

EFFECTS OF COOPERATIVE AND COMPETITIVE GAME PLAYING ON EMPATHY

by

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Honours Bachelor of Arts, University of Ontario Institute of Technology, 2015

A thesis

presented to Ryerson University

in partial fulfillment of the  
requirements for the degree of

Master of Arts

in the program of

Psychology

Toronto, Ontario, Canada, 2019

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# Effects of Cooperative and Competitive Game Playing on Empathy

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## Abstract

The present study examined the effects of cooperative and competitive game playing on empathy. Participants were randomly assigned to one of two conditions, with a confederate: playing a video game cooperatively (N = 51), or playing a video game competitively (N = 55). The game played was the non-violent, puzzle-platformer Portal 2. When playing cooperatively, participants completed levels through the multiplayer option where they had to act together with the confederate to be successful. In the competitive condition participants played the single-player campaign and competed with the confederate for the best time-to-completion of the first series of levels. After playing Portal 2 for approximately 15 minutes, participants watched the confederate submerge her hand in what they thought was ice-cold water for 30 seconds. Participants sat facing the confederate and rated their perception of the confederate's pain, their own pain, the amount of empathy they felt for the confederate, as well as how close they felt to the confederate. A subsequent measure also assessed the extent of participants' empathic concern by providing them the option to reduce the time that the confederate had to put her hand in the water a second time. Results showed no significant differences between the two conditions with respect to levels of empathy. However, participants felt more trusting and friendly towards the confederate in the cooperative condition.

## Acknowledgements

I would like to take this opportunity to thank the many people who have helped me throughout my graduate career.

First, I would like to thank my supervisor, Dr. Stephen Want, for his incredible generosity, support, and kind words over the years. Thank you for helping this thesis come to fruition.

I would also like to thank my committee member, Dr. Julia Spaniol, and my external examiner, Dr. Tara Burke, for their time and effort.

I extend my sincere gratitude to all the research assistants at the Media & Social Development Lab, particularly those who devoted hours of their time to helping collect our data.

Thank you to my friends, Ela, Craig, Neil; my family, Tata; and my roommates, Zander, Clara, and Max - and especially to my best friend Sam whose love and support helped me cross the finish line. Finally, I would like to thank the artists whose songs got me through the final stages of my graduate degree. Stray Kids, Monsta X, and BTS, your music really works wonders.

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## Introduction

In terms of popularity and consumption, video games have been steadily surpassing more traditional forms of entertainment media such as movies and television programs (Pethokoukis, 2002; eMarketer, 2017). Take, for example, the highest-grossing film of 2014, *Transformers: Age of Extinction*. During its 15-week box office run it grossed US\$ 1B worldwide. By comparison, sales of the video game Grand Theft Auto V hit that figure within the first week, and the game went on to gross over US\$ 6B in revenue, making it not only one of the most successful video game launches in history, but also rivaling some of the most well-known movie franchises in Hollywood (Ramdurai, 2014). It became the fastest-selling entertainment product in history and broke another five sales records along the way, according to *Guinness World Records* (as cited in Ramdurai, 2014).

Viewing a film or a television program is a relatively passive experience, in which viewers simply observe an unfolding story. Video games offer players a chance to actively participate in a story, or even to create their own narrative in a personalized, dynamic, reactive environment. The appeal of spending time in a virtual world may not be understood by all, but the billions of logged gameplay hours worldwide are a testament to their popularity and immersive capabilities. As one example, in 2012, League of Legends (a multiplayer online battle arena game) players logged more than 1 billion hours of gameplay per month with 12 million daily active users, and a peak of 3 million concurrent users (as cited in Kenreck, 2012). A second example is the role-playing fantasy game *World of Warcraft*. According to one analyst's calculations, the 11 million registered users of *World of Warcraft* have collectively spent as much time playing the game since its introduction in 2004 as humanity spent evolving as a

species; about 50 billion hours of game time, which adds up to about 5.9 million years (as cited in Hotz, 2012). With so many individuals connected through, and to, virtual worlds, it is important to understand the impact video games have on players' thoughts, feelings, and future behaviours.

One outcome of video game play that has been studied in various ways is empathy – defined as the ability to understand other people's perspectives, along with the tendency to feel personal distress and/or sympathy when others are suffering (Davis, 1983). Some scholars have investigated the question of whether carrying out violent acts in video games can potentially diminish a player's empathic concern for others and can increase their aggressive tendencies in real life (Bushman, 2016; Ferguson, 2015). Others have investigated whether games in which players engage in more prosocial acts can foster empathy (Greitemeyer & Mügge, 2014). Still others have examined whether the way that games are played – with a distinction made between competitive and cooperative game play – may change their effects on empathy. The purpose of the present study is to contribute to the literature on the effects of video game playing on empathy. More specifically, the study described here is an attempt to replicate a recent finding from Martin et al. (2015). These researchers showed that playing a cooperative video game with a stranger reduced stranger-induced anxiety and increased empathic concern for that person's pain. In less than an hour, cooperative play created an in-group dynamic where levels of empathic concern for the stranger became comparable to those demonstrated towards a close friend (Martin et al, 2015). The present study is aimed at replicating this dramatic effect. If the replication is successful, then it will support the notion that cooperatively playing video games can reduce stranger-induced anxiety, leading to empathic responses.

Before addressing Martin et al.'s (2015) study specifically, the following literature review will explore definitions of empathy and its subcomponents, and examine studies investigating the effects playing video games – with different content and different styles of play – have on empathy.

### **Empathy and its Subcomponents**

Empathy has been defined in several different ways, but for the purposes of this thesis, I will follow the definitions originally given by Davis (1983) and that are commonly-used in the literature. Davis divides empathy into four components. Perspective-taking is defined as the tendency to spontaneously try to understand other people's mental viewpoints; in other words, the willingness to try to understand alternatives to one's own point of view. Personal distress is defined as the discomfort and anxiety personally felt in emotional social situations, such as an emergency. Empathic concern is defined as the tendency to feel a combination of sympathy and concerns for others' well-being. In addition to these forms of empathy, Davis (1983) also includes fantasy empathy as a distinct component. Fantasy empathy is described as feelings of genuine empathic concern for fictional characters, fostered by relating to the emotions they convey; the person is transposed into the character's mind (Cheetham, Hänggi, & Jancke, 2014).

### **How Might Empathy be Affected by Video Games?**

It has been argued that video-game playing may have the effect of either increasing or decreasing players' empathy, depending on both the content of the video game, and the way it is played. For instance, some have argued that, like all forms of violent media, violent video games desensitize and numb individuals to the suffering of others, effectively blunting the personal distress and empathic concern components of empathy (Bushman & Anderson, 2009; Gabbiadini, et al., 2016; Gao et al., 2017; Wonderly, 2008; Funk, Buchman, Jenks, & Bechtoldt,

2003; Triberti, Villani, & Riva, 2015). Bushman and Anderson (2009) argued that repeated exposure to violent media might decrease people's physiological reactions to the sights and sounds of violence. These desensitized physiological reactions might then lead to decreased attention to, and decreased perceptions of the seriousness of, the real-world violence. In turn, these decreased perceptions might lead people to be less sympathetic to, and less likely to help, victims of violence. Violence in video games in particular is a visceral experience, and one that the player is actively involved with. The actions of the individual have direct consequences in the digital world and people sometimes choose to express themselves violently within the confines of the game. In fact, researchers who make these arguments highlight the immersive nature of video games as especially hazardous in this regard.

