Effects of Visual Perspective in Video Games on Activity Construals and Behavioural Intentions

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

The perspective from which people view or imagine a situation has downstream effects on the construal of that situation and subsequent cognitions and behaviours. My study suggests that these effects from the mental and visual imagery literature carry over to the domain of interactive media, specifically video gaming. I manipulated whether 82 undergraduates played a motorcycle racing video game from either the first-person perspective or the third-person perspective and had participants rate the perceived risk of a list of 24 different inherently risky activities and then rate their willingness to engage in the same activities. Participants who had played the video game from the third-person perspective perceived the activities as more risky than participants in the first-person perspective. Furthermore, participants in the third-person perspective condition reported less willingness to engage in the risky activities than those in the first-person condition. Mediation analysis confirms that the effect of perspective on willingness to take risks is mediated by risk perceptions. Implications are discussed for the literatures on visual perspective, action construal and detrimental effects of video gaming.

Table of Contents

List of Figures

CHAPTER 1

INTRODUCTION

It may come as no surprise that video games are a popular form of entertainment for today's youth. As many as 88% of American youth between the ages of 8 and 18 years old play video games at least occasionally (Gentile, 2009), with additional figures suggesting that as many as 80% of the videogames on the market contain at least some form of violence (Dietz, 1998; Children Now, 2001). The popularity of video games and the fact that such a large proportion of them portray violent or undesirable behaviour has led to widespread concern from parents, the media, and researchers regarding the use of video games by adolescents and young adults.

The State of Video Game Research

This concern over the potentially detrimental effects of video games on behaviour is not just reflected in wave upon wave of media stories reporting on the fear of parents and school boards that video games are negatively influencing children's behaviour. Nor is it solely in the domain of political rhetoric aimed at restricting the sales of certain games to minors or the outright banning of specific games or attempted legal action taken against game developers and the stores who sell the games (*Brown et al. v. Entertainment Merchants Association et al, 2011*). A burgeoning literature studying the negative behavioural effects of video games shows that researchers' interest in the potentially undesirable effects of video games has been growing as fast as the video game industry itself. Indeed researchers have been concerned about this problem for nearly as long as we've had video games: the first studies of violent video games looked at video games whose 8-bit graphics and simple polygonal design seem laughably tame by today's gaming standards (Anderson & Ford, 1986).

The recurring theme throughout this literature is a nearly-unanimous conclusion: playing violent videogames increases aggression and aggressive behavior (Anderson et al., 2007; Anderson et al., 2010; Anderson & Carnagey, 2009; Barlett, Branch, Rodeheffer & Harris, 2009; Barlett, Harris & Baldassaro, 2007; Bluemke et al., 2010; Carnagey, Anderson & Bushman, 2006; Dill & Dill, 1998; Fischer et al.,

1

2010; Kirsh, S., 2006; Tamborini et al., 2001). Longitudinal studies (Anderson et al., 2007), correlational studies (Gentile et al, 2004), experimental studies (Anderson & Dill, 2000), and studies using multiple measures of aggression (Anderson et al., 2007) have all replicated the same basic effect using dozens of different games, to the point where a popular introductory psychology textbook has stated that "the impact of video games is… larger than such widely accepted findings as the impact of calcium intake on bone mass" (p. 448, Olson, Breckler & Wiggins, 2008). But while these studies focus on violence in video games in general, there is a specific genre of violent video game that, more than other genres of violent games, tends to be the focus of media, parental and research concern: the first-person shooter.

Perhaps because of the increased immersion associated with first-person games, or maybe due to the media's focus on the popular first-person shooter game *Doom* in the wake of the 1999 Columbine school shootings in Littleton, Colorado (Cullen, 2009; Kirsh, 2006), research focusing on video game violence, media attention and parental concern has had a disproportionate focus on first-person shooter video games. One could argue that this may be excessive focus on what amounts to only a small part of the video game market. More importantly, and crucial to the research discussed in this thesis, is the question of what the literature has to say about other video game genres, specifically third-person games. Relatively speaking, the video games and aggression literature has little to say on the subject.

Insights from the Visual Perspective Literature

Conversely, the visual perspective literature has much to say about the effects of perspective on cognition, motivation, and behaviour and, crucially, the different effects a third-person perspective can have relative to the first-person perspective (Libby & Eibach, 2011). Specifically, the research on visual perspective suggests that the perspective from which a scene is observed, whether it's a mental image, a photograph, or a video, can influence perceptions of the scene's meaning and emotional reactions (Robinson & Swanson, 1993), cognitions (Abelson, 1975; Nigro & Neisser, 1983), goal pursuit (Fishbach et al., 2006; Taylor et al., 1998) and future behaviour (Libby & Eibach, 2011; Libby et al., 2007). This research demonstrates that the perspective from which an image is viewed determines whether it is understood in a bottom-up fashion, in the case of first-person views, or a top-down fashion, in the case of third-person

views. In the first-person perspective the viewer observes a scene as if they were viewing the scene through their own eyes or through the eyes of the main actor in the scene. These first-person scenes tend to be represented in terms of the concrete features of the pictured situation and the phenomenological evocations of the scene, leading to a bottom-up processing and conceptualization of the scene (Libby & Eibach, 2011). In the third-person perspective, rather than viewing the scene through the eyes of the actor in the scene, the participant instead views the scene as an outsider, observing the character in the scene from a distance as if through the lens of a video camera. In third-person scenes, where meaning is constructed in a top-down fashion, participants construe the pictured event in a more abstract manner, in relation to its broader context, which may include the consequences of the action or its broader meaning and implications (Libby & Eibach, 2011).

