94, p < .001, r = .42, 95% CI = −.24, .57].

6.3. Confederate ratings

Ratings of the confederate were gathered post play only, and thus were analyzed using a 2 × 2 (gender × gameplay) ANOVA. Results indicated a significant effect for game play with cooperative players rating the confederate more positively (M = 4.84, SD = 0.47) than competitive players (M = 4.40, SD = 0.88), [F (1, 96) = 9.44, p = .003, r = .30, 95% CI = .11, .47], although it's worth noting that ratings of the confederate were generally positive in both conditions. No gender effects were observed.

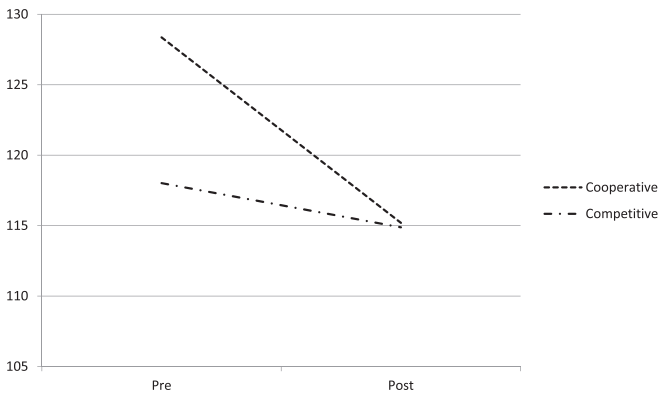

Fig. 1. Pre/post results for systolic blood pressure in game play conditions.

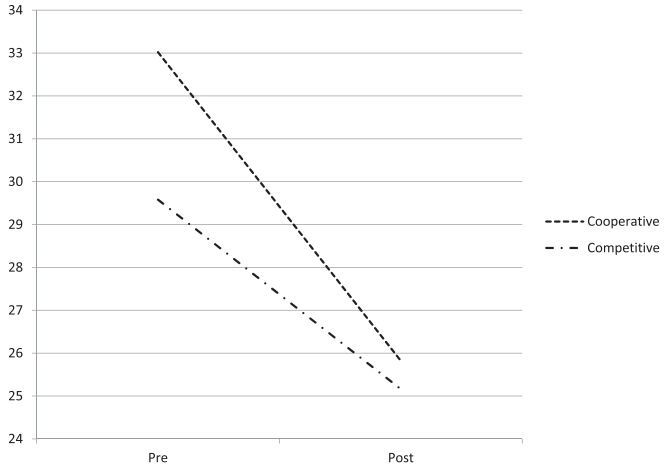

Fig. 2. Pre/post results for self-reported stress in game play conditions.

6.4. Behavioral observations

A negative valence composite score was created by subtracting the number of positive behaviors and verbalizations from the number of negative behaviors observed through the two-way mirror. As with the confederate ratings, this was then analyzed using a 2 × 2 gender × gameplay ANOVA. Neither group [F (1, 96) = 0.94, p = .335] nor gender were significant predictors of negatively valenced behaviors.

7. Discussion

Scholars remain interested in examining the relative differences between the experiences of playing video games cooperatively versus competitively. In the current study, we sought to examine the effects of competitive and cooperative game play on stress. It was found that both conditions were successful in decreasing heart rate and systolic blood pressure, as well as self-reported stress, leading to the conclusion that a game with mild violence is effective as a means to reduce stress, whether played cooperatively or competitively. Thus H1 was not fully supported. Negatively valenced behaviors did not differ between game condition, although cooperative gamers rated the confederate slightly higher than did players in the competitive condition. This last outcome is consistent with research from other labs (Adachi & Willoughby, 2011; Ewoldsen et al., 2012). Thus H2 was partially supported.

This study is of value in addressing the degree to which play style in games including a game with mild violence, is effective in reducing stress (e.g. Rieger, Frischlich, Wulf, Bente, & Kneer, 2015; Valadez & Ferguson, 2012). Our results suggested that playing a mildly violent game, irrespective of play style, was associated with a decline in stress from pre to post play. Only research from one lab (Hasan, Bègue, & Bushman, 2013) has suggested violent games may increase stress; this finding has generally not replicated across other studies. This may be explained via two issues. The first is researcher expectancy effects. The authors of the Hasan et al., 2013 study employ citation bias in their literature review (failing to adequately cite research data conflicting with their personal views) a behavior indicative of researcher expectancy effects and now known to be associated with spuriously high effect sizes in research (Ferguson, 2015). Second, the stress reduction qualities of video games appear to be most pronounced in studies in which participants are exposed to acute stress, such as through the PASAT. In cases of background stress, the influence of video games may be

modest, given that stress levels among a majority of players may already be fairly low.

We note that the game chosen for the current study was one with mild "violence." It is worth noting that "violence" in video games is an ill-defined concept, as is the general use of the term "violent video game" which is defined so loosely as to incorporate almost all video games. Indeed, the term "violent video game" is often used as if this term has conceptual meaning and encapsulates a clear spectrum of games, but we see no evidence that this is the case. Violent content may have different meaning across games, just as it does across different books and movies. Thus, it may be more precise to discuss specific games in regards to format, structure and narrative rather than focus on broad, yet conceptually problematic categories such as "violent video games." We speculate that use of the term "violent video game" has prejudicial emotional intent that is not appropriate for scientific inquiry.

Unlike in some previous studies (Ferguson et al., in press; Quaiser-Pohl et al., 2006), gender did not appear to be a critical factor in our results, aside from women reporting more stress than men. Game play appeared to be generally calming for both male and female participants. Certainly, more work would be welcome, examining the nuances of gender differences and similarities in response to game play.

Like most studies, ours is not without limitations. Most notably, it is important to acknowledge that by inducing acute stress, some regression in stress symptoms is to be expected as a function of time. Previous research (Ferguson & Rueda, 2010) has indicated that gaming can be more effective than a no-game control in reducing acute stress. However, from the current study we can't compare gaming to other stress reducing activities. Further we only considered a single video game; thus generalization to other games or game formats is limited. Competition and cooperation may mean very different things across games and game genres, just as violent content likely does. Further, we made the decision to limit deception in regards to the confederate for the current study. However, it could be that responses would have differed had the participants perceived the confederate to simply be another student. Our study also only utilized one female confederate, thus limiting the study in observations for gender effects. It would be foolish to rationalize gender effects with only one side of the gender spectrum being represented. Finally, the study only utilized one standard sized blood pressure cuff, which did not fit around all arms equally. In the future, a bariatric and a pediatric sized cuff should be added to the standard sized cuff to ensure that all blood pressures were accurately monitored. Further, our study only compared relative stress reduction for different modes of game play. Our study cannot be used to compare gameplay to other activities in relation to stress reduction. Studies employing other activities as control groups could be instrumental in exploring this further.

Gamers often express the idea that they use games, including those with violent content, to reduce acute stress. Our current study suggests that gamers may be on to something, with both cooperative and competitive games reducing acute stress in a laboratory environment. Playing competitive games may result in some lasting feelings of competition toward another player, although these appear to be mild overall. We observe that it is unfortunate that some scholars have too often portrayed game studies as a competition between gamers and a scientific field that is often problematic. We suggest that instead of condemning gamers for their skepticism of the rampant anti-game messages that have emerged from social psychology in recent decades (e.g. Nauroth et al., 2014), it may be time to start listening to their experiences and perspectives.

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