However, the flipside of such arguments is that, if a video game has less violent content and more prosocial content (e.g., more instances of helping others, rather than hurting them) then video games may act to enhance empathy. Video games are powerful and engrossing forms of visual storytelling. At their best, they act as conduits for deeply-impactful, emotional, parallel representations of society and people's interactions. If a video game can authentically portray relatable emotions, players may be more inclined to identify with those emotional states, and so develop empathic feelings for the characters and situations depicted in them (Rigby & Ryan, 2011). Wondra and Ellsworth (2015) put forward an appraisal theory of empathy that applies to how fictional characters might trigger empathetic responses. Appraisal theory proposes that we not only feel the emotions of others who feel similarly to us, but that we also appraise each situation and are capable of feeling incongruent emotions. As players evaluate their own situations, they can feel empathic concern for the fictional representation as well as take on their perspective (Wondra & Ellsworth, 2015).

This appraisal theory of empathy helps to explain how, and why, players might feel empathic concern for fictional characters in imaginary scenarios that they may not have experienced. Instead of understanding the exact emotions or character perspective, they may appraise the situation and vicariously assume other emotional responses. Wondra and Ellsworth argue that empathy and perspective-taking in video game play should not be viewed as an accidental by-product of good storytelling, but should rather be framed as a natural response triggered by an underlying, implicit understanding of the human experience.

In short, there are theoretical reasons to believe that video game content may affect players' empathetic responses. Other researchers have focused more on the effects of the way video games are played rather than the video game content itself. As we shall see shortly, it may be that the competitive or cooperative nature of playing with another person may also influence participants' empathy. In particular, playing with another person may foster a sense that the person is part of the participant's in-group, and thereby empathy may be increased for that person.

### **Evidence from Studies Looking for Effects of the Content of Video Games: Violent Content**

In recent years, violent video game content has come under intense scrutiny due to the long-held belief that violent imagery may increase desensitization towards real-world violence, as well as decrease prosocial behaviours (Funk, Buchman, Jenks, & Bechtoldt, 2003; Triberti, Villani, & Riva, 2015). Fraser et al. (2012) explored the associations between violent video game content, empathic concern, and prosocial behaviours towards strangers and members of one's in-group. In their study Fraser et al. (2012) assessed violent video game play by having participants rate their own violent video game consumption using a 6-point Likert scale – this self-report measure did not specify what qualified as violence; this was left to each participant's individual

judgment. Participants' empathic concern and prosocial behaviours were measured using the Interpersonal Reactivity Index which measures Davis' (1983) four dimensions of empathy and the Kindness/Generosity Subscale of the Values in Action Inventory of Strengths (Peterson & Seligman, 2004). This 15-item subscale assessed prosocial behavior toward strangers ("I go out of my way to cheer up people who seem sad, even if I do not know them"), friends ("I help my friends, even if it is not easy for me"), and family members ("I voluntarily help my family members with things they need") on a 5-point Likert scale ranging from 1 (*not like me at all*) to 5 (*very much like me*). Results indicated small to moderate correlations between playing video games with violent content and lowered empathic concern. These results were found in both male and female participants. Lowered empathic concern was also strongly associated with lowered prosocial behaviours towards strangers (Fraser et al, 2012).

Fraser and colleagues' (2012) study is just one example of a study that demonstrates a negative correlation between exposure to virtual violence and levels of empathy; several other such studies exist (Happ, Melzer, Steffgen, 2015; Gao et al., 2017; Gao et al., 2017; Wonderly, 2008). Fraser et al. (2012) is notable for considering the influence violent video games have on in-group (friends and family) and out-group (strangers) dynamics. However, it should be noted that because their results are just correlations, it cannot be determined if violent video games reduce empathy, or if having reduced empathy causes an attraction to violent video games. Either one of these conclusions seems plausible.

That said, some experimental studies, with the power to determine causality, do seem to indicate that video game violence can physiologically desensitize players to real-life violence. A study done by Carnagey, Anderson, and Bushman (2006) measured participants' heart rates (HR) and galvanic skin responses (GSR) while they were watching a 10-minute video tape of real-life

violence, after having played a violent video game for 20 minutes. The video tape included real violence in four contexts: courtroom outbursts, police confrontations, shootings, and prison fights. These clips were not Hollywood reproductions, they were actual violent episodes selected from television shows and films. Furthermore, two sets of video games were used during this study: 4 violent video games (Carmageddon, Duke Nukem, Mortal Kombat, Future Cop) and 4 non-violent video games (Glider Pro, 3D Pinball, 3D Munch Man, Tetra Madness). Participants who had previously engaged in violent video game play had lower HR and GSR while watching the real-life violence, thus demonstrating that playing a violent video game can physiologically desensitize players to violence.

These findings are echoed by broader reviews of the literature. Brockmyer (2016) reviewed data from questionnaires, behavioural, and psychophysiological research and concluded that exposure to violent video games increased the relative risk of desensitization to real-world violence. Anderson, Shibuya, Ihori, Swing, Bushman, Sakamoto, Rothstein, and Saleem (2010) conducted a cross-cultural meta-analytic review, and strongly supported the argument that prolonged and habitual exposure to violent video games is a potentially causal risk factor for increased decreased empathy.

Despite these findings, not everyone agrees that violent video game playing is a risk factor for detrimental outcomes, including desensitization. Spaniol and Bowen (2011) examined whether chronic exposure to violent video games alters emotional long-term memory. Participants reported their recent video game exposure using a video game inventory, prior to completing an old-new recognition task. Although it was initially predicted that violent video game exposure would decrease memory, or elicit a less liberal response bias, for negative

stimuli, these researchers found that violent video game exposure did not negatively impact self-reported arousal, memory, or response bias for emotional stimuli.

Furthermore, there is a growing body of literature that either fails to find effects of playing violent video games or shows that the effects are minimal (Ferguson, 2015; Teng et al., 2018). Ferguson reviewed results compiled from 101 studies and suggested that negative video game influences on factors such as academic performance, aggression, depressive symptoms, attention deficit symptoms, and prosocial behaviour are marginal. Ferguson (2015) noted that researcher degrees of freedom, citation bias, poorly standardized outcome measures, and publication bias for studies of violent video games are common problems for the field. Ferguson argues that these articles are often beset with methodological problems and feed into a misguided public perception of violent video games. Markey (2015) provided further commentary on these matters by expanding upon the evidence uncovered by Ferguson's (2015) comprehensive meta-analysis. Markey emphasized how previous studies that found relations between violent media and aggression did not account for extraneous variables. When variables such as gender, trait aggression, and mental health were controlled for they yielded much lower effects than analyses that did not consider such extraneous factors.

In short, no consensus has been reached. There are researchers who argue that violent content alone does not necessarily trigger desensitization to violence and a decrease in empathy. Instead, any such possible effect has to be considered in interaction with other factors such as a person's sense of ethics and morality (Heron & Belford, 2014). The variability of results described in the above section cannot be concisely explained by any one-size-fits-all theoretical framework.

## **Evidence from Studies Looking for Effects of the Content of Video Games: Prosocial Content**

Unfortunately, research on the impact of prosocial video games on empathic concern is still in its infancy. Two studies done by Greitemeyer and Osswald (2010) focused on whether or not prosocial game play had any impact on empathic concern. The studies revealed that playing a prosocial game increased interpersonal empathy and decreased the phenomenon known as *schadenfreude*, the reported pleasure at viewing another's pain and misfortune. In their studies, participants either played *Lemmings*, a prosocial game with the goal of leading a small group of creatures through various worlds to safety, or *Tetris*, a neutral game in which the goal is simply to stack coloured blocks together. After playing either game for roughly ten minutes, participants were asked to rate how prosocial the game was. Once their prosocial video game scores were taken, participants were given one of two essays to read and respond to. In both variants, the apparent theme was suffering, and participants were asked to indicate how sympathetic they felt towards the author of the essay directly after reading it (Greitemeyer & Osswald, 2010). Results showed that those who played the prosocial game, and who perceived the *Lemmings* game as being more prosocial, had increased empathic concern for the authors of the essays, and decreased tendencies towards *schadenfreude* - they did not take pleasure when reacting to another person's misfortune as described in the essays.