 Visual perspective and construal level. To illustrate the concept of construing the same situation in either a concrete or abstract manner, imagine the action of locking the front door of one's house. Focusing on bottom-up, concrete aspects of the situation, the scene could be construed as putting a key in the lock and turning it, closing the door, and hearing the lock slide into place. A more abstract level of construal however would involve statements about securing one's belongings, being conscientious, and being of a cautious mindset. Based on the visual perspective literature just described, asking someone to imagine the activity of "locking your house" from the first-person perspective makes them more likely to use descriptions and mental representations of the activity that include concrete descriptions than they would if they had been asked to imagine the same activity but from the third-person perspective – watching themselves locking the front door of their house.

 Far from being a trivial distinction, an action's level of construal has downstream effects on an activity's performance (Vallacher et al., 1992), influences self-regulation (Freitas et al., 2004) and self-presentation (Vallacher et al., 1987), is correlated with ratings of personal agency and inclinations towards impulsive actions (Vallacher & Wegner, 1989), and influences subsequent behaviour (Wegner et al., 1986). Perhaps most relevant to this thesis, however, the level of an action's identification can influence the meaning of an action and its "incorporation into one's identity structure", suggesting that the

significance of an action for the self is influenced by its level of identification, with higher/ more abstract levels of action identification influencing higher-level identities in one's identity structure (Vallacher & Wegner, 1987). As such, returning to our example of locking the door, the visual perspective research has found that, whether participants were asked to mentally imagine themselves locking their door, to imagine watching themselves locking their door, or whether they looked at pictures of someone locking their door from either the first- or third-person perspective, the third-person visual perspective should lead to more abstract construals of the action (Libby & Eibach, 2011).

In a typical mental imagery study, participants are asked to recall a past action, and are told to do so from either the first or the third person perspective. They are also asked to indicate what specifically they recall of the scene. Those who imagine the scene from the first-person perspective recall more concrete information than those in the third-person perspective, indicating sensations, affective reactions and psychological states. When participants recall a situation from the third-person perspective, they report more abstract information than those in the first-person perspective, including information about environment and others in it and contextual information about the scene. This effect holds whether participants are instructed to construct mental images or are looking at actual photographs (McIssac & Eich, 2002).

Visual perspective and processing style. The visual perspective literature makes a strong case for the differences in processing styles elicited by first- and third-person perspectives, suggesting that the third-person perspective is more likely than the first-person perspective to cause people to incorporate relevant contextual information into their understanding of the scene or action's meaning (Libby & Eibach, 2011) or to link the action to their self-concept (Libby & Eibach, 2002). For example, Valenti & MacGregor (2011, cited in Libby & Eibach, 2011) instructed participants in a study to imagine themselves letting a friend copy off their exam and to do so from either the first- or third-person perspective, that is, either imagining the scene through their own eyes or to imagine watching themselves in the scene as an outside observer would see it, respectively. Participants were given contextual information about the friend who they were allowing to copy off of them: they were told either that this

friend had recently gotten a new television, or told that this friend had recently gone through an emotionally painful break-up with their significant other. For participants in the third-person perspective condition, the contextual information about the friend was incorporated into the meaning of the scene as it was imagined by participants. As a result, participants were less likely to report that the cheating was immoral when it was for a friend going through heartbreak relative to those who read that the friend was getting a television. Importantly, no such distinction between the two contextual information conditions was made for participants imagining the same scene from the first-person perspective, suggesting that the contextual information played less of a role in how the situation was construed or the higher-level meaning of the activity (Valenti & MacGregor, 2011, cited in Libby & Eibach, 2011). The importance of visual perspective, then, goes beyond simply recognizing that different perspectives lead to a focus on different details of the scenes. Perspective causes people to not only define actions and situations differently, but to process information about the meaning and relevance of those scenes in fundamentally different ways (Shaeffer, Libby & Eibach, 2011).

