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A Longitudinal Investigation of the Effect of Violent Video Game Play on Capability for Suicide

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A LONGITUDINAL INVESTIGATION OF THE EFFECT OF VIOLENT VIDEO GAME PLAY ON CAPABILITY FOR SUICIDE

by

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ABSTRACT

A LONGITUDINAL INVESTIGATION OF THE EFFECT OF VIOLENT VIDEO GAME PLAY ON CAPABILITY FOR SUICIDE

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According to the interpersonal theory of suicide, for an individual to be capable of engaging in suicidal behavior they must be fearless about death and possess elevated physical pain tolerance. It is believed that such capability is developed through exposure to painful and/or provocative events, which serve to habituate the individual to fear and pain. The current study sought to expand on previous studies to examine the impact of video game play on capability for suicide. Participants (n = 63) were randomly assigned to a violent or non-violent video game condition and fearlessness about death and pain tolerance were assessed at baseline, following exposure to video game play, and at a one-week follow-up. Results revealed no significant between-group differences on changes in capability constructs across time points. Additionally, participants' perceived immersion in gameplay did not moderate the relationship between game condition and capability. Similarly, player-perspective (i.e., first- versus third-person) did not influence this relationship. Overall, these results indicate that, contrary to previous findings, brief exposure to violent video game play does not have a robust impact on capability for suicide in the short-term, nor when examined longitudinally. Limitations to the current study's design preclude definitive conclusions regarding the impact of violent video game play on capability for suicide. Exploratory results and future directions are discussed.

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DEDICATION

I would like to dedicate this document to my family. Their support and encouragement throughout my academic career has continually bolstered my resolve and has pushed me to aim higher and reach farther. I would also like to thank my friends, both at USM and in Chicago, who have been vital sources of validation, reassurance, and support throughout my graduate school experience.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
CS	Capability for Suicide
FAD	Fearlessness About Death
M	Mean
SD	Standard Deviation
SE	Standard Error

CHAPTER I - INTRODUCTION

Joiner's (2005) interpersonal theory of suicide (ITS) posits that risk for suicide is highest among those who have both a desire and capability for suicide. The desire for suicide is characterized by an individual's perception that he or she is a burden and lacks meaningful reciprocal relationships. Capability for suicide is characterized by fearlessness about death and elevated physical pain tolerance. Notably, individuals report suicidal desire at a much higher rate than the rate of non-lethal suicide attempts and death by suicide (Van Orden et al., 2010). This indicates that, although many experience suicidal desire, only some are capable of acting on that desire. Identifying this subgroup of individuals is critical for suicide prevention. One way to better understand these individual differences is to investigate the mechanisms by which individuals become capable of overcoming the innate drive for self-preservation. Heightened capability for suicide (CS) has been found in individuals who have experienced painful and provocative events, including witnessing violence or engaging in non-suicidal self-injury (Joiner, 2005). These events decrease fear of death and increase physical pain tolerance through habituation. This progression is consistent with Solomon's (1980) opponent process theory, which posits that repeated exposure to a harmful stimulus can cause an individual, over time, to have a reduction in the initial aversive reaction to the stimulus and an increase in a reaction of the opposite valence to that stimulus.

One potential experience through which CS may be increased is violent video game play. Most research on violent video game play has focused on its relationship with aggression and aggressive outcomes. Violent video game play has been associated with negative behavioral and cognitive outcomes, such as increased aggression and aggressive

cognitions, as well as physiological arousal, which often precedes aggressive actions (Anderson et al., 2004; Anderson & Bushman, 2001; Sherry, 2001). Lin (2013) found that, when keeping violent content constant across mediums, violent video game play led to higher levels of aggression and physiological arousal than did watching a recording of violent video game play, or watching violent movie clips. This study highlights the idea that the interactivity of violent video game play has a unique and significant impact on aggressive outcomes (Lin, 2013). Similarly, a study by Bushman & Anderson (2002) found that individuals who played a violent video game versus a non-violent video game had higher expectations that others would have hostile and aggressive thoughts, feelings, and behaviors. Notably, the development of such hostile expectation biases over time has been associated with aggression in some individuals (Bushman & Anderson, 2002).

Furthermore, Uhlmann and Swanson (2004) found that violent video game play led participants to implicitly associate themselves with aggressive actions and traits on an implicit association task, indicating that aggressive self-views can be automatically learned following exposure to violent video games. The long-term effects of violent video game play were examined in a study by Möller and Krahé (2009), who found that participant-reported violent video game exposure at baseline predicted physical aggression at follow-up 30 months later. Expanding on this study, Willoughby, Adachi, and Good (2012) surveyed high school students each year, following them from grades nine through twelve. They found that sustained violent video game play over this time was associated with sharper increases in aggressive behavior relative to those with less sustained play. Another study investigated the effect of violent video game exposure on aggression and discovered that acute and chronic exposure led to increased aggression,

even when controlling for personality variables that may predispose an individual to seek out violent media content (e.g. hostility and antisocial personality traits; Bartholow, Sestir, & Davis, 2005). Finally, a study by Hasan, Bègue, Scharkow, and Bushman (2013) found that participants engaging in violent video game play over a three-day period experienced a cumulative increase in aggression, relative to those who played non-violent video games over the same period. The results of these studies imply that violent video game play has both automatic and long-term implications for aggression and has implications for different forms of aggression (e.g. hostile expectations, physical aggression, aggressive associations).

Further evidence has been found to suggest that violent video game play has a desensitization effect. In a study by Carnagey, Anderson, and Bushman (2007), participants playing a violent video game experienced decreased physiological reactions (decreased heart rate and galvanic skin response) to subsequent video footage of real-life violence, than did those individuals playing a non-violent video game. Another study investigated the desensitizing effect of violent video game play by examining event-related potentials (ERPs) in the brain, specifically P300 amplitudes (Bartholow, Bushman, & Sestir, 2006). Typically, large P300 amplitudes are observed when an individual experiences "stimuli that are evaluatively inconsistent with a preceding context" (Bartholow et al., 2006, p. 533). For example, an individual viewing neutral images would be expected to have a large P300 amplitude response to the insertion of a violent image, because that image is inconsistent with the previously viewed images. Researchers found that individuals who reported higher violent video game exposure not only had decreased P300 amplitudes in response to violent images specifically (as

opposed to negative images generally) but also displayed more aggression in a subsequent task. These results indicate that individuals with higher violent video game exposure display desensitization to violent images specifically, rather than desensitization to all negative images. Furthermore, the results indicate that individuals who display desensitization to violent images also tend to display higher levels of aggression (Bartholow et al., 2006). These examples of physiological desensitization to violence may contribute to an individual's habituation to painful and provocative events and may also decrease fear of death. Consequently, it may be that such processes contribute to the development of high CS.