As previously mentioned, few studies examining the effect of prosocial video-game content exist. So, while the results of Greitemeyer and Osswald's (2010) studies do suggest that prosocial content may lead to prosocial outcomes, further studies are clearly needed to replicate such effects.

## **Evidence from studies looking for effects of how video games are played**

Despite violent video game content being linked to decreased empathy, there is evidence supporting the idea that the effects of such imagery may in fact be mitigated by the way the video game is played; more specifically, whether a player is playing cooperatively or competitively (Harrington & O'Connell, 2016). Greitemeyer (2013) explored the relationship between cooperative gameplay and increased empathic concern. Greitemeyer's (2013) studies addressed whether playing a violent video game cooperatively would foster empathic concern for others, and negate the negative effects of violent video game play. To assess empathic concern in Study 1, participants were assigned to one of three conditions: cooperative team-player violent, single-player violent, and single-player neutral. The violent video game was called "Dstroy", a Bomberman-like game where the aim of the game is to kill monsters. The neutral video game was "The Settlers", a strategy game. In the single-player condition participants acted on their own, whilst teams of two battled monsters together in the cooperative condition. After approximately 15 minutes of video game-play, participants were asked to read an essay about a woman and her four children who live in Bangladesh. Participants learned about the family's strained emotional and financial situations, and were asked to rate how sympathetic, warm, compassionate, soft-hearted, and tender they felt towards the family. Empathy was measured using a self-report method on 7-point and 10-point Likert-type scales (1 = *not at all*, 10 = *very much*). Results showed that when playing a violent video game cooperatively, the cooperation ameliorated the negative effects of violence on empathy. Researchers found that participants in the single-player violent condition reported less enjoyment of the game content and had corresponding low levels of empathic concern. Teams in the cooperative-violent condition

reported higher levels of empathy, comparable to, or sometimes more than, their neutral-game-playing counterparts.

In Study 2, researchers examined the effects of cooperative gameplay relative to single-player gameplay with a neutral (non-violent) game. Participants were randomly assigned to one of two conditions, cooperative team-player neutral and single-player neutral. The game of choice was “New Super Mario Bros. Wii” where participants had to either work together to rescue the princess or achieve this goal by themselves. Post gameplay, participants were asked to read a similar essay as in Study 1, in this case adapted from DeWall and Baumeister (2006), in which the author broke a leg. Empathy was scored as in Study 1. Results showed that cooperative-neutral game play in Study 2 fostered general empathic concern for the person with the broken leg, as well as cooperative behaviour towards the person they were playing the game with. So, playing a neutral video game cooperatively increased empathic concern (Greitemeyer, 2013).

When the effects of outgroup and intergroup cooperation effects were further studied it was found that, again, even in a violent setting, cooperation managed to not only improve outgroup attitudes and pro-outgroup behaviour, but that the effects of cooperation stayed salient throughout both the non-violent and violent conditions (Adachi, Hodson, Willoughby, Blank, & Ha, 2016). Researchers assessed outgroup attitudes by providing Brock University students with a set of 12 social groups. Participants indicated their attitudes towards 11 other social groups (e.g., alcoholics, immigrants) including the desired groups of interest, University of Buffalo students and Americans. Researchers then informed participants of a partnership between Brock University and the University of Buffalo, a cross-border university 50 km away. In the intergroup condition, participants were supposedly playing a first-person shooter game (Call of Duty: Black Ops) online cooperatively through XboxLive with an American student from the

University of Buffalo; Brock University participants were deceived into thinking they were playing with an American student but were actually playing with another Brock student online via XboxLive. Attitudes were reassessed after video game playing and it was found that attitudes towards University of Buffalo students improved from pre- to post-cooperative video game playing when participants were explicitly told that they were playing with a University of Buffalo student. When players worked together and assisted each other to achieve a common goal, it ultimately fostered an environment of trust where the in-group dynamic outweighed the effects of violence and desensitization. This new in-group dynamic ultimately diverted attention away from the content and helped players focus on contextual information and cues from their real-world environment, therefore actively discounting the negative influences of the virtual world (Greitemeyer & Cox, 2013).

Similarly, other researchers have also examined the potential prosocial effects of playing cooperatively, even when playing violent video game content. In a study done by Jerabeck and Ferguson (2013), participants were assigned to one of six video game engagement conditions: antisocial (the first-person shooter, *Borderlands*, was played), violent prosocial (the universe-sandbox game, *Lego Star Wars III*, was played), and control (the non-violent puzzle-platformer, *Portal 2*, was played). Each of these conditions had a cooperative condition where the game was played on the same television with the use of split-screen mode. *Borderlands* and *Lego Star Wars III* saw the participants working together towards the same goal, whilst individuals playing *Portal 2* played the single-player campaign in a non-competitive fashion. Participants were neither encouraged nor discouraged from interacting with one another. Aggressive behaviour was measured using The Hot Sauce Paradigm (Lieberman et al., 1999). Participants were asked to select a hot sauce for the other participant and were given the option of tasting the sauces for

themselves. Sauces ranged from 1 (least hot) to 4 (most hot). The Prisoner's Dilemma (Luce & Raifa, 1957) was used to measure both prosocial and cooperative behaviour. In each of the five rounds of The Prisoner's Dilemma participants could choose one of two options: cooperation or defection. Jerabeck and Ferguson scored how many times participants cooperated (both participants won coin rewards), mutually defected (no one won coins), and engaged in single-sided defection (one participant won coins, one did not). Self-perceived empathy was measured through the use of the 28-item Interpersonal Reactivity Index (IRI; Davis, 1980). The IRI consists of questions that measure Davis' four aspects of empathy: perspective-taking, fantasy, empathic concern, and personal distress. The researchers found that playing cooperatively was associated with less aggressive behaviour (giving less spicy sauce to the other participant) regardless of whether the video game was violent or not (Jerabeck & Ferguson, 2013), although there were no effects on prosocial behaviour or self-reported empathy. Violent content did not have a significant influence on participants' aggression, prosocial behaviour, or self-ratings of empathy, regardless of play condition.

The above studies suggest that playing video games cooperatively with other people may lead to positive outcomes (such as increased empathy) and potentially mitigate some of the negative outcomes (such as increased aggression) that otherwise might occur from playing games with violent content. The increases in empathy that come from playing video games cooperatively with another person may result from fostering a bond with that person that creates a sense of closeness, a sense of sameness, and possible nascent friendship. The goal of the present study was to examine such effects by attempting a replication of a study that found increases in empathy for another person with whom people had recently cooperated to play a video game.

## **The Present Study**

The present study was a replication with extension of a study done by Martin et al. (2015). Researchers found that playing a cooperative video game with a stranger reduces stranger-induced anxiety (social stress) and elicits an emotional contagion of pain which in turn increases empathic concern for that person's pain. In one study, participants were recruited individually and played the video game Rock Band either alone or with another participant (a stranger). Participants' perceptions of pain were then tested using a 4°C cold pressor test. This procedure occurred twice – with each participant taking the test once alone, and once while sitting directly across from the stranger. After a 30-second immersion period in the cold water, participants rated the intensity and unpleasantness of their pain on a Visual Analog Scale (VAS). Martin et al. reasoned that if participants in the study empathized with the stranger, they would experience increased pain in the cold pressor test when sitting opposite the stranger. In effect, undergoing the painful experience with a person they empathized with would make them feel their own distress and some of the distress of the other person, increasing their perceptions of pain and stress. Martin et al. found that cooperative video game play (but not solo video game play) did increase the pain that participants experienced when sitting across from the stranger, as compared to when they took the cold pressor test alone. In fact, just a short period of cooperative video game play increased participants' ratings of pain when seated opposite their fellow game player to the same level that participants in a separate study of theirs had reported when seated opposite a close friend (Martin et al., 2015).