Visual perspective and behaviour. As a result of differential processing styles elicited by different visual perspectives, there are demonstrable downstream behavioural effects of visual perspective (Libby & Eibach, 2011). For example, the meaning of a situation or an image involves, among other things, analyzing it with regard to its consequences and broader implications for the self and for others beyond the immediate situation. In turn, the implications or consequences of a situation or image can influence how people respond to it – perhaps by asking "what are the ramifications of this action" or "are the broader implications positive or negative" (Libby & Eibach, 2002). Given that a third-person perspective is more likely than a first-person perspective to elicit a higher-level construal of the action or scene which should, in turn, evoke a greater consideration of the implications of a situation, it should be apparent that visual perspective can moderate the effect of an image or scene on behaviour (Libby & Eibach, 2011). If an action's broader implications are desirable, picturing that action from the third-person perspective should amplify those desirable implications and increase motivation to engage in that action more than if the same action were pictured from a first-person perspective. As an example of this

5

ability for visual perspective to influence behaviour, Libby et al (2007) manipulated whether voters on the eve of the 2004 US Presidential election imagined themselves voting the next day from the first- or third- person visual perspective. The third-person perspective, more than the first-person perspective, led participants to construe the act of voting in terms of their own goals and identities as American citizens, for whom voting is a critical part of civic responsibility. As a result of sensitizing participants to these broader desirable implications of voting, the third-person perspective actually increased their likelihood of voting the next day compared to participants in the first-person condition. Indeed, the effect of perspective on rates of voting was mediated by its effects on participants' construal of the broader implications of voting.

If the effects of third-perspective on motivation are due to its effect on people of sensitizing them to an activity's broader implications, it should be the case that simulating an activity with negative implications or consequences (e.g. imagining a dangerous activity with potentially fatal consequences) from the third-person perspective should reduce a person's motivation to engage in that activity relative to the first-person condition. To my knowledge, this hypothesis has not been tested in the visual perspective literature.

Study Overview

It may seem, given how much the visual perspective literature has to say on the subject of first- and third-person perspectives influencing attitudes, behaviour and cognition, that it should also include studies beyond the mediums of mental imagery, photographs and videos. Specifically, given the immersion associated with video games and the interactive nature of the medium (Przybylski et al., 2010), the visual perspective literature should have a lot to say on the subject. However, there has been little work investigating whether the effects of visual perspective on attitudes, behaviour and cognition demonstrated in mental imagery, photography and video studies carry over to the interactive domain of video games. Thus, while the literature provides us with a paradigm with which to study the potential effects of video game visual perspective on behaviour – desirable and undesirable – the research has not been done to date.

Using predictions from the visual perspective literature and applying them to the domain of video games and undesirable behaviour, we can make several informed hypotheses about potential differences in the effects of first- and third-person video games on behaviour. Libby and colleagues demonstrated that a desirable behaviour pictured from the third-person perspective should lead to an increase in that behaviour due to the action being construed with regard to its broader implications and desirable consequences. Following the same logic, we would predict that an undesirable action pictured from the third-person perspective should have the opposite effect and reduce the undesirable behaviour due to the same mechanism: the undesirable behaviour is construed in terms of its broader implications and negative consequences. Since people are motivated to think about themselves in a positive light (Sedikides, 1993), it should follow that an activity with undesirable consequences or negative implications would be perceived as less desirable and thus one's interest in it should be reduced to dissociate oneself from it. Playing a videogame from the third person perspective should cause participants to construe the event in a more abstract, top-down fashion, which includes incorporating environmental and contextual cues into the meaning of the activity. Playing from a first-person perspective conversely, should lead to a more concrete construal of the activity, with a focus on sensory or phenomenological aspects of the activity. The combination of contextual and consequential information about the activity elicited by the third-person perspective combined with one's motivation to see oneself in a positive light should lead to reduced motivation to engage in the activity if it is undesirable.

Due to the near-exclusive focus of the media and the video game literature on the first-person shooter genre, and in light of the video game literature showing the increase in aggressive cognition and behaviour as a result of playing video games, there may be a tendency for the layperson and scientist alike to adhere to relatively uninformed beliefs about the nature of visual perspective effects based solely on intuition (e.g. that visual perspective is of little consequence so long as undesirable behaviour is being simulated). In contrast, informed by the visual perspective literature, I predict that the third-person perspective should lead to fewer undesirable cognitions and behavioural intentions than the first-person perspective. Much of the research on visual perspective supports this hypothesis, though research which

7

has focused on factors such as immersion of the player into the game may support this hypothesis but propose a different mechanism. For example, there is evidence showing that the first-person perspective is typically seen as more immersive than the third person perspective (Hsu, 2010). As a result of this increased immersion, participants may construe the activity at a more concrete level, focusing more on the sensations involved rather than the consequences or broader implications of the activity. Such a model posits that an effect of visual perspective would be driven by the immersion of the first-person perspective, not by a consideration of the broader implications and consequences afforded by the third-person perspective. It is with this intent of testing my prediction against the preceding alternatives that I conducted the study described below.