In contrast, several studies have shown that violent video game use does not increase aggression. For example, Ferguson et al. (2008) demonstrated that participants who were randomly assigned to a violent video game condition did not display short-term increases in aggression relative to those assigned to a non-violent video game condition. This study also found that self-reported exposure to violent video games had no direct effect on criminally violent behavior when controlling for the effects of exposure to family violence. Both of these findings indicate that violent video game use does not have significant short-term or long-term effects on aggressive behavior, which contradicts past research in this area (Ferguson et al., 2008). Furthermore, a meta-analytic study examining violent video game literature found that, when controlling for publication bias, violent video game use was not associated with higher levels of aggression (Ferguson, 2007).

Additionally, Ferguson and Rueda (2010) demonstrated that short-term randomized exposure to violent video games did not lead to increased aggression and

also, long-term exposure to violent video games actually resulted in decreased hostile feelings and depression. Similarly, Bösche (2010) found that laboratory-controlled exposure to violent video games resulted in the priming of aggressive cognitions *and* positive cognitions, suggesting that violent video game use may lead to positive and negative outcomes, as opposed to strictly negative outcomes in the form of increased aggression. Despite these contradictory findings, there appears to be a great deal of support for the association between violent video game play and aggression. Past research has identified the existence of this relationship in correlational, experimental, and longitudinal studies and evidence has been obtained by a variety of means, such as behavioral, physiological, and brain activation measures. The present study acknowledges this empirical disparity but operates in favor of the overwhelming evidence and theoretical support for the association between violent video game exposure and aggression.

Violent video game use has not only been associated with aggression but has also been implicated in its development. Importantly, past research has identified that aggression is a risk factor for suicide (Conner, Duberstein, Conwell, Seidlitz, & Caine, 2001; Conner, Duberstein, Conwell, & Caine, 2003; Nock & Marzuk, 2000). The general aggression model (GAM) posits that the effects of situational factors and personal factors on aggression are mediated by cognition, affect, and arousal (Anderson & Bushman, 2002). This mechanism suggests that violent media, which contains many situational factors for aggression (e.g. aggressive cues and incentives for aggression) leads to aggressive action through the activation of aggressive cognitions, and/or aggressive affect, and/or increased physiological arousal (Anderson & Bushman, 2002). Using the

GAM as a basis, Dewall, Anderson, and Bushman (2011) posited that CS can be acquired through media violence, just as capability for aggression towards others can be acquired through this medium.

Two studies have investigated violent video game play and its potential relationship to the components of CS: physical pain tolerance and fearlessness about death. One examined the effect of laboratory-controlled violent video game play on a subsequent measure of pain tolerance and found that those engaging in violent video game play had elevated pain tolerance relative to those engaging in a non-violent speed-racing game (Teismann, Förtsch, Baumgart, Het, & Michalak, 2014). Another study by Gauthier and colleagues (2014) examined the effect that participant-reported violent video game play had on fearlessness about death and pain tolerance. Results indicated that there was a positive relationship between self-reported violent video game exposure and fearlessness about death but not pain tolerance. Between these two studies, there appears to be some support for a relationship between violent video game play and increased CS. However, neither study measured change in pain tolerance before and after video game play, so the actual effect of the violent game itself is not clear. Additionally, participants were assessed at only one-time point, so it is unclear whether effects on CS are long-term. In order to more precisely understand the effect of violent video game play on suicide-related variables, these shortcomings must be addressed. Importantly, the goal of the current study is not to establish a link between violent video game use and suicidal desire. As previously mentioned, the ITS identifies two components that are necessary for suicide: suicidal desire and CS (capability for suicide). The present study seeks to

identify and expand understanding of the pathways to increased capability for suicide and does not implicate violent video game use in the development of suicidal desire.

In examining the effect of violent video game play on CS, certain aspects of the technological medium may offer insight as to how and why changes are observed. Two such aspects of video game play are telepresence and player-perspective. Telepresence (often referred to as "presence") is a subjective perception of immersion and involvement in a game, combined with a decreased awareness of the technology throughout the experience (International Society for Presence Research, 2000). Presence has been shown to affect the ways in which individuals perceive and respond to stimuli in a technological environment (Lombard & Ditton, 1997). High presence has been suggested to increase the extent to which players identify with violent video game characters and has been connected to increased levels of hostile thought (Tamborini, Eastin, Skalski, & Lachlan, 2004; Tamborini, 2000). As a component of the GAM, the relationship between hostile thought and presence is noteworthy (Anderson & Bushman, 2002). Farrar, Krcmar, and Nowak (2006) found that increased perception of involvement in a video game (an aspect of play related to presence) led to increased hostility and aggression, indicating that those individuals who felt more immersed had more aggressive outcomes. Similarly, Nowak, Krcmar, and Farrar (2008) found that individuals with high presence while playing a violent video game had higher levels of hostility, which led to more verbal aggression and physically aggressive intentions. However, Nowak et al. (2008) also found that violent video game play versus non-violent video game play did not have a direct effect on reported levels of presence. These studies indicate that the level of subjective immersion an individual experiences while playing a violent video game can affect their

responses to that game; namely, it can increase aggressive and hostile responses. In applying this notion to suicide and the general aggression model, it is possible that these aggressive/hostile responses can serve to increase pain tolerance and fearlessness about death (Dewall et al., 2011), at least temporarily. Yet to be determined conclusively is whether violent versus non-violent video game play effects CS and whether or not presence plays a role in that relationship.

Player-perspective is another aspect of violent video game technology that can influence aggressive outcomes. It has been found that first-person player perspective (relative to third-player perspective) increases identification with violent video game characters, which can lead to aggression outside of the gaming context (Tamborini et al., 2004; Cohen, 2001). Identification with violent video game characters gives individuals the opportunity to have a vicarious experience – an experience that is likely heightened when the individual is carrying out actions "as" a character, rather than "with" the character. Increased identification with a violent media character can lead to learning aggressive behaviors, empathizing with a character's goals, and adopting character attitudes and behaviors (Cohen, 2001; Eastin, 2006). Thus, individuals may vicariously experience the painful and provocative events that happen to characters in violent video games and develop heightened CS as a result. A study by Montag et al. (2011) found that individuals with experience playing first-person shooter games had decreased brain activation in the lateral prefrontal cortex when compared to control participants with no gaming experience. This decreased activation reflects a dampening of emotional and cognitive responses to aversive stimuli and may indicate that repeated exposure to first-person violent video gaming causes habituation to carrying out violent acts and viewing

violent images in the game (Montag et al., 2011). This type of habituation to carrying out violence in the first-person may be one of the ways that violent video game play decreases fear of death. Additionally, decreased brain activation in response to carrying out and viewing violence may also be a mechanism by which pain tolerance is heightened in individuals who play violent video games.

Playing violent video games in the first-person player perspective (as opposed to watching others play in the first-person perspective) has also been associated with increased sense of presence (Tamborini et al., 2004). This provides additional support for the notion that first-person perspective connects players with the violent video game experience. In contrast, Farrar et al. (2006) found that participants endorsed lower levels of obtrusiveness of the medium (a component of presence indicating increased focus in the game), specifically when playing in the third-person versus the first-person perspective. This suggests that some individuals actually feel more immersed in the video game when playing in the third-person perspective, rather than the first-person perspective. Discrepancies in perspective-related video game presence highlight the need for further clarification, specifically with regards to how these elements of technology influence not only aggressive outcomes directed towards others, but also outcomes related to increased CS and suicide.