The present study attempted to replicate the initial result from the cooperative condition but removed the solo play condition and replaced it with a competitive play to see if competition with a stranger reduces empathy for said stranger. It also made use of a different video game than

the original study, to test the generality of the result. Finally, it tested to see if the result generalized to a separate empathy task – feeling empathy for another’s pain rather than directly experiencing an increase in one’s own feelings of pain.

The goal of this research was to test whether cooperative gameplay in a non-violent environment increased empathic concern for another person’s pain. Previous research found increases in empathy amongst participants in cooperative conditions, even in the presence of violent content. Cooperation seemed to elicit positive feelings, and to reinforce empathy. To maximize the ability to find an effect, cooperative game-playing was contrasted with competitive game-playing in the present study. Competition has not been greatly explored in a virtual, video game setting, but competitiveness is associated with aggressiveness and out-group dynamics, so it might intuitively lower empathy.

**Hypothesis.** It is hypothesized that there will be a significant difference between players in the cooperative game play condition from the competitive play condition with regards to their empathic concern and perceptions of a stranger’s pain.

## Method

### Participants

One-hundred and eight female participants were recruited from introductory psychology courses (Psy102 and Psy202) at Ryerson University in Toronto, Ontario. Participation counted towards the fulfillment of 1 research participation credit towards their respective course. Of the 108 participants, data from two were excluded as they were male. This was done in order to keep the sample homogenous in terms of gender. (Both the experimenter and confederate were also female; participants took part in same-gender pairs.) This resulted in a final sample size of 106 participants with 55 in the competitive condition and 51 in the cooperative condition.

Age and ethnic background are summarized in Table 1. Gender is excluded since all participants were female. Participants did not significantly differ in age between the cooperative condition,  $M = 19.43$ ,  $SD = 2.63$ , and the competitive condition,  $M = 19.51$ ,  $SD = 3.28$ ,  $t(104) = 0.13$ ,  $p = .89$ , Hedges's  $g_s = 0.03$ .

Table 1

*Demographic information of participants in both conditions.*

Variable	Condition	
	Competitive (N = 55)	Cooperative (N = 51)
Age	19.51 (3.28)	19.43 (2.63)
Ethnicity	20 (36%) White/Caucasian 14 (25%) South Asian 5 (9%) East Asian 3 (5%) Black/African-American 6 (11%) Middle-Eastern 1 (2%) Not Specified 5 (9%) Mixed 1 (2%) Native American	16 (31%) White/Caucasian 16 (31%) South Asian 5 (10%) East Asian 7 (14%) Black/African-American 3 (6%) Middle-Eastern 3 (6%) Not Specified 1 (2%) Latino

## **Overview of Procedure**

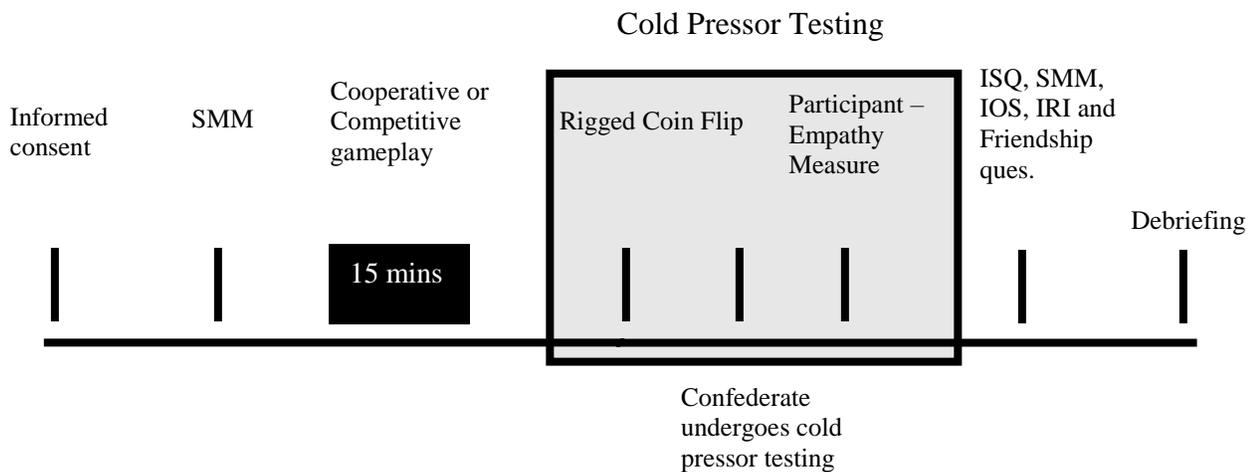
At the beginning of the study, the participant entered the room and awaited the confederate's arrival. The participant was told that they would be taking part in the study with another student; in reality this other student – hereafter the confederate – was the author of this thesis. To avoid suspicion, and for consistency, the confederate always arrived after the participant. Both the participant and confederate were then briefed on what the study would entail by a Research Assistant, who was playing the part of the experimenter. The experimenter explained the video game portion of the study as well as the ice bucket task and the participant and confederate signed consent forms. Participants were welcomed to inspect the ice bucket to verify that it was indeed cold. Next, the participant filled out a mood measure before beginning the game. Following this, participants were randomly assigned to one of two conditions: playing cooperatively or playing competitively. Participants played the non-violent, puzzle-platformer Portal 2. In both conditions, participants played the game with the confederate. When playing cooperatively, participants completed levels through the multiplayer option where they had to cooperate with the confederate to be successful. In the competitive condition, participants played the single-player campaign and competed against the confederate for the best time-to-completion of certain levels. In the competitive condition, the confederate always won. After playing Portal 2 for approximately 15 minutes, participants engaged in the ice bucket task. This was framed as the part of the experiment where the experimenter was interested in how impaired motor function due to colder temperatures might impair spatial processing and task completion in a virtual environment. The experimenter flipped a coin and relayed to the participant that this was to determine who would have to submerge their hand in the ice water. The experimenter then asked

the participant whether they wanted heads or tails - the confederate always lost the coin toss. After the winner was announced, the experimenter turned to the confederate and explained that the hand submergence would be filmed. This was done in order to have video evidence of the facial expressions made by the confederate to ensure consistency across both conditions. The confederate then submerged her dominant hand in the ice bucket.

The ice bucket task was divided in to two phases: one 30-second submergence, a recovery break where both participant and confederate filled out personality measures, and then a second 60-second submergence. This was explained to the participants as a way to ensure a proper level of numbness and motor impairment. During the 30-second submergence, the participant was asked to rate the confederate's pain, as well as their own discomfort. After this, participants were asked to rate their willingness to decrease the second, 60-second submergence for the confederate; they were given the option to subtract time from the second ice bucket submergence that the confederate still had to complete. This measure was framed as a way for the participant to give their feedback on the study's procedures and influence future usage of this task. After the forms were collected, the experimenter left the room to refill the ice bucket, and the participant along with the confederate filled out personality measures on individual computers. Once the questionnaires were completed, the experimenter handed out one final evaluation. This form asked if the participant would be willing to submerge their hand in the ice bucket for the time they subtracted from the 60-second hand submergence (if any) the confederate was due to undergo. They were also given the opportunity to change how much time they took off from this second submergence. If they agreed, participants believed that they would put their hand in the ice bucket for the amount of time they subtracted from the confederate. We then examined differences between the cooperative and competitive conditions' self-reported

ratings of empathy, the amount of time they wanted to take off of the second 60 second submergence that the confederate was to undergo, and whether or not they wished to change that amount once participants were given the option to submerge their own hand in the ice bucket. Once these measures were completed, a debriefing session followed. Participants were then asked to consent to having their data included in the study at the conclusion of the study. once the true nature of the experiment was revealed.

An overview of the procedure is illustrated in Figure 1.



*Figure 1.* Timeline of study procedures, adapted from Martin et al. (2015). SMM = State Mood Measure. ISQ = Introductory Screening Questionnaires. IOS = Inclusion of Other and Self scale. IRI = Interpersonal Reactivity Index.