CHAPTER 2

A STUDY INVESTIGATING HOW VISUAL PERSPECTIVE AFFECTS BEHAVIOURAL

INTENTION

In this study I tested whether people playing a video game portraying a risky activity from the third

person perspective would report greater perceptions of risks in other, unrelated risky behaviour and, as a

result, show reduced interest in engaging in those risky behaviours relative to people who played the

game from the first-person perspective. This prediction is based on a review of the visual perspective

literature which suggests that the third-person perspective should sensitize people to an activity's broader

implications when being simulated in a video game. This sensitization to risk should, in turn, be

detectable shortly after playing the video game via increased perceptions of risk in other risky activities. I

manipulated visual perspective by randomly assigning participants to play one of two of the available

views within a motorcycle racing game: a first-person view, where the player saw the handlebars,

windshield and hands of the rider, and a third-person view, where the player saw the entire rider and

motorcycle from a view behind the bike, as if watching the character from a following video camera.

Participants who played the game from the third-person perspective should have construed the activity

simulated in the video game at a higher level of abstraction, in terms of broader contextual information

and the implications of the simulated action, than those playing from the first-person perspective, who

should have construed the activity at a lower level, focusing on sensory and experiential features.

Participants then completed a number of questionnaires assessing their involvement with and immersion

into the game, their attitudes toward the game, their previous experience with this game and other video

games and, critical for testing my hypothesis, a measure assessing the perceived risk of and their interest

in participating in a number of different risky activities.

I expected that participants who had played the game from the third-person perspective would

rate the risky activities as being more risky than those who played the game from the first-person

perspective, given the greater focus of third-person participants on the broader implications of the

simulated action as predicted by the visual perspective literature. As a result, I also predicted that those who played from the third-person perspective would also report less willingness to engage in the risky activities than those who played in the first person perspective, since the third-person perspective should lead players to construe the activity in terms of its broader implications: asking questions such as "just how dangerous is this activity?" and "could I get seriously hurt if I were to actually engage in this behaviour?". Those playing from the first-person perspective, in contrast, should see less risk in the activities and be more likely to be interested in taking such risks because of a focus on the short-term thrills of playing the game, not on the consequences of the activity. This focus on the broader implications of and potential consequences of the activity for the third-person participants should carry over from the video game to the list of risky activities that previous research has shown contains at least some modicum of risk.

Additionally, I expected participant gender to be an important moderator variable of obtained effects. The literature on risk perception suggests that females are more likely to perceive the risks of an activity and to be more averse to taking risks than are males (e.g., Carr & Steele, 2010). This leads to the prediction of a main effect of gender on both perceptions of risk and willingness to engage in risky activities. It is also possible that gender might interact with the perspective manipulation. If the effect of adopting the third-person perspective is to induce people to think about the broader implications of a simulated action, then I would expect men to show more sensitization to risk and more risk avoidant preferences in the third person condition than in the first person condition. However, since women are already relatively more sensitized to risk and risk-avoidant, I would expect relatively little impact of perspective on women's risk perceptions and risk preferences.

Method

       Participants. Forty-four male and thirty-eight female undergraduate students participated in the study in exchange for research participation credit in introductory psychology courses.

       Procedure and materials. Participants volunteered for the study online, advertised as a study about "Video Games and Verbal Reasoning". Participants were led to believe that the study would

involve playing a video game for a few minutes, completing some unrelated measures, ostensibly for an unrelated study, and then completion of a verbal reasoning task to determine whether playing video games influenced verbal reasoning ability. In fact, the "unrelated measures" were the measures of interest in my study.

Prior to the participant arriving at the lab, the research assistant (always female) set up the video game SBK 2009 for the Xbox 360 Console on a 42" LCD screen. The game SBK 2009, a speedbike racing game, was the ideal game for several reasons. For one thing, the game has particularly realistic graphics and is played on the most current and popular generation of gaming consoles. It sold more than 200,000 copies worldwide, making it reasonably representative of the kind of racing game played by gamers. Furthermore, it simulates a particularly risky activity with potentially dangerous consequences in real life. While the player's character does not get visibly injured (i.e. they always get back on the motorcycle and continue), crashes and falls do occur in the game. Finally, the game allows the ability to toggle between a first- and third-person perspective in-game. In the first-person perspective the player plays the game through the eyes of the motorcyclist: the cyclist's hands are in view on the handlebars and the player is able to see the bike's instruments, and windshield as it would appear were they actually riding a motorcycle. In the third-person perspective, the player plays the game through the vision of a "chase camera" several metres behind the cyclist with the back of their character and motorcycle completely in view. The game was set up by the research assistant picking the same motorcycle, rider, weather conditions, track and computer player difficulty (on the easiest setting) for all participants. The research assistant then started the race, just long enough to set the player's viewpoint to either the first or third person perspective in-game. Once the view had been set, the assistant paused the game and waited for the participant's arrival.