Current Study

To determine whether violent video game play increases CS, the current study utilized a random-assignment experimental design to assess changes in fearlessness about death and pain tolerance across four conditions and three-time points. The manipulated variables within conditions were violent or non-violent video game play and first or third

person perspective. Baseline and post-manipulation measurements of fearlessness about death and pain tolerance were assessed and participants returned to the laboratory after a one-week interval for follow-up measurements of these variables. It was anticipated that there would be an interaction effect of condition by time on mean levels of fearlessness about death and pain tolerance (CS), such that individuals in the violent video game condition would display the highest CS. Furthermore, it was expected that these observed group differences in CS would be most pronounced as levels of presence increase. Lastly, it was believed that individuals in the first-person perspective violent video game condition would display the highest mean levels of fearlessness about death and post-manipulation pain tolerance compared to all other conditions. Based on past findings, it was believed that the effects seen at the second time point would be maintained over time (Möller & Krahé, 2009; Willoughby et al., 2012; Bartholow et al., 2005; Hasan et al., 2013), particularly for participants who reported engagement in violent video games in the week between time points, as repeated exposure to painful/fear-inducing events may be necessary to effect long-term changes in the CS (Van Orden et al., 2010).

CHAPTER II – METHODS

Participants

Participants were 63 undergraduate students recruited through the University of Southern Mississippi SONA subject pool. The target sample size for this study was 120 participants, with approximately 30 participants in each of the four experimental conditions. Participants were randomly assigned to experimental conditions, with 26 participants assigned to the non-violent video game conditions and 33 assigned to the violent video game conditions. This sample was 60.3% female and ages ranged from 18 to 55 (M = 22.16, SD = 6.08). This sample was comprised of primarily White (49.2%) and African American (44.4%) participants, with a smaller proportion identifying as Hispanic/Latino (4.8%) and Asian/Pacific Islander (1.6%). The reported sexual orientation of this sample was primarily heterosexual (82.5%), with 9.5% of the sample identifying as bisexual, 6.3% identifying as homosexual, and 1.6% identifying as "other." Most of the sample (52.3%) endorsed a total annual family income of $50,000 or less. The vast majority of the sample reported that they had never been married (90.5%), with 4.8% reporting that they were currently married, 3.2% reporting that they were divorced, and 1.6% reporting that they were separated. The majority of the sample reported that they current live with one or more other people (76.2%). In terms of employment, 44.4% of the sample reported that they were currently unemployed, whereas 42.9% of the sample reported that they were employed part-time and 12.7% reported that they were employed full-time. See Table 1 for demographic information across each experimental condition.

Table 1

Demographic Information by Condition

	Non-Violent	Violent	Third-Person Non-Violent	First-Person Non-Violent	Third-Person Violent	First-Person Violent
n	26	33	14	12	16	17
Sex						
Male	46.2	36.4	28.6	66.7	18.8	52.9
Female	53.8	63.6	71.4	33.3	81.3	47.1
Race						
White	57.7	42.4	42.9	75.0	50.0	35.3
African American	38.5	48.5	50.0	25.0	50.0	47.1
Hispanic/Latino	3.8	6.1	7.1	0	0	11.8
Asian/Pacific Islander	0	3.0	0	0	0	5.9
Orientation						
Heterosexual	76.9	87.9	78.6	75.0	87.5	88.2
Homosexual	7.7	6.1	7.1	8.3	6.3	5.9
Bisexual	11.5	6.1	7.1	16.7	6.3	5.9
Other	3.8	0	7.1	0	0	0
Marital						
Never Married	84.6	97.0	85.7	83.3	100.0	94.1
Married	7.7	3.0	14.3	0	0	5.9
Separated	3.8	0	0	8.3	0	0
Divorced	3.8	0	0	8.3	0	0
Employment						
Unemployed	38.5	42.4	42.9	33.3	56.3	29.4
Part-Time	50.0	42.2	42.9	58.3	31.3	52.9
Full-Time	11.5	15.2	14.3	8.3	12.5	17.6

Note: Information presented in percentages.

Measures

Structured Interview

Lifetime Suicide Attempt Self-Injury Count (L-SASI; Linehan & Comtois, 1996). The L-SASI is a clinician-administered structured interview designed to assess factors related to lifetime suicide attempts and non-suicidal self-injury. This measure is designed to provide a high level of detail regarding the intent of each self-injurious act and the level of lethality of the act, as well as the contextual factors surrounding that event, allowing the clinician to gain further insight as to the nature of an individual's history. The L-SASI has had no psychometric evaluation to date. However, this structured interview is derived from the Suicide Attempt Self-Injury Interview (SASII; Linehan, Comtois, Brown, Heard, & Wagner, 2006), which has shown excellent interrater reliability. The SASII has also shown good validity when comparing ratings by non-medical interviewers using the SASII and medical personnel providing an evaluation. The SASII demonstrated adequate validity when comparing ratings by independent interviewers using the SASII and therapist notes of episodes of self-injury and/or suicide attempts. The SASII was also found to have good validity when comparing participant-reported medically treated parasuicide episodes and participant medical records. Furthermore, the SASII demonstrated good consistency between self-injurious episodes reported by participants during the interview and self-injurious episodes recorded by participants in diaries in the preceding months (Linehan et al., 2006).

Self-Report Questionnaires

Video Game Questionnaire (Anderson & Dill, 2000). The Video Game Questionnaire is a self-report measurement of an individual's exposure to video games.

This questionnaire asks participants to report the five video games they have played the most and to rate the amount of time they played each game, the violent content of each game, and the violence of each game's graphics. Participants are asked to rate the amount of time they played each video game across a 7-point Likert scale ranging from 1 – "Rarely" to 7 – "Often". Participants are asked to report their frequency of play for each game across four time periods in their life, ranging from 7th grade to the present. Violent content and violent graphics are also assessed on a 7-point Likert scale, with higher scores indicating higher violent content and violent graphics. The violent content and violent graphic ratings for each game are summed and multiplied by the "how often" rating provided by the participant. These scores are calculated for each game and averaged to obtain an index of exposure to violent video games. An overall video game composite score is calculated by averaging the amount of time playing video games across each of the four time periods (present, 11th & 12th grades, 9th &10th grades, and 7th & 8th grades). This questionnaire has displayed adequate to good internal consistency in past research (Gentile, Lynch, Linder, & Walsh, 2004; Bartholow et al., 2005; Anderson & Dill, 2000). The internal consistency in this sample was .90.

Video Game Use Questionnaire. Participants were asked if they have played the video games that are being used in the current study and, if they have played these games, to estimate the amount of time (in hours) that they have spent playing each game. Participants were administered a similar questionnaire at one-week follow-up, in which participants were asked to report the amount of time (in hours) they have spent playing video games in the last week, the amount of time spent playing video games with violent

content, and the amount of time spent playing each of the video games being used in the study.