## **Materials**

The current study used the same materials as the Martin et al. (2015) study, with the exception of the video game – Rock Band was replaced with Portal 2 – and modifications to the cold pressor (ice bucket) task.

**State Mood Measure (SMM).** Participants first completed the State Mood Measure (SMM), which includes 12 adjectives from the Profile of Mood States (POMS) and has four subscales: Anger, Anxiety, Happiness, and Sadness. The purpose of this scale was to measure participants' mood prior to playing Portal 2, and prior to being exposed to the ice bucket portion of the study. The SMM uses an 11-point scale ranging from 0 = not at all feeling like this to 10 = extremely. The 12 adjectives are as follows: Sad, Discouraged, Hopeless, Angry, Hostile, Irritable, Anxious, Afraid, Worried, Happy, Delighted, and Joyful. Participants completed the State Mood Measure (SMM) for a second time post game-play. Unfortunately, due to an error in the Qualtrics software used to collect these mood data, the pre-game mood measures were lost before they could be analyzed.

**Video game.** Prior to playing either competitively or cooperatively with the confederate, participants received a brief tutorial about the game Portal 2 (Valve, 2011). In this game, players have to solve physics-based and logic-based puzzles. Portal 2 is a critically-acclaimed puzzle-platformer, in which players must solve puzzles by moving objects and themselves around virtual rooms to reach the exit. The game is played in first-person and requires players to use a mouse and keyboard. During the tutorial, participants completed two introductory puzzles; if necessary, hints and guidance were provided by the experimenter so that all participants in both conditions solved these first puzzles. Individuals were told that this study was looking to quantify the differences between individual and collaborative logic and spatial problem-solving

in digital environments, to reduce suspicion of empathic concern and pain perception being the main goal of the study. The cooperative-play group played Portal 2 through the cooperative play option. They were told to work together for 15 minutes and to complete as many puzzles as they could in the given time. The competitive-play group played Portal 2 through the single player option. They were told that they were in direct competition with one another as we were testing to see whether motor impairment (to be induced later, with the ice bucket task) impacted spatial awareness and problem-solving.

**Ice Bucket Task (IBT).** This task was a variation of the cold pressor task (CPT) which involves placing a hand or forearm in cold water, a stimulus that produces a numbing sensation of mild to moderate intensity. For this study, a three-litre ice bucket was used along with 2 pounds of acrylic (fake) ice cubes. Since participants were never the ones to submerge their hand in the ice bucket, the ice inside the ice bucket was not real. However, to simulate the temperature, the ice bucket was inserted into the freezer in-between time slots in order to achieve the look of condensation on the outside of the bucket, as well as on the outer layer of acrylic ice cubes. The cubes were also mostly covered with lukewarm water. During this task, the confederate had to simulate being in pain. All the confederate's reactions (facial expressions) were recorded and rated by a group of independent raters for consistency across conditions.

**Measure Evaluation and Feedback.** During the 30-second submergence, participants were asked four questions relating to how they perceived the confederate's pain: 1) How much pain do you believe the other participant is in? 2) How distressed do you feel watching the other participant in pain? 3) In this moment, would you say that you also feel discomfort/pain? 4) How sympathetic do you feel towards the other participant? Answers were ranked on a 5-point Likert scale with answers ranging from 1(not at all) to 5(very much). After this, participants were asked

to indicate their willingness to reduce the duration of the second, 60-second submergence. A form was presented to participants with the opportunity to provide their feedback regarding the ice bucket task; it was stated that this was the first time this method was being employed in our lab. With the ostensible aim of better evaluating its usefulness and accuracy, participants were asked whether submerging the confederate's hand in the bucket for a total of 60 seconds was adequate and if they felt that the time should be changed. Participants were free to subtract any amount of time as their answers were not shared with the confederate (see Appendix E).

**Introductory Screening Questions (ISQ).** Participants completed a demographic questionnaire. The questionnaire inquired about participants' age, university program, ethnic background, and previous study involvement.

**Interpersonal Reactivity Index (IRI).** The purpose of this scale is to measure an individual's empathy-related thoughts and feelings in a variety of contexts. The IRI consists of 28 questions, divided up into four subscales: perspective-taking, fantasy, empathic concern, and personal distress. Participants answer on a scale of 0-5 coded as A (does not describe me well) through to E (describes very well). Upon completion, answers were scored on a scale of 0-5. In accordance with the scale instructions, certain questions were reverse-scored due to the nature of the statement.

**Friendship Questionnaire.** This version of a friendship questionnaire (FQ) was originally created for Martin et al.'s study. It is used to assess relationships based on the sum of nine items. In the original study, participants rated their responses on a 9-point Likert scale ranging from -4 (very much disagree) to 4 (very much agree). For the purpose of this study, the scale was altered to reflect the fact that none of the participants had previous interactions with the confederate and instead rated their responses on a collapsed 5-point Likert scale ranging from

0 (disagree strongly) to 4 (strongly agree), with 2 being a neutral response (see Appendix D).

The purpose of this questionnaire was to assess how close the participants felt to the confederate after completing both Portal 2 and the IBT. This scale was divided into the subscales used in the original Martin et al. (2015) study, these subscales include: willingness to interact with the confederate (items 1, 2 and 6), impression of the confederate (items 3, 4, and 9), and the degree of shared intimacy, trust, comfort between the participant and the confederate (items 5, 7, and 8). The items of these subscales were summed for a total score.

**Inclusion of Other and Self (IOS) scale.** This scale is a series of seven pictures of interlocking and overlapping circles. It is meant to help participants visualize their mental representations of closeness to their romantic partner, a friend, an acquaintance, or a stranger. Participants were asked to indicate interpersonal closeness through the set of circles that best approximated their feelings towards the confederate in the study (see Appendix C).

**Measure of Prior Experience with Portal 2.** Participants were asked whether they had previously played (yes/no) or completed all the single-player puzzles (yes/no) the video game Portal 2 (see Appendix E).

**Measure Validation.** Participants were asked why they chose, or chose not, to deduct time off the 60-second hand submergence. This was done to check for possible demand characteristics (see Appendix F).

**Ice Bucket Evaluation.** Participants were asked three final questions relating to the ice bucket task. At this time, they were presented with the opportunity to alter their previous answer and they were asked if they were willing to submerge their hand in the ice bucket for the amount of time they had previously removed from the 60-second hand submergence (see Appendix G).

**Debriefing.** After the subjects completed all measures they were debriefed about the true nature of the experiment and dismissed. Participants were asked if they had realised that the confederate was not a fellow participant. It is important to note that out of 106 participants, no one ever realized the other participant was in fact a confederate. Out of 106 participants, only two individuals correctly guessed the true nature of the experiment before they were told the true purpose during the debriefing.

## Results

### Randomisation Check

**Interpersonal Reactivity Index (IRI).** The means of the total and subscale scores for the IRI are shown by condition in Table 2.

Table 2

*Mean (SD) total and subscale scores for the IRI, by condition.*

IRI scale	<u>Condition</u>	
	Competitive (N = 55)	Cooperative (N = 51)
Total score	3.56 (0.38)	3.54 (0.41)
Fantasy subscale	3.47 (0.63)	3.53 (0.84)
Empathic concern subscale	4.13 (0.46)	4.09 (0.38)
Perspective taking subscale	3.71 (0.61)	3.59 (0.66)
Personal distress subscale	2.92 (0.66)	2.96 (0.56)

A multivariate ANOVA on the four subscale scores was conducted to determine whether there were any pre-existing differences between the competitive and cooperative conditions in trait empathy, as measured by the IRI. No significant effect was found,  $F(1,101) = 0.32$ ,  $p = .86$ ,  $\eta p^2 = .01$ .