Upon arriving in the lab and completing the consent form, participants in the first and third person conditions were led to a seat across the room approximately 4-5 feet away from the television. They were handed the wireless controller and the research assistant informed them of the game's controls: acceleration, braking and steering. Participants, who could see the paused game interface, were briefly

shown how to play the game, including the concept of braking while steering into corners, the track map, and the other computer-controlled, non-human players. Finally, they were informed that the game was a particularly difficult one, and that they should not be discouraged if they found it tough, as the experiment required only that they play the game and their performance was not being evaluated. However, the research assistant covertly assessed their performance, recording the number of times the participant crashed the motorcycle and the number of laps completed in the allotted time as proxy measures of skill.

Participants played the racing game for approximately ten minutes, a standard amount of time for this type of task in the video game literature (Barlett, Branch, Rodeheffer & Harris, 2009; Kirsh, 2006; Uhlmann & Swanson, 2004). Participants were then informed that before they could complete the verbal reasoning task it was necessary to allow a few minutes of "cool-down" time, during which they would complete a few questionnaires for an unrelated study about risk perception before getting to the verbal reasoning questions.

Participants then completed several different risk perception questionnaires. The first involved reading five short scenarios that involved making a decision between a conservative option and a superior option that was inherently risky, adapted from Erb, Bioy & Hilton (2002) and Anderson & Galinsky (2006). Participants made their decision on a 1-9 Likert scale (ranging from the least risky option to the most risky option) and on the same 1-9 scale rated their confidence in the decision made (ranging from not at all confident to completely confident, $\alpha = .62$).

Participants then completed a 23-item measure adapted from Finucane, Alhakami, et al. (2000) asking them to rate how risky a number of activities or technologies were for Canadian society as a whole on a scale from -3 to +3 (ranging from not at all risky to very risky, $\alpha = .84$). Items on the scale included commonly-used substances (e.g. cigarettes, alcoholic beverages), controversial technologies (e.g. nuclear power, water fluoridation), leisure activities (e.g. roller blades, swimming pools) and means of travel (e.g. railroads, air travel).

Next, participants completed a 24-item measure that described 24 risky activities and asked participants to assess the degree of risk in each activity and to then indicate their own likelihood of

engaging in each activity, adapted from Weber et al. (2002) and Blais & Weber (2006) ($\alpha = .88$). The items represented different domains, including the financial domain (e.g. "Investing 10% of your annual income in a moderate growth mutual fund"), the health and safety domain (e.g. "Not wearing a seatbelt when being a passenger in the front seat") the recreation domain (e.g. "Going down a ski run that is beyond your ability or closed") and gambling behaviour (e.g. "Betting a day's income at a high stake poker game"). Participants were asked to indicate on a 1-5 scale how risky each activity was (from not at all to extremely risky). They were then asked to indicate on a 1-5 scale their likelihood of engaging in each activity or behaviour (ranging from very unlikely to very likely, $\alpha = .83$).

Next, participants completed a 17-item version of the Brockmyer et al (2009) Game Engagement Questionnaire ($\alpha = .86$). The measure involved participants indicating on a 1-5 scale (ranging from disagree completely to agree completely) their level of agreement with statements that assessed the extent to which participants engaged with the game (e.g. "The game felt real", "I really got into the game").

Participants then completed several items assessing their attitudes toward the video game. Participants rated, on a 1-10 scale (ranging from not at all to extremely) how well they thought each word described the game (e.g. "boring", "arousing", "fun", "difficult").

Finally, participants completed a 4-item measure assessing their past experience with SBK 2009, with other racing games, with other console video games and with computer games by asking them to indicate on a 1-10 scale how often they play each category of game (ranging from "never" to "often", $\alpha = .60$, $\alpha = .68$ when the SBK item is dropped due to no participants having reported any experience playing the game).

At the end of the procedure all participants had the deception explained to them. No participants indicated suspicion about the study's true intent.

Results

Omnibus MANOVA. I conducted a 2 (gender: male vs female) x 2 (perspective: first-person versus third-person) MANOVA with scores on the risky-choice scenarios, societal risks scale, perceptions of risk in activities scale and willingness to engage in activities scale as dependent variables.

Risky-Choice Scenarios. There was no main effect of visual perspective, $F(1,76) < 1$, of gender, $F(1,76) = 1.00$, or of their interaction, $F(1,76) < 1$, on the riskiness of the choices people made in the scenarios. Similarly, there was no main effect of visual perspective, $F(1,76) = 1.54$, $p = .22$, of gender, $F(1,76) = 1.87$, $p = .18$, or of their interaction, $F(1,76) < 1$, on the confidence of participants in their choices made regarding the scenarios.

Societal Risks. There was a main effect of gender on the average standardized perception of risk in the Finucane, Alkahami et al. 23-Item societal risks scale, such that females saw more risk than did males ($M_{MALE} = -.13$, $SD_{MALE} = .45$, $M_{FEMALE} = .14$, $SD_{FEMALE} = .46$, $F(1,76) = 6.63$, $p = .012$, $\eta^2 = .08$), a finding consistent with the risk perception literature (Finucane, Slovic et al., 2000). There was no main effect of visual perspective, $F(1,76) < 1$ or the interaction between visual perspective and gender, $F(1,76) < 1$ on perceptions of societal risks.