Acquired Capability for Suicide Scale-Fearlessness About Death (ACSS-FAD; Bender et al., 2011; Ribeiro et al., 2014). The ACSS-FAD is a 7-item self-report questionnaire that assesses an individual's lack of fear regarding death. This measure is based on a broader 20-item self-report questionnaire, which assesses self-perceived pain tolerance in addition to fearlessness about death. Participant responses are recorded on a 5-point Likert scale ranging from 0 - "not at all like me" to 4 - "very much like me", with higher scores indicating greater fearlessness about death. Past research has found strong support for the discriminant and convergent validity of the ACSS (Van Orden, Witte, Bender, & Joiner, 2008; Bender et al., 2011) and has found similar support for the ACSS-FAD (Ribeiro, 2014). The internal consistency in this sample was .85.

Presence Questionnaire (PQ; Witmer, Jerome, & Singer, 2005). The PQ measures the extent to which an individual experiences immersion and involvement in an alternative environment. This 24-item measure asks participants about their perceived immersion in the mediated experience. Responses are recorded on a 7-point Likert scale, with higher scores indicating higher levels of presence. Individual factors measured in the PQ are Involvement, Adaptation/Immersion, Sensory Fidelity, and Interface-Quality. The PQ has demonstrated high reliability and high internal consistency, as well as good discriminant and convergent validity (Witmer & Singer, 1998). The internal consistency for the full-scale PQ in this sample was .90.

Behavioral Measures

Cold Pressor Task. The cold pressor task is a measurement used to assess an individual's pain threshold and pain tolerance. Participants were presented with a container of cold water, which was maintained at 2 degrees Celsius. They were asked to submerge their dominant or non-dominant hand in the water (hand order was counterbalanced between and within participants) and were instructed to notify the researcher, but keep their hand submerged when they began to feel pain or discomfort. Then, they were instructed to remove their hand when the pain or discomfort could no longer be tolerated. The submersion time for participants' pain threshold and pain tolerance were recorded. This task allows participants to experience discomfort comparable to chronic pain and has demonstrated good reliability and validity (Mitchell, MacDonald, & Brodie, 2004; Edens & Gil, 1995). Furthermore, the cold pressor task offers the advantage of a high degree of participant control over the pain/discomfort they experience, as the participant is able to remove him or herself from the stimulus (Edens & Gil, 1995).

Stimulus Materials

Individuals who participated in the violent video game condition played Counter-Strike: Global Offensive (Hidden Path Entertainment & Valve Corporation, 2012). Based on the most recent data available (November 2014) this game is the most played online video game with a content rating of "Mature", due to blood and intense violence (Dimaranan, 2014; Entertainment Software Rating Boards, 2014). This game allows for both first-person shooter mode as well as third-person mode, so it was used across both perspective conditions (Prosody, 2014). Individuals who participated in the non-violent

video game condition played the speed racing video game Grid Autosport (Codemasters, 2014). Based on the most recent data available (June 2014), Grid Autosport is a popular online video game with a Metacritic rating ("Metascore") of 78 out of 100. This score represents a weighted average of all known critic reviews for this particular game (Metacritic, 2014). Grid Autosport also has a content rating of "Everyone", indicating that it does not involve aggressive content (Entertainment Software Rating Boards, 2014). This game also allows for both a first-person and third-person perspective, so it was used across both perspective conditions (Robinson, 2014).

Procedure

Participants were undergraduate students at USM recruited via the USM SONA subject pool. Due to the study's use of pain induction equipment (cold pressor), exclusionary criteria included individuals with Raynaud's Disease. Participants were also informed that no analgesics or alcohol could be consumed within the eight hours before participation in the study, as this may interfere with accurate pain tolerance measurement. Furthermore, participants were made aware that this study has a baseline and follow-up phase and that these exclusionary criteria apply to both phases of the study. Interested and eligible participants came to the laboratory where they were given the chance to provide informed consent for participation in the study. Participants were then randomly assigned to a condition, each of which involved playing a video game at baseline. The conditions varied in terms of violence (inflicting violence on a human or a non-violent speed racing game) and perspective (first vs. third person). Next, a series of self-report questionnaires were completed, participants were administered a structured interview regarding past self-injurious behaviors, and they also took part in a baseline pain

tolerance task. Afterward, participants received a 5-minute introduction to their assigned video game and then played the video game for 20 minutes, followed by a second administration of the pain tolerance task and additional self-report questionnaires. Approximately one week later, participants returned to the laboratory where self-report questionnaires were administered, followed by a final pain tolerance task. All participants were compensated with six-course credits for their participation in the baseline phase of this study, as the protocol took approximately two hours to complete. Three additional course credits were awarded to participants who completed the hour-long follow-up session, which took place approximately one week after the baseline session.

Data Analytic Procedure

Mixed design analyses of covariance (ANCOVAs) were utilized to assess for between group differences on fearlessness about death and post-manipulation pain tolerance across video game condition, as well as within group differences on those variables across three-time points. All analyses controlled for prior violent video game exposure, pre-manipulation pain tolerance, and other empirically derived covariates. In these mixed design ANCOVAs, post-manipulation pain tolerance and fearlessness about death served as the repeated measures dependent variables and experimental video game condition (violent vs. non-violent) served as the independent variable. Linear regressions were performed in order to assess whether the observed group differences (between video game conditions) in CS are most pronounced at higher levels of presence. Lastly, mixed design ANCOVAs were performed to determine whether player perspective moderates the relationship between video game condition and changes in CS, such that participants in the first-person perspective violent video game condition display higher mean levels of

CS variables compared to all other conditions. Whenever possible, analyses used a repeated measures design to assess for changes in the dependent variables across time. All hypotheses using a mixed design ANCOVA required two analyses (one with fearlessness about death as the dependent variable and one with pain tolerance as the dependent variable). The hypothesis using linear regression analyses required four analyses (one for each of the two dependent variables across two post-manipulation time points). This resulted in a total of 10 analyses.

CHAPTER III - RESULTS

Correlations and descriptive data for the variables used in primary analyses are located in Table 2

Table 2

Descriptive Statistics and Correlations for Variables Utilized in Primary Analyses

	1	2	3	4	5	6	7	8	9
1. Video Game Condition	-								
2. Pain – Time 1	.22	-							
3. Pain – Time 2	.15	**.74	-						
4. Pain – Time 3	*.32	**.82	**.98	-					
5. FAD – Time 1	-.13	.21	*.30	.22	-				
6. FAD – Time 2	-.10	.15	*.28	.16	**.86	-			
7. FAD – Time 3	-.15	.20	.24	*.28	**.85	**.81	-		
8. Presence	*-.33	.03	.00	.00	**.36	**.35	.21	-	
9. Video Game Exposure	-.02	.22	.02	.05	.11	.00	.08	.09	-
Mean	-	49.73	38.31	42.84	13.78	13.98	14.30	87.36	15.49
SD	-	70.33	61.59	67.24	6.64	6.25	6.48	19.98	6.57
Minimum	0	7	7	7	0	1	0	42	5
Maximum	3	300	300	300	26	28	25	145	33.25

Note: * = significant at the p < .05 level; ** = significant at the p < .01 level; Pain = Pain Tolerance; FAD = Fearlessness About Death.