### Manipulation Checks

**Friendship Questionnaire (FQ).** A multivariate ANOVA was conducted to determine whether the cooperative condition successfully induced feelings of friendliness compared to the competitive condition. A significant effect of condition was found,  $F(1,102) = 5.95$ ,  $p = .001$ ,  $\eta p^2 = .15$ . To follow-up on this, individual ANOVAs were performed on the different subscales of

the FQ. No significant effect was found for the first subscale of interaction,  $F(1,104) = 1.28, p = .26, \eta p^2 = .01$ . However, two significant effects were found for the subscales of impression,  $F(1,104) = 14.70, p < .001, \eta p^2 = .12$ , and trust,  $F(1,104) = 6.42, p = .013, \eta p^2 = .06$ . The cooperative condition resulted in greater feelings of trust,  $M = 3.00, SD = 1.06$ , and a better impression of the confederate,  $M = 2.88, SD = 0.97$ , than the competitive condition,  $M = 2.48, SD = 1.03$  and  $M = 2.23, SD = 0.75$ , respectively.

**Inclusion of Other and Self (IOS) scale.** An independent samples t-test was conducted on IOS scores to determine whether competitive and cooperative participants differed in their feelings towards the confederate. On average, participants in the cooperative condition,  $M = 2.25, SD = 1.43$ , felt closer to the confederate than participants who competed against the confederate,  $M = 1.53, SD = 0.94$ . This difference was significant,  $t(104) = -3.08, p = .003$ , Hedges's  $g_s = 0.60$ . This lends further support to the conclusion that the cooperative condition was a social bonding experience which resulted in feelings of friendliness.

### **Dependent Variables**

**Empathy Measure.** The means of each of the four questions in the empathy measure are shown by condition in Table 3.

Table 3

Mean (SD) of the four empathy measure questions, by condition.

Question	Condition	
	Competitive (N = 55)	Cooperative (N = 51)
How much pain do you believe the other participant is in?	1.82 (0.95)	2.27 (1.13)
How distressed do you feel watching the other participant in pain?	1.78 (1.13)	1.98 (1.28)
In this moment, would you say that you also feel discomfort/pain?	1.09 (1.07)	1.27 (1.13)
How sympathetic do you feel towards the other participant?	2.75 (1.10)	2.69 (1.08)

A multivariate ANOVA on these four questions was conducted. Although mean scores for three of the four questions were higher in the cooperative than in the competitive condition, no significant effect of condition was found,  $F(1,101) = 1.92$ ,  $p = .11$ ,  $\eta p^2 = .11$ .

**Additional Empathy Measure.** No significant difference was found between groups in the amount of time removed from the 60-second hand submergence  $F(1,104) = 0.03$ ,  $p = .85$ ,  $\eta p^2 < .001$ . On average, women in the competitive condition deducted a total of 22.18 seconds ( $SD = 2.09$ ) from the 60-second hand submergence compared to their cooperative counterparts who deducted a total of 22.90 seconds ( $SD = 3.26$ ).

**Ice Bucket Evaluation.** In the cooperative condition, 38 participants were willing to submerge their hand, while 10 were not. In the competitive condition, 36 participants were

willing to submerge their hand, while 16 were not. A chi-square test was performed to assess the relationship between condition and whether participants would submerge their hand for the amount of time they deducted, and showed no significant relationship,  $X^2(1, N = 100) = 1.28, p = .27$ . A further exploratory analysis revealed that 40 (76%) participants in the competitive condition would change how much time they took off compared to 33 (68%) participants in the cooperative condition. On average, individuals in the cooperative condition who decided to change their answer differed by 9.90 seconds from their original deduction, compared to participants in the competitive condition whose answers only differed by 7.31 seconds, both in the direction of taking off less time than their original answer. However, this difference was not significant,  $t(100) = -0.78, p = .23$ , Hedges's  $g_s = 0.15$ .

### **Exploratory Measures**

**Relationship Between IRI and Empathy Measure.** As an exploratory analysis, the relationships between the IRI and the four empathy questions created for this study were examined. Total IRI empathy scores were positively correlated with the last three questions of the empathy measure questionnaire. There was a positive correlation between total IRI score and how distressed participants felt watching the other participant in pain  $r = .25, p = .01$ , total IRI score and if the participant felt discomfort/pain  $r = .29, p = .002$ , and total IRI score and how sympathetic they felt towards the other participant  $r = .41, p < .001$ .

## Discussion

The aim of the current study was to investigate the effects of video game cooperation and competition on empathy. In their original study, Martin et al. (2015) explored how playing a cooperative video game, such as Rock Band, could increase empathy for a stranger's pain. Martin et al. found that playing Rock Band acted as a social bonding activity that reduced stranger-induced anxiety and increased emotional contagion, such that participants seemed to literally feel each other's pain. This study, with a somewhat modified procedure, aimed to replicate Martin et al.'s findings, and to explore how emotional contagion would contribute to empathic concern and pain perception, using a different video game and contrasting cooperative play with competitive play.

### Overview of the Results

The hypothesis that, compared to competitive game playing, cooperative game playing can increase empathy for a stranger received no support. The participants in the cooperative condition did not report feeling more pain themselves than participants in the competitive condition (unlike in Martin et al., 2015). Additionally, the cooperative participants also did not report feeling more distressed while viewing the confederate in pain, nor that they felt more sympathetic to the confederate's pain.

### **Why caused the failure to replicate Martin et al.'s result? Why did cooperative play not increase empathy?**

The present study failed to replicate the positive effect of cooperative video-game playing on empathy that Martin et al. reported. In this section, we consider four possible reasons for this failure: (1) That the experimental manipulation – playing Portal 2 cooperatively or competitively – was weak; (2) That the use of an all-female sample in the present study eliminated the effect;

(3) That in the present study, participants did not think the confederate required empathy because they did not understand how painful an ice bucket can be, and; (4) That cooperative gameplay does not in fact increase empathy.

**(1) The experimental manipulation.** One possibility is that the experimental manipulation used in the present study was not strong enough; that the participants simply were not at all influenced by whether they played the video game cooperatively or competitively with the confederate. However, the results from the manipulation checks – the Inclusion of Other in Self scale (IOS) and the Friendship Questionnaire (FQ) – speak against this interpretation of the results. Relative to the competitive condition, the cooperative condition increased participants' feelings of closeness to the confederate (as measured by the IOS) and their trust in the confederate (as measured by the FQ). The cooperative condition also gave participants a better impression of the confederate (FQ). So, it seems that the cooperative condition, relative to the competitive condition, did cause some sorts of positive feelings towards the confederate. But these positive feelings did not include feeling more empathy to the confederate when she underwent the ice bucket manipulation.

**(2) The use of an all-female sample.** A second possibility is that cooperative (relative to competitive) video game playing could increase empathy, but that this effect was reduced or eliminated in the present study by the use of an all-female sample. Women are typically perceived as, on average, being more inherently empathic than men (Gilet, Mella, Studer, Grünh, & Labouvie-Vief, 2013). The original Martin et al. study did not use an all-female sample, which could be an explanation for the difference in results.

Gender differences play an important role in research on empathy. Some researchers have speculated that women tend to empathize from a place of nurturance compared to men who are

culturally taught to be less sensitive and put up a front of bravado (Baez et al., 2017; Gabbiadini, et al. 2016). Female-to-female empathy also potentially emerges from a place of commonality, one where women feel stereotypically weaker than men. This commonality allows women to bond over a shared social status and experience, and this can be especially apparent when in the sole company of other women (Baez et al., 2017).

Over the course of their lives, men are exposed to societal factors that may limit their displays of empathy. These include encouragement to not show signs of weakness, not indulge in over-emotionality, and to feel a sense embarrassment when a woman outdoes them at a stereotypically male activity (Connell, 2002; Farrell, 2016). For these reasons, the present results, with an all-female sample, may have differed from those of Martin et al., who used a mixed sample, including both female-female pairs and male-male pairs. This possibility could be tested in future research by including male-male pairs.