Perceptions of Risk in Activities. There was no main effect of visual perspective on average perceptions of risk in the 24 activities, $F(1,76) < 1$. There was a main effect of gender such that females saw more risk in the 24 activities than males ($M_{MALE} = .00$, $SD_{MALE} = .47$, $M_{FEMALE} = .25$, $SD_{FEMALE} = .48$, $F(1,76) = 5.96$, $p = .017$, $\eta^2 = .07$). There was also a significant gender by visual perspective interaction, $F(1,76) = 5.76$, $p = .019$, $\eta^2 = .07$) (see Figure 1). Subsequent simple effects analyses found that for males the difference between visual perspective conditions was significant such that the third-person perspective led to greater perceptions of risk than the third person perspective, $F(1,76) = 4.18$, $p < .05$. There was no significant difference between the visual perspectives for females, $F(1,76) = 1.76$, $p > .05$. Within the first-person perspective females reported far greater perceptions of risk than did males, $F(1,76) = 11.50$, $p < .01$, a difference which was not present in the third-person condition, $F(1,76) < 1$.

Likelihood of Engaging in Activities. There was no main effect of visual perspective on the average reported likelihood of engaging in the same 24 activities as in the previous section, $F(1,76) = 1.81$, $p = .18$. There was a main effect of gender consistent again with previous results, such that females reported being marginally less likely to engage in the 24 activities than males ($M_{MALE} = .06$, $SD_{MALE} = .44$, $M_{FEMALE} = -.12$, $SD_{FEMALE} = .43$, $F(1,76) = 3.63$, $p = .060$, $\eta^2 = .04$). There was also a marginally

significant gender by visual perspective interaction, $F(1,76) = 2.88$, $p = .094$, $\eta^2 = .03$ (see Figure 2).

Subsequent analysis of the simple effects show that for males the third-person perspective led to a reduced likelihood of engaging in the risky activities than the first-person perspective, $F(1,76) = 4.65$, $p < .05$, whereas for females there was no difference between the two visual perspective conditions, $F(1,76) < 1$. Within the first-person perspective, men reported a greater willingness to engage in the risky activities than women, $F(1,76) = 6.22$, $p < .03$, a greater willingness which was not present in the third-person condition, where men and women did not significantly differ, $F(1,76) < 1$.

Mediation. I tested the hypothesis that, for males, risk perception mediated the effect of visual perspective on reported likelihood of engaging in risky behavior using the procedure recommended by Baron & Kenny (1986). There were significant initial relationships between viewpoint and risk perception, $\beta= .32$, $p<.05$, between risk perception and engagement likelihood, $\beta= -.50$, $p<.05$, and between visual perspective and engagement likelihood, $\beta= -.33$, $p<.05$. The latter relationship fell to non-significance, $\beta= -.17$, $p>.05$ after controlling for the relationship between perception of risk and engagement likelihood, which remained significant in the final model, $\beta= -.50$, $p<.05$ (*Sobel's z* $= -1.86$, $p<.06$, see Figure 3). There is thus evidence for complete mediation of the effect of visual perspective on likelihood of engaging in risky behaviour by perceptions of risk.

Difficulty. I included a number of measures, both behavioural and self-reported, which allowed me to determine whether the first- and third-person conditions differed in terms of their perceived difficulty. For exploratory purposes I examined these factors using a 2x2 multivariate ANOVA, using as dependent measures number of falls and number of laps completed (as recorded by the research assistant), the self-reported frustration, liking, skill at and difficulty of the game, as well as past experience with computer, video and racing games.

There was a main effect of visual perspective on frustration with the game and the game's difficulty. The first-person condition was considered more frustrating than the third-person condition ($M_{1ST}= 6.30$, $SD_{1ST} = 2.35$, $M_{3RD}= 5.23$, $SD_{3RD} = 2.55$, $F(1,77) = 3.82$, $p = .05$, $\eta^2 = .05$) and the first-person condition was considered more difficult than the third-person condition ($M_{1ST}= 8.41$, $SD_{1ST} = 1.77$,

M_{3RD}= 6.93, SD_{3RD} = 2.37, $F(1,77)$ = 10.71, p = .002, η^2 = .12. There was no effect of perspective condition on liking of the game, self-reported skill, self-reported experience with computer/ video racing games, number of laps or number of falls (all ps > .10).