Selection of Covariates

To select covariates for the primary analyses, demographic variables were examined to determine which were associated with the independent variable (video game condition), the dependent variables (fearlessness about death and pain tolerance), and the moderator variables (presence and player perspective). Categorical demographic variables were assessed using analyses of variance (ANOVAs), whereas continuous demographic variables were assessed using zero-order correlations. Results of these analyses revealed significant between-group differences on sex when assessed across all four video game conditions, but not when assessed across violent versus non-violent video game conditions. As a result, sex was utilized as a covariate in all analyses where player perspective serves as a moderating variable. An additional ANOVA revealed significant between-group differences on fearlessness about death by sex, such that males displayed higher mean levels of fearlessness about death, both at time point one and time point three. As a result, sex was utilized as a covariate in all analyses in which fearlessness about death was a dependent variable. Similarly, an ANOVA showed significant between-group differences on fearlessness about death by marital status, such that those who reported that they have never been married had higher mean levels of fearlessness about death at time point one than did individuals who reported that they are currently married. Therefore, marital status was used as a covariate in analyses with fearlessness about death as a dependent variable.

The a priori intent was to include lifetime video game exposure as a covariate in all analyses, in order to determine if changes in CS (fearlessness about death and pain tolerance) could be attributed to the experimental video game condition, as opposed to

differences in lifetime exposure to video game play. However, correlational analyses revealed that lifetime video game exposure was not significantly associated with video game condition, nor was it significantly associated with the dependent variables (fearlessness about death and pain tolerance) or moderating variables (presence and player perspective). Consequently, lifetime video game exposure was not included in subsequent analyses as a covariate.

Primary Analyses

Results of the mixed design ANCOVAs revealed a non-significant interaction between video game condition and time on fearlessness about death [$F(2, 92) = .498$, $p = .609$; see Table 3 and Figure 1]. Further investigation of the main-effects also revealed non-significant results; specifically, there was a non-significant main effect of video game condition on fearlessness about death [$F(1, 46) = 1.358$, $p = .250$] as well as a non-significant main effect of time on fearlessness about death [$F(2, 92) = 1.611$, $p = .205$].

Table 3

Mean Differences Between Video Game Conditions on Fearlessness About Death

		Time 1	Time 2	Time 3		
	n	M (*SE)*	M (*SE)*	M (*SE)*	*F*	*p*
					.498	.609
Non-Violent	26	15.42 (1.40)	15.16 (1.32)	15.44 (1.34)		
Violent	33	13.20 (1.23)	13.77 (1.16)	13.01 (1.18)		
					.712	.641
Non-Violent, Third-Person	12	16.26 (1.88)	16.02 (1.78)	16.40 (1.80)		
Non-Violent, First-Person	10	14.22 (2.22)	13.92 (2.09)	14.18 (2.12)		
Violent, Third-Person	14	13.88 (1.85)	14.53 (1.74)	12.54 (1.77)		

Violent, First-Person	14	12.67 (1.77)	13.16 (1.67)	13.56 (1.69)

Note: M = estimated marginal means; *SE* = standard error.

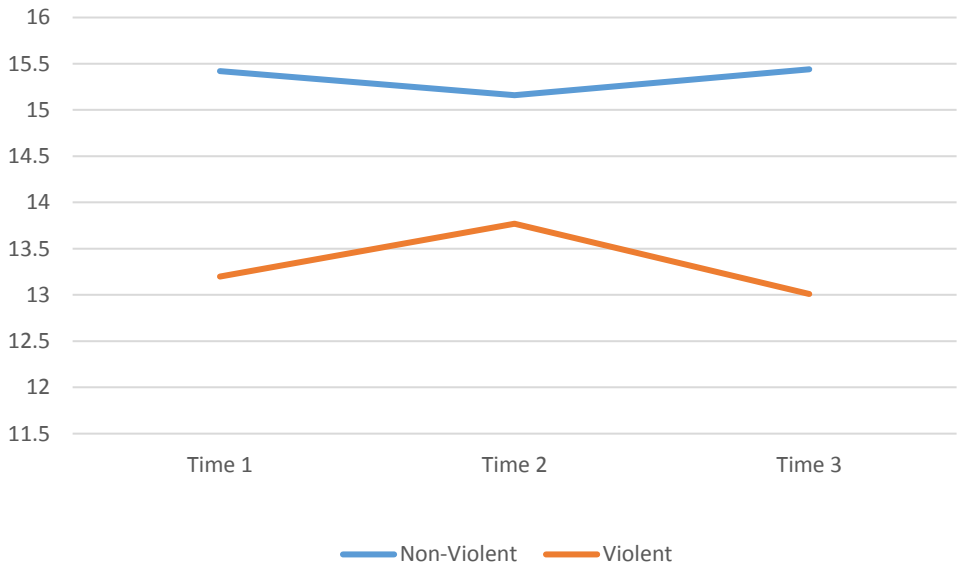

Figure 1. Violent versus Non-Violent Conditions on Fearlessness About Death

The effects of video game condition and time on pain tolerance were also examined. Results revealed that the interaction of video game condition and time on pain tolerance was non-significant [$F(2, 100) = .307$, $p = .736$; see Table 4 and Figure 2]. Further examination of the main effect of video game condition on pain tolerance was also non-significant [$F(1, 50) = 1.945$, $p = .169$]. However, results did reveal a significant main effect of time on pain tolerance [$F(2, 100) = 5.395$, $p = .006$]. Simple-first planned contrasts were used to assess for differences in mean levels of pain tolerance following the experimental manipulation. Therefore, mean levels of pain tolerance at time points two and three (post-manipulation time points) were compared to mean levels of pain tolerance at time point one. These contrasts revealed significant differences between post-manipulation time points and time point one on pain tolerance, regardless of condition

[$F(1, 50) = 6.242$, $p = .016$]; [$F(1, 50) = 4.912$, $p = .031$]. In both of these contrasts, pain tolerance was significantly decreased at post-manipulation time points when compared to time one pain tolerance.