**(3) The participants did not believe the confederate was in significant discomfort.** A third possibility for the failure to replicate Martin et al.'s (2015) results is that, in the present study, we did not require participants to submerge their hands into the ice bucket, whereas Martin et al. did. Martin et al.'s participants submerged their own hands into the ice bucket while they watched their video-game playing partner do the same. They therefore knew that their video-game playing partner was in some considerable discomfort, because they were experiencing similar discomfort themselves. It is possible that in the present study, the participants underestimated the confederate's pain, and therefore did not think that she really required much empathy. In the present study, the ratings that participants gave for the confederate's pain were, on average, below the mid-point of the scale, which went from 1 (no pain at all) to 5 (very much pain). It is therefore possible that the stressor that the confederate

endured was seemingly too weak to trigger much empathy; that neither the participants who played the game cooperatively nor those who played competitively really felt much distress, discomfort, or sympathy from watching the confederate in pain because they did not understand how much pain the ice bucket was supposed to induce (unlike in Martin et al., 2015). In future, we might test this possibility by creating a situation that seems to more obviously require sympathy, such as more extended physical or emotional pain.

**(4) Cooperative video game playing may not increase empathy.** A final possibility for mostly null effects of the manipulation on empathy is that, contrary to Martin et al., cooperative video game playing does not actually increase empathy. Perhaps the effect reported by Martin et al. was simply a false positive.

### **Why Didn't Competitive Game Play Reduce Empathy?**

Theoretically, any differences in empathy between the cooperative and competitive conditions in the present study could have resulted from two separate processes: (1) increased empathy from playing cooperatively (as in Martin et al., 2015), and; (2) decreased empathy from playing competitively. However, there were generally no significant differences between the empathic responses for the two groups. So, this is inconsistent not only with Martin et al. (2015), but also with previous literature that suggests that competitive video game playing might decrease empathy. In what follows we consider four potential reasons for this inconsistency with previous research (in addition to the use of an all-female sample, as already mentioned): (1) The video game was not violent in nature; (2) Participants were more focused on becoming familiar with the game rather than competing; (3) The confederate was not outwardly rude towards the participant, and; (4) The sample in the present study was all female.

**(1) The video game was not violent in nature.** One possibility for the non-significant difference in empathy scores between the conditions is that the video game itself was not violent in nature. Although possibly causing annoyance and frustration, the game is unlikely to have elicited feelings of aggression. The game revolved around solving puzzle rooms, and about using logic to progress faster than the confederate. When competing with each other, the player and the confederate were not on each other's screens in the digital world, but rather they sat next to each other; they did not directly interact in the game when competing with each other. Even though the confederate's screen was clearly visible, and the participant could see their progress, it was a solitary moment of attempting to outwit the game faster than the other. Games that have been used in studies showing increases in aggression have generally been of a more violent and directly competitive nature.

**(2) Familiarity.** Almost all participants, except for five out of 106, were not familiar with the game mechanics of Portal 2. Most reported never playing video games. Therefore, it seems likely that their focus was on learning how to maneuver the game, rather than on competing per se; it is difficult to be competitive at something you have no previous experience in. The competition was quite one-sided as the participants were trying to bring themselves up to speed, while the confederate was highly familiar with the game. If it is very clear that defeat is inevitable, people might not be as invested in the outcome and might instead focus on the experience itself rather than wasting energy and resources on competing.

**(3) The confederate was not outwardly rude towards the participant.** To keep the tone of the experiment consistent across both conditions, it was decided early on that the confederate would act neutrally towards the participant and be quite passive in nature. The confederate was quiet and only interacted with the participant if the individual asked them a

question or made a comment. If the confederate were to act in an aggressive or condescending manner, as might be more typical of a competitive video game interaction, the participants might have felt less sympathetic during the ice bucket task.

**(4) The All-Female Sample and Internalized vs Externalized Frustration.** At the end of the study, many participants in the competitive condition noted that their poor performance within the game frustrated them. They explained how watching the confederate progress through the levels with ease induced a sense of anger and annoyance. However, all these participants also expressed that their feelings of anger were not directed towards the confederate; quite the contrary, their frustration lay with themselves. They internalized their struggle and blamed their lack of progress on their own shortcomings rather than becoming irritated with the confederate (Gresham, Melvin, & Gullone, 2016). This is a contrast to how males may typically process frustration in a competitive setting (Koivula, 1995; Efthim, Kenny, & Mahalik, 2001; Fischer-Shofty, Levkovitz, & Shamay-Tsoory, 2013). Especially in the context of video games, most male players externalize their frustration and place blame on their teammates or other players who they believe are somehow being deceitful within the confines of the game. Thus, again, the all-female sample of the present study may mean that the results found here would not generalize to all gamers.

## **Final Conclusions**

The current study aimed to examine the potential effects on empathic concern for another person's pain of playing a video game cooperatively or competitively. Digital environments are becoming increasingly common places in which people, and not just youth, spend their free time. People speak to different individuals from around the globe through a variety of social applications, which include video games. Most video game studies that have been conducted in

the last decade have focused on the negative side effects of video games: addiction, depression, violence, and isolation. With this, it is important to also properly assess both the potential positive benefits. Though this study found only very limited support for effects on empathic concern, it also has several methodological limitations. For instance, the results should not be generalized to populations outside of young women. To make fully generalizable conclusions, the study would have to run eight different iterations to properly assess male and female reactions to an all-male group, a mixed-gender group, and a primarily-male group while accounting for the gender of the researcher and confederate. In addition, in future investigations of the effects of competitive game play, it would be useful to assess how people react to aggressiveness and condescending tactics from an opponent. Furthermore, this study assessed a sample of mostly non-gameplayers, which means that results would most likely differ in hardcore gamer groups. Also, future studies might investigate whether changes in empathic reactions occur when playing games from other video game genres (e.g. first-person shooters, role-playing games).

## Appendix A

### State Mood Measure

Please indicate your present mood below using an 11-point scale: 0 = not at all, 10 = extremely

---

1. Sad \_\_\_\_\_
2. Discouraged \_\_\_\_\_
3. Hopeless \_\_\_\_\_
4. Angry \_\_\_\_\_
5. Hostile \_\_\_\_\_
6. Irritable \_\_\_\_\_
7. Anxious \_\_\_\_\_
8. Afraid \_\_\_\_\_
9. Worried \_\_\_\_\_
10. Happy \_\_\_\_\_
11. Delighted \_\_\_\_\_
12. Joyful \_\_\_\_\_

## Appendix B

### Interpersonal Reactivity Index

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: A, B, C, D, or E. When you have decided on your answer, fill in the letter next to the item number. **READ EACH ITEM CAREFULLY BEFORE RESPONDING.** Answer as honestly as you can. Thank you.

#### ANSWER SCALE:

A	B	C	D	E
DOES NOT DESCRIBES ME DESCRIBE ME WELL				VERY

1. I daydream and fantasize, with some regularity, about things that might happen to me.
2. I often have tender, concerned feelings for people less fortunate than me.
3. I sometimes find it difficult to see things from the "other guy's" point of view.
4. Sometimes I don't feel very sorry for other people when they are having problems.
5. I really get involved with the feelings of the characters in a novel.
6. In emergency situations, I feel apprehensive and ill-at-ease.
7. I am usually objective when I watch a movie or play, and I don't often get completely caught up in it.
8. I try to look at everybody's side of a disagreement before I make a decision.
9. When I see someone being taken advantage of, I feel kind of protective towards them.
10. I sometimes feel helpless when I am in the middle of a very emotional situation.
11. I sometimes try to understand my friends better by imagining how things look from their perspective.)
12. Becoming extremely involved in a good book or movie is somewhat rare for me.
13. When I see someone get hurt, I tend to remain calm.
14. Other people's misfortunes do not usually disturb me a great deal.
15. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments
16. After seeing a play or movie, I have felt as though I were one of the characters.
17. Being in a tense emotional situation scares me.
18. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.
19. I am usually pretty effective in dealing with emergencies.
20. I am often quite touched by things that I see happen.
21. I believe that there are two sides to every question and try to look at them both.
22. I would describe myself as a pretty soft-hearted person.
23. When I watch a good movie, I can very easily put myself in the place of a leading

character.