There was a main effect of gender on self-reported skill, behavioural measures of laps and falling, and difficulty of the game, such that females reported less skill at the game than males (M_{MALE}= 3.67, SD_{MALE} = 1.55, M_{FEMALE}= 2.50, SD_{FEMALE} = 1.31, $F(1,77)$ = 13.33, p< .01, η^2 = .15), completed fewer laps than males (M_{MALE}= 3.95, SD_{MALE} = .754, M_{FEMALE}= 3.24, SD_{FEMALE} = .786, $F(1,77)$ = 18.35, p<.01, η^2 = .18) and fell off the bike in the game more than males (M_{MALE}= 2.35, SD_{MALE} = 1.76, M_{FEMALE}= 3.68, SD_{FEMALE} = 2.35, $F(1,77)$ = 8.30, p<.01, η^2 = .10 and found the game marginally more difficult than males (M_{MALE}= 7.33, SD_{MALE} = 2.28, M_{FEMALE}= 8.08, SD_{FEMALE} = 2.08, $F(1,77)$ = 2.76, p = .10, η^2 = .03. There was no effect of gender on frustration, liking of the game or experience with video / computer racing games (all ps > .13).

Finally, there was a significant interaction between gender and visual perspective on the number of laps completed, $F(1,77)$ = 5.29, p= .02, η^2 = .05. The interaction was not significant for any of the other indicators of difficulty (all ps >.12).

Discussion

Male participants who played the racing game from the third-person perspective perceived greater risk in a number of activities than those in the first-person condition. This greater perceived risk, in turn, led participants to report a decreased likelihood of subsequently engaging in those same activities in the future, with a mediation analysis suggesting risk perception as the mechanism involved. These results are in line with my predictions based on the visual perspective literature, which suggest that playing the video game from the third person perspective should lead to greater reflection of the participant on the broader implications of the simulated activity which, because these are negative in the case of risky activities, should decrease the participants' willingness to engage in these activities.

Interestingly, this effect only held for the males in my study. There was no difference for females between the two visual perspective conditions in terms of reported engagement likelihood in the risky

activities. Given the relatively high risk perception scores for females and the relatively low likelihood of willingness to engage in the activities, it may be the case, supported by the risk literature, that female participants were already more sensitized to risk than were men in the study. As a result, there was little effect of visual perspective (proposed to have its effect by increasing awareness of consequences and risks) on females' scores of risk perception and engagement likelihood – they were unlikely to become "more vigilant" due to the third-person induction.

Another interesting interpretation of the data involves gender differences between the first- and third-person perspectives, specifically the lack of gender differences in the third-person condition. In the first-person perspective condition, participants act just as the risk literature would predict: females perceive greater risk than do males, and report less desire to take risks than do males. In the third-person perspective condition, however, the effect is gone, largely driven by shifts in the male participants to more closely resemble the responses of the female participants (i.e. males becoming more cautious, rather than females becoming more risky). This may be evidence that the effects of visual perspective observed in this study are largely driven by the third-person perspective. Or, to put it another way, in the first-person perspective gender mattered, but that was not the case in the third-person perspective. While further research is clearly needed to explain why, it seems that the third-person perspective in videogame play eliminated the usual gender effects in risk-perception and willingness to engage in risks.

I should note that my finding that the risky video game led to increased perceptions of risk (at least for males) is not a novel one. Indeed Fisher, Guter & Frey (2010) suggest that risk-promoting media content increases the accessibility of risk-promoting cognitions. Interestingly, they suggest that playing the risky video games should lead to an increase in risk-taking inclinations. Without a control group, I am unable to say whether or not the third person led to a reduction in risk-taking inclinations or whether the first-person condition increased them, but I can state that, at very least, visual perspective moderated this previously-discovered effect. While the risk-taking media literature can do little to explain the obtained findings, the visual perspective literature provides a sound explanation for the phenomena by suggesting that perceiving the simulated risky activity from a higher level of construal should lead players to

consider the broader implications of the simulated activity. Since people should be inclined to avoid unnecessary risk to themselves, sensitizing participants to the risks of an activity should reduce their willingness to engage in that activity and similarly dangerous activities.

Another point of interest in the obtained findings was the lack of an effect of visual perspective on either the risky choice scenarios or on the societal risk items, given the effect of visual perspective on the risky activities scale. Upon consideration of the nature of the measures, one can hypothesize reasons for their differential responsiveness to the visual perspective manipulation. My hypothesized mechanism for the effects on the risk-taking measure is that the third-person perspective leads to a more abstract level of action conceptualization which, in turn, forces a person to consider the broader implications and consequences of the activity for the self (e.g. "could I get hurt if I were to do this?"). If this is indeed the mechanism involved, it is possible that a measure assessing risks for society at large may be relatively unaffected by an increased vigilance for self-relevant risks. Put another way, societal-level implications are perhaps too broad to be affected by the simulation of an individual-level risky activity like motorcycle racing, even when being done so from a third-person perspective. This may represent an important boundary condition for the obtained visual perspective effect. With regard to the risky scenarios measure, the lack of an effect of visual perspective may owe more to a lack of matching between the types of questions raised by an abstract conceptualization of the simulated speedbike racing and the decisions being made in the scenarios. An abstract mindset and the associated concern for consequences seems to naturally lead to the form of question asked by the risky activity measure: how risky is this activity, and would you be willing to engage in it, yes or no? The scenarios measure, by design, presumes an already-present risk and forces a choice between two alternatives. Choosing between two competing alternatives is a different form of cognitive task than is choosing yes or no to a presented option. Specifically, the forced choice format may sensitize participants to the risks involved in the choice by making risk salient as a key dimension of choice. If this were the case, there would be little room for this measure to capture carryover risk sensitization differences elicited by the manipulation of visual perspective. Further research is needed to verify these hypothesized reasons for the failure of these measures to respond to the

visual perspective manipulation. In understanding why these measures may not have worked we can hopefully better understand the nature of the obtained visual perspective effect and the limitations of its generalizability within the risk-taking domain.