Table 4

Mean Differences Between Video Game Conditions on Pain Tolerance

		Time 1	Time 2	Time 3		
	n	M (*SE*)	M (*SE*)	M (*SE*)	*F*	*p*
					.307	.736
Non-Violent	23	40.65 (15.49)	24.57 (12.12)	23.44 (12.01)		
Violent	29	60.69 (13.79)	47.45 (10.80)	51.14 (10.70)		
					.737	.621
Non-Violent, Third-Person	13	26.98 (20.47)	19.47 (15.91)	21.60 (15.63)		
Non-Violent, First-Person	10	54.35 (24.17)	28.44 (18.79)	22.70 (18.45)		
Violent, Third-Person	14	48.29 (20.50)	30.48 (15.93)	32.62 (15.65)		
Violent, First-Person	15	74.98 (19.17)	65.12 (14.91)	70.50 (14.64)		

Note: M = estimated marginal means; *SE* = standard error

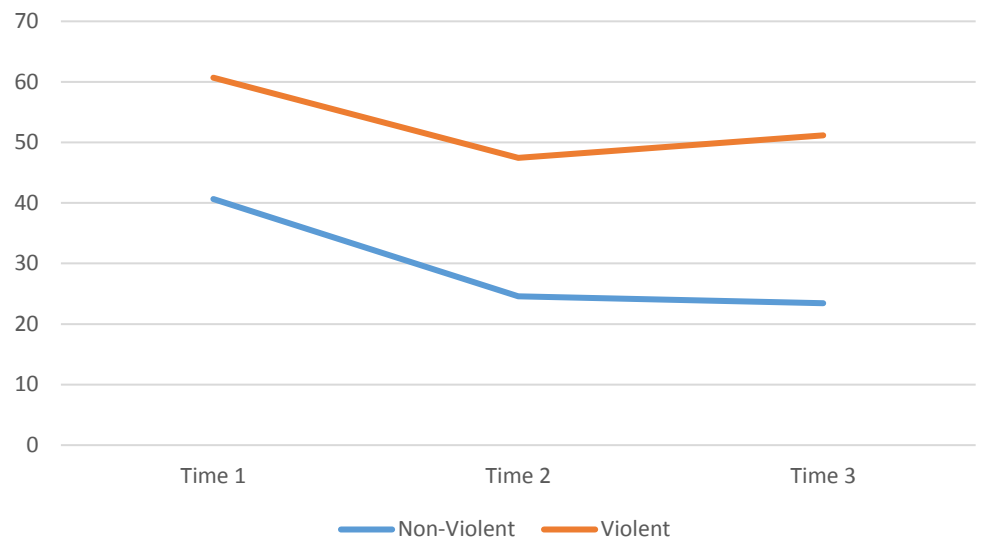

Figure 2. Violent versus Non-Violent Conditions on Pain Tolerance

Further analyses were conducted to determine whether presence and player perspective influenced the relationship between video game condition and changes in CS. First, linear regressions were used to investigate the potential moderating effect of presence through the PROCESS macro for SPSS (Hayes, 2013). Results revealed non-significant interaction effects between video game condition and presence on post-manipulation fearlessness about death, both at time point 2 (t = .027; p = .567) and time point 3 (t = .045; p = .438). There were also non-significant interaction effects between video game condition and presence on post-manipulation pain tolerance, both at time point 2 (t = .151; p = .806) and time point 3 (t = -.044; p = .935).

Finally, the moderating effect of player perspective on CS was examined. Mixed design ANCOVAs were used to examine between group differences across conditions and across time points, specifically investigating whether or not there were significant differences on CS variables between the first-person violent video game condition and all other experimental conditions at post-manipulation time points. These mixed design

ANCOVAs revealed non-significant group differences on post-manipulation pain tolerance [$F(3, 47) = 1.627$, $p = .196$], as well as non-significant group differences on post-manipulation fearlessness about death [$F(3, 44) = .657$, $p = .583$; see Tables 3 & 4 and Figures 3 & 4].

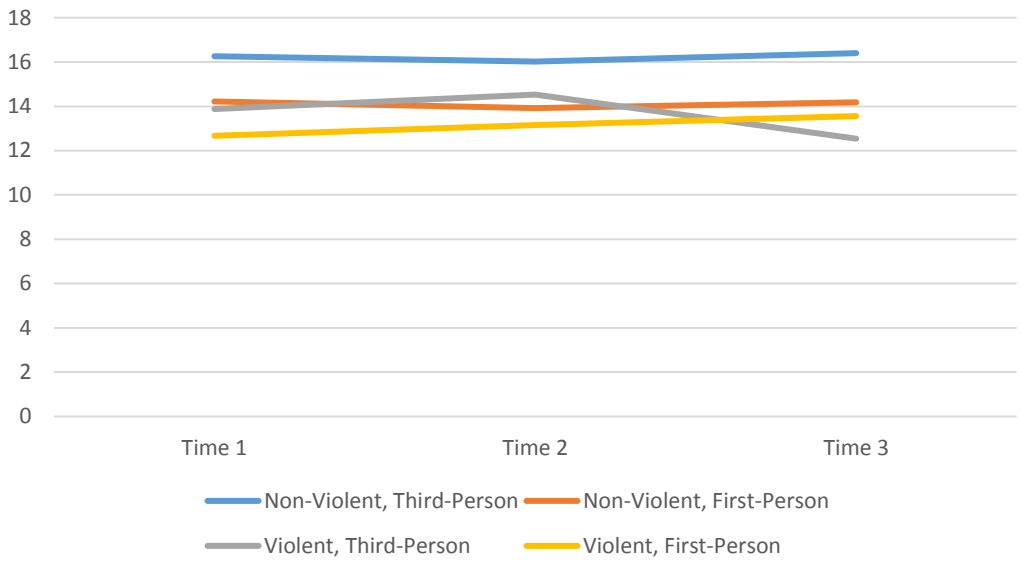

Figure 3. Four Conditions on Fearlessness About Death

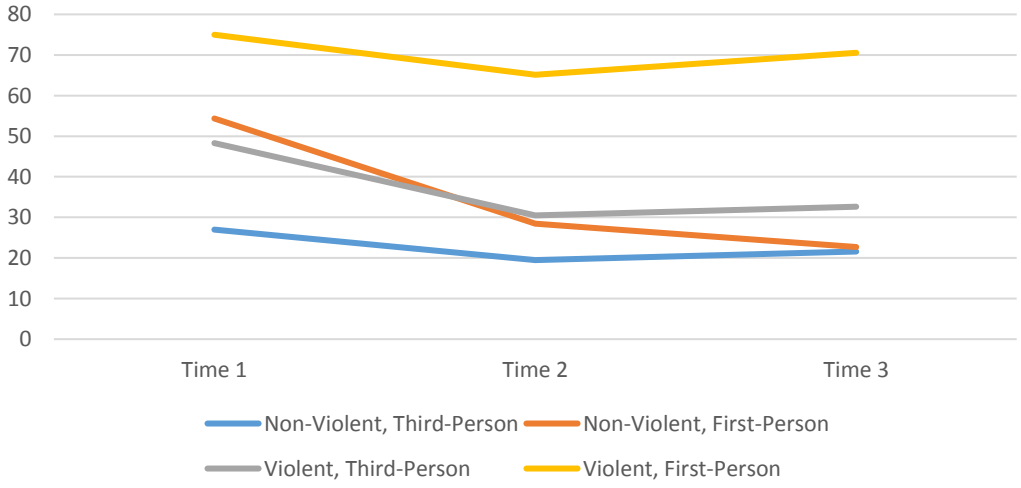

Figure 4. Four Conditions on Pain Tolerance

CHAPTER IV – DISCUSSION

This study aimed to investigate the impact of video game play on capability for suicide (CS). Specifically, this study sought to examine whether violent video game play, as opposed to non-violent video game play, would result in increased physical pain tolerance and decreased fear of death, both immediately following exposure to violent video game play, as well as one week later. The results of this study largely failed to support the primary hypotheses, indicating that exposure to violent video game play does not cause changes in CS over time and does not result in significantly different changes in CS when compared to exposure to non-violent video game play.