24. I tend to lose control during emergencies.

25. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.

26. When I am reading an interesting story or novel, I imagine how I would feel if the events in the story were happening to me.

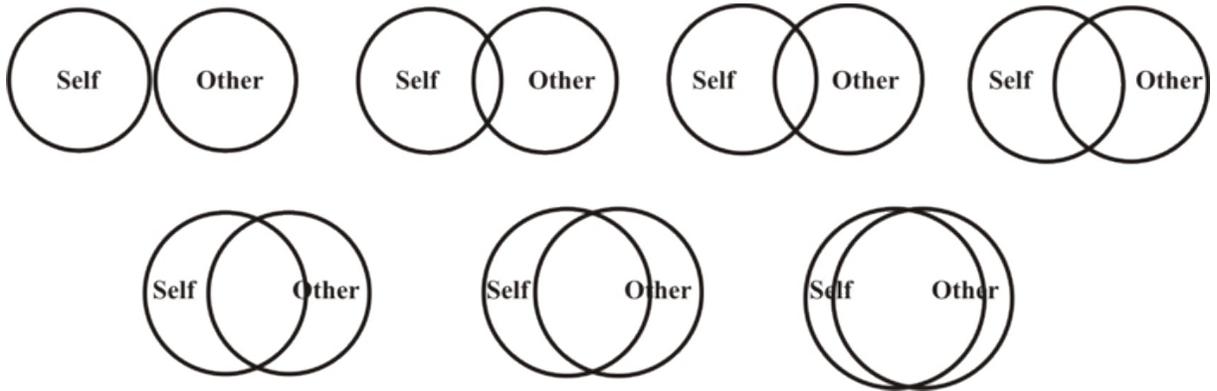
27. When I see someone who badly needs help in an emergency, I go to pieces.

28. Before criticizing somebody, I try to imagine how I would feel if I were in their place.

## Appendix C

### Inclusion of Other and Self Scale

Instructions: Please circle the picture that best describes your current relationship with your partner.



## Appendix D

### Friendship Questionnaire

The friendship questionnaire (FQ) used to assess the relationship with the other participant. The sum of the items (1–9) was calculated as a total measure of friendship. We also divided the items into subscales that reflected: a) willingness to interact with the other participant (items 1,2 and 6), b) impression of the other participant (items 3,4 and 9) and c) the degree of shared intimacy (trust, comfort) between the participants (5,7 and 8). The items of the subscales were summed for a total score.

For the items below, circle the number that indicates how much you agree that the statement describes your feelings:

	Very Much Disagree	-4	-3	-2	-1	0	1	2	3	4	Very Much Agree
1. I have met the <b>other participant</b> before	-4	-3	-2	-1	0	1	2	3	4		
2. I have spent time with the <b>other participant</b> before	-4	-3	-2	-1	0	1	2	3	4		
3. I like the <b>other participant</b> a lot	-4	-3	-2	-1	0	1	2	3	4		
4. I feel good about the <b>other participant</b>	-4	-3	-2	-1	0	1	2	3	4		
5. I feel I could talk to the <b>other participant</b> easily	-4	-3	-2	-1	0	1	2	3	4		
6. I would enjoy seeing the <b>other participant</b> again	-4	-3	-2	-1	0	1	2	3	4		
7. I feel I could trust the <b>other participant</b> with a secret	-4	-3	-2	-1	0	1	2	3	4		
8. I feel comfortable with the <b>other participant</b>	-4	-3	-2	-1	0	1	2	3	4		
9. I am friends with the <b>other participant</b>	-4	-3	-2	-1	0	1	2	3	4		

### Friendship Questionnaire (Modified)

For the items below, circle the number that indicates how much you agree that the statement describes your feelings:

0 – Very much disagree, 1 – Disagree, 2 – Neutral, 3 – Agree, 4 – Very much Agree

- |  |           |
|--|-----------|
| 1. I have met the <b>other participant</b> before                  | 0 1 2 3 4 |
| 2. I have spent time with the <b>other participant</b> before      | 0 1 2 3 4 |
| 3. I like the <b>other participant</b> a lot                       | 0 1 2 3 4 |
| 4. I feel good about the <b>other participant</b>                  | 0 1 2 3 4 |
| 5. I feel I could talk to the <b>other participant</b> easily      | 0 1 2 3 4 |
| 6. I would enjoy seeing the <b>other participant</b> again         | 0 1 2 3 4 |
| 7. I feel I could trust the <b>other participant</b> with a secret | 0 1 2 3 4 |
| 8. I feel comfortable with the <b>other participant</b>            | 0 1 2 3 4 |
| 9. I am friends with the <b>other participant</b>                  | 0 1 2 3 4 |

## Appendix E

### Measure Evaluation and Feedback

Answers questions according to the following scale:

1- not at all      2- minimal      3- somewhat      4-considerable      5- very much

1. How much pain do you believe the other participant is in?
2. How distressed do you feel watching the other participant in pain?
3. In this moment, would you say that you also feel discomfort/pain?
4. How sympathetic do you feel towards the other participant?

### Behavioural Empathy Measure

Due to this measure never being used before, we would like to gather as much feedback as possible.

You will now be given the opportunity to assess whether or not the second hand submersion should remain at 60 seconds.

How many seconds would you deduct from the 60 seconds? If you feel that the time should remain the same, please indicate this with a 0.

\_\_\_\_\_ seconds

### Measure of Previous Experience with Portal 2

1. Have you ever played the video game Portal 2? (yes/no)
2. If you answered yes to the previous question, have you ever completed (beat) the video game Portal 2? (yes/no)

## Appendix F

### Measure Validation

1. If you chose to deduct time off the 60 second hand submersion, please choose the response that adequately describes why you did so:

- I saw the other participant's discomfort, and felt that the time was too long
- I felt that the time was too long, the other participant's reaction did not impact my decision
- I did not deduct any time

2. If you chose NOT to deduct time off the 60 second hand submersion, please choose the response that adequately describes why you did not:

- I felt that it would go against the nature of the experiment, so I did not
- I did not see a reason to deduct any time-the participant's reaction did not bother me
- The other participant did not seem uncomfortable

## Appendix G

### Ice Bucket Evaluation

The next set of questions specifically deal with the ice bucket portion of the study. Please answer all applicable questions.

1. Would you have been willing to take time off the 60-second ice bucket submersion if you had to take on the time you deducted, and submerge your OWN hand?

**YES**

**NO**

2. If you had to submerge your own hand for the amount of time you deducted, would you change how much time you took off?

**YES**

**NO**

3. If you indicated YES, please specify your new answer (indicate how much time you should be taken off the 60 second submergence): \_\_\_\_\_

## Appendix H

### Time Deduction Reasoning

Table 4

*Summary of participants' time deduction reasoning.*

Variable	Condition	
Reduced Time	Competitive (N=55)	Cooperative (N=51)
Discomfort	36 (65%)	27 (53%)
Time too long, no personal impact	7 (13%)	8 (16%)
Did not reduce time	12 (22%)	16 (31%)
Did Not Reduce Time	Competitive (N=12)	Cooperative (N=16)
Experimental Integrity	6 (50%)	9 (56%)
No Reason/Reaction did not bother them	0	1 (6%)
No Discomfort Detected	6 (50%)	4 (25%)
Did not answer	0	2 (13%)

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