Contrary to the first hypothesis, participants exposed to violent video game play did not report significantly higher mean levels of fearlessness about death at either of the post-manipulation time points than did participants exposed to non-violent video game play. This indicates that, following exposure to video game play, those in the violent video game condition did not exhibit greater changes (increases or decreases) in their self-reported fear of death than did those who were in the non-violent video game condition. Similarly, individuals in the violent video game condition did not exhibit significantly greater physical pain tolerance than individuals in the non-violent video game condition at either of the post-manipulation time points. This indicates that, following exposure to video game play, those who were exposed to the violent video game did not exhibit greater changes (increases or decreases) in their behavioral pain tolerance than those who were exposed to the non-violent video games. Although unsurprising given the lack of significant between group differences on CS variables, the moderating effects of presence and player perspective were also non-significant. This

indicates that neither how immersed you are in a video game, nor whether you are playing in the first-person perspective increases the strength of the relationship between video game condition and CS variables.

There are several possible reasons for the lack of significant findings. First, there were several design-related limitations that may have contributed. The desired sample size for this study was 120 participants, with 30 participants in each of the four experimental conditions. Due to time constraints and recruitment difficulties, however, only half of that sample was obtained for the current study. As a result, the current analyses may be insufficiently powered to detect between-group differences on CS, particularly when examining group differences between all four experimental conditions. Comparisons between violent and non-violent video game conditions had approximately 30 participants per condition, which is relatively consistent with the sample size of a previous experimental design examining the effect of violent video game play on pain tolerance (Teismann et al., 2014). Consequently, analyses comparing violent and non-violent video game conditions in the current study likely had low but sufficient, power to detect group differences on CS.

Several other design-related considerations are worth noting. First, it is possible that the constructs relevant to CS are highly stable and not susceptible to change over short periods of time. Specifically, it is possible that 20 minutes of video game exposure is insufficient to effect changes in fearlessness about death and physical pain tolerance. Although such an explanation is inconsistent with the findings from a similar study conducted by Teismann and colleagues (2014), it is possible that repeated exposure to such stimuli is necessary to effect meaningful changes in CS (Van Orden et al., 2010).

Furthermore, mean levels of fearlessness about death and pain tolerance within each condition were quite stable across time points (see Tables 3 and 4). This may provide further support for the notion that 20 minutes of video game play is an insufficient amount of exposure to elicit notable changes in CS. Additionally, because CS variables were largely stable across the three-time points, there was very little variance to account for, which made it especially difficult to detect significant changes in the current underpowered sample.

Another possible explanation for this study's null findings is that testing effects influenced the lack of significant between-group differences on CS. For example, participants were administered the ACSS-FAD three separate times. Following the initial administration, it is possible that participants became familiar with this measure and may have attempted to match their answers from the first administration to their answers on subsequent administrations of the ACSS-FAD. Such testing effects would have resulted in very little variance across time points and across video game condition. If testing effects did account for the lack of significant between-group findings on fearlessness about death, then future studies should refrain from using the ACSS-FAD as a repeated measures assessment. This measure was not explicitly designed to capture short-term changes in fearlessness about death, so it is possible that it cannot adequately assess state changes in this construct. Another possible testing effect may have come in the form of experimental fatigue. Similar to the ACSS-FAD, participants were asked to perform the cold pressor task three separate times. Following the initial administration, it is possible that participants learned that this task is aversive and, upon subsequent administrations, had decreased motivation to reach their true pain tolerance. Experimental fatigue on this

task may account for relative decreases in mean levels of pain tolerance across time points, regardless of experimental condition.

Another possible interpretation of the null findings is that the hypotheses are incorrect and violent video game play does not cause increases in CS, in the moment or over time. It is possible that, when accounting for baseline fearlessness about death and pain tolerance, one-time, brief violent video game play does not have a meaningful impact on CS. This result stands in contrast to findings from a previous study by Teismann and colleagues (2014). Using an experimental design very similar to the one used in the current study (e.g., random assignment to violent or non-violent video game conditions, 20-minute video game play exposure, cold pressor task to assess pain tolerance), Teismann and colleagues (2014) found significant between-group differences on pain tolerance, with participants in the violent video game condition displaying significantly higher mean levels of physical pain tolerance than participants in the non-violent video game condition. Such findings were not replicated in the current study, as there were no significant between-group differences on pain tolerance. However, Teismann and colleagues (2014) only assessed post-manipulation pain tolerance and did not account for baseline levels of pain tolerance. As a result, it is possible that the two groups significantly differed on pain tolerance prior to being exposed to the experimental stimulus. Had Teismann and colleagues (2014) assessed the extent to which the stimulus itself caused a change in pain tolerance, it is possible that their results would have mirrored the current findings. As previously noted, it is also possible that repeated assessment of participant pain tolerance contributed to decreased motivation on the cold pressor task. Consequently, post-manipulation pain tolerance in the current study may be

artificially deflated due to testing effects, rather than a failure of the stimulus to elicit the expected changes.

The current findings also stand in contrast to findings from a previous study by Gauthier and colleagues (2014). In this study, they found that participant-reported violent video game play was positively related to fearlessness about death, as measured by the ACSS-FAD. This finding indicated that individuals who had more experience playing violent video games also had higher fearlessness about death (Gauthier et al., 2014). There are several possible explanations for the discrepant results between the current study and the study conducted by Gauthier and colleagues (2014). First, the current study sought to examine the impact of brief exposure to violent video game play on fearlessness about death, whereas Gauthier and colleagues (2014) examined lifetime exposure to violent video game play. Due to the fact that repeated exposure to such a stimulus may be necessary to effect notable changes in fearlessness about death (Van Orden et al., 2010), the non-significant findings in the current study may simply indicate that 20 minutes of exposure is an insufficient dose of the stimulus to effect changes in fearlessness about death. Importantly, however, Gauthier and colleagues (2014) relied upon participants' retrospective self-report regarding prior exposure to violent video game play and examined its relationship to participants' fearlessness about death in a cross-sectional design. Although this is a valid way to evaluate the impact of violent video game play, it lacks experimental control and cannot determine causality. The current study attempted to assess this same relationship using a more rigorous experimental design that would allow the researcher to infer a causal relationship. Therefore, the lack of significant findings in the current study may indicate that violent

video game play does not significantly impact changes in fearlessness about death. Instead, it is possible that Gauthier and colleagues' (2014) findings indicate that individuals who have higher levels of fearlessness about death are more likely to engage in lifetime violent video game play.

Interestingly, these findings appear to align more closely with studies which have found non-significant effects of violent video game play on aggression (Ferguson et al., 2008; Ferguson & Rueda, 2010). Using an experimental design, Ferguson and colleagues (2008) found that individuals who engaged in violent video game play, as opposed to non-violent video game play, did not experience short-term or long-term increases in aggression. Similarly, a randomized trial by Ferguson and Rueda (2010) found that short-term exposure to violent video games did not result in increased aggression. Although aggression and CS are not synonymous constructs, similar mechanisms (e.g., physiological and cognitive desensitization to violent content) are believed to underlie the relationships between violent video game play and both aggression and CS. Consequently, the current findings may lend support to the notion that violent video game play does not activate such mechanisms and/or does not lead directly to negative outcomes.

Despite the fact that the main hypotheses of this study were not supported, several interesting findings did emerge. One such finding was that the correlation between fearlessness about death and pain tolerance was significant at time points two and three, but not at time point one ($r = .28$, $p < .05$ at times 2 and 3; see Table 2). This indicates that, following exposure to video game play, participants' self-reported fearlessness about death and observed physical pain tolerance were related to one another, whereas they

were not related to one another prior to video game exposure. Notably, participants generally displayed decreases in mean levels of fearlessness about death and pain tolerance at time points two and three (see Table 3 and Table 4), but it was only after this decrease occurred that the variation in fearlessness about death was related to the variation in pain tolerance. Although causality cannot be inferred, the fact that these relationships emerged post-manipulation may suggest that exposure to video game play (violent or non-violent) activates one or more mechanisms underlying both of these components of CS. It is possible that exposure to such provocative stimuli increases the salience of death and pain and makes it more likely for individuals to behave or respond in a way that is similar across these two constructs. The value of this finding is limited due to the fact that it was not anticipated and is based only on correlational results. Future studies should consider assessing state changes in the relationships between variables relevant to CS, before and after exposure to a painful or provocative event. If there are underlying mechanisms linking the constructs relevant to CS, we may expect to see relationships appear and/or strengthen following exposure to a painful or provocative event. Such information would help broaden our understanding of the way one can develop CS and may also assist in identifying and refining the essential components of this construct for future research.

Another notable finding that emerged was the significant relationship between post-manipulation (time two) fearlessness about death and presence ($r = .35$, $p < .01$; see Table 2). This indicates that, following exposure to video game play, how immersed and involved participants felt during the video game was positively related to self-reported fearlessness about death. This finding could indicate that those with high fearlessness

about death are able to engage with and become immersed in video game play more readily than those with low fearlessness. This interpretation may help to explain who seeks self-exposure to video game play and how impactful those experiences are on CS. As previously mentioned, such an interpretation may also account for the results obtained by Gauthier and colleagues (2014). Alternatively, this finding could suggest that increased immersion in video game play, regardless of video game content, leads to heightened fearlessness about death. If true, this would imply that video game play may only lead to CS among those who feel immersed when playing video games. This could also have an impact on the types of games targeted for intervention, with the immersive quality of a game being a more salient target than violent content.

Interestingly, the current study found a negative association between presence and video game condition ($r = -.33$, $p < .05$; see Table 2). Based on the coding of video game conditions from least violent (third-person non-violent) to most violent (first-person violent), this suggests that presence was lower among participants in the violent video game condition. The presence of this negative relationship could indicate that it was easier to become immersed in a non-violent racing game than it was to become immersed in a violent shooting game. This is understandable, given that participants likely have more real-world experience with driving than they do with shooting, making it easy to engage with the content of the non-violent game. However, it could also be the case that participants were resistant to immersion in violent games. It is possible that the shocking and/or aversive content makes it difficult or unpleasant to identify with the characters or goals of the game. Therefore, violent video game play may only increase CS among those who are willing or able to become immersed in the violent content. Again, it is important

to interpret these findings with caution given their posthoc nature and the limitations inherent in correlational research. Nevertheless, these findings do provide some insight as to possible mechanisms involved in any risk conferred through video game play. Based on these preliminary findings, it appears as though the relationship between video game play and CS is more complex than previous studies have implied.

Although the primary hypotheses were not supported, this study provided important information regarding the impact of video game play on CS. Primarily, it provided preliminary evidence indicating that, when accounting for baseline fearlessness about death and pain tolerance, brief violent video game play does not have a robust impact on CS. The current results do not appear to support the notion that violent video game exposure, as opposed to non-violent video game exposure, causes significant changes in fearlessness about death and physical pain tolerance. Replication of these findings would suggest that violent video game play does not meaningfully influence CS. Such support for the current findings may indicate that intervention efforts targeted at this medium among those at risk for developing suicidal desire are unnecessary. Importantly, however, the design and sample size limitations faced by the current study preclude definitive conclusions regarding the effect of violent video game play on CS. In order to more conclusively assess the impact of violent video game play on fearlessness about death and physical pain tolerance, future studies should consider the impact of testing effects on the repeated assessment of such constructs. Specifically, it may be worthwhile to measure fearlessness about death and/or physical pain tolerance using different methods of assessment at baseline and post-manipulation, in order to decrease the likelihood that participants will become fatigued and/or try to match their previous

responses across assessments. Alternatively, a more concerted effort could be made to space out assessments of CS constructs or performance on these assessments could be incentivized in some way to account for the possibility of testing effects. In addition to these considerations, future studies should be mindful of the importance of adequate sample size when attempting to draw conclusions about the impact of brief exposure to violent video game play on CS. Future studies may also consider experimentally manipulating repeated exposure to violent video game play to determine the extent to which additional doses of the stimulus have more meaningful impacts on fearlessness about death and pain tolerance.

Although the results of the current study found that neither presence nor player perspective significantly moderated the relationships between video game play and changes in CS, future studies should continue to assess for factors that may impact the strength of the relationship between video game play and CS. Contextual factors, such as immersion in a game and the specific characteristics of the game itself (i.e., player perspective) may impact the extent to which violent video games cause changes in fearlessness about death and pain tolerance. Investigation of such factors provides more fine-tuned information about which aspects of this virtual medium confer risk and for whom violent video games may be most problematic. Violent media, and violent video games specifically, continue to be controversial topics. Continued examination of the effects of violent video game play on CS can help researchers and policy makers understand the true risks inherent in exposure to this form of media and can help direct future intervention efforts that may be relevant to suicide prevention.

APPENDIX A – IRB Approval Letter

THE UNIVERSITY OF
SOUTHERN MISSISSIPPI

INSTITUTIONAL REVIEW BOARD
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NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
  Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: 16012001
PROJECT TITLE: A Longitudinal Investigation of the Effect of Violent Video Game Play on the Acquired Capability for Suicide
PROJECT TYPE: New Project
RESEARCHER(S): Claire Houtsma
COLLEGE/DIVISION: College of Education and Psychology
DEPARTMENT: Clinical Psychology
FUNDING AGENCY/SPONSOR: N/A
IRB COMMITTEE ACTION: Expedited Review Approval
PERIOD OF APPROVAL: 01/28/2016 to 01/27/2017
Lawrence A. Hosman, Ph.D.
Institutional Review Board

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