CHAPTER 3

GENERAL DISCUSSION

This study suggests that the visual perspective from which a video game is played can play a significant

role in moderating the well-documented effect of video games on undesirable behavior outside of the

game.

This finding should be considered both in terms of how it advances research in the field of visual

perspective and in terms of the implications it has for future research in the video game violence

literature.

Implications for the Visual Perspective Literature

Competing models. With regard to the visual perspective literature, my findings, while consistent with

my predictions, could have been predicted to work out in the opposite direction. In contrast to the model

put forth by Libby & Eibach (2011), which posits that the first- and third-person visual perspective

correspond to bottom-up and top-down processing respectively, Frank & Gilovich (1989) propose an

attributional model which would lead to a different set of predictions. Seeing oneself from the third-

person perspective, according to Frank & Gilovich, should lead one to make dispositional attributions

about their behaviour. This model would lead to the prediction, in the case of players simulating a risky

activity, that players in the third-person condition would attribute their behaviour to a dispositional

preference for or tendency to engage in risky activities more than players in the first-person perspective.

The data in this study show the opposite and are critical for comparing the two models. Past research

(Libby et al., 2007), focusing only on a desirable behaviour, was unable to distinguish between the

models put forth by Libby & Eibach and Frank & Gilovich, which both made the same prediction. My

study, with its focus on undesirable behaviour, creates a situation where the models make contrasting

predictions and can thus be pitted against one another. The data support the model put forth by Libby &

Eibach (2011) and for the mechanism hypothesized in this paper, that the obtained effects are due to

consideration of the broader implications of the action and the top-down processing elicited by the third-person perspective.

Gender and direction of effect. One should be cautious, however, when evaluating the results from the study and attempting to determine the presumed direction of the obtained effect. After all, without a control group, all I have established thus far is that there is an effect of visual perspective on the risk perception and risk-taking intentions of participants. I have suggested that the effect is largely driven by the third-person perspective, a position compatible with work by others such as Ayduk & Kross (2010) who suggest that the psychological distancing created by the third-person perspective leads to less emotional reactivity, more problem-solving behaviour and less cardiovascular arousal. However, a case could be made that the effect is driven in the opposite direction, by the first-person perspective. Lee (2007), for example, states that the first-person perspective leads to greater emotional arousal and sense of engagement with the game. Applying this interpretation to the obtained data, the difference between first- and third-person perspectives may be driven largely by the increased immersion and emotional arousal caused by the first-person perspective which, by magnifying the excitement of the racing activity, desensitizes people to considerations of risk. Without a control group, it is difficult to say for sure whether the first- or third-person perspective is driving the effect. Nonetheless, there is reason to believe the effects are largely driven by the third-person condition, as suggested by the data on gender differences in risk perception. In general, women are more risk averse than men and should therefore be more sensitive to risks (Carr & Steele, 2010). This difference was observed in the first-person perspective, where a main effect of gender showed that male participants were more likely to perceive risks in the activities than were female participants. In the third-person perspective, however, the traditional difference between males and females in risk perception was absent. As such, given that the third-person perspective was the aberrant condition, the most straightforward interpretation of the data is that the third-person perspective led males to become more risk-averse and to more closely resemble female participants. Of course, future studies with a control group built into the design will be necessary to support this interpretation. But nonetheless, these results provide some confidence in the interpretation of

21

the results as being due to the third-person perspective sensitizing participants to risk rather than the first-person desensitizing participants to risk. Such findings may have important implications for informing policy and for the literature on both visual perspective and video gaming.

Interactive media. More novel, however, we have the first indications of evidence supporting the claim that visual perspective has demonstrable downstream effects on cognition and behavior beyond the domain of mental images, static photographs or videos. Previous visual perspective research has focused extensively on self-generated media, such as memories (Crawley, 2010; Frank & Gilovich, 1989; Libby et al., 2005), or mental imagery (Abelson, 1975; Fiske et al., 1979; McIssac & Eich, 2002; Libby et al., 2007). When not studying self-generated media, visual perspective studies have focused on the effects of manipulating perspective in photos (Libby et al., 2009) and videos (Knoblich & Flach, 2001). Comparatively little work, however, has focused on visual perspective in the domain of interactive media. Interactive media differs in numerous important ways from traditional media, including an increased immersion or presence of the user (Blascovich et al., 2002, Steuer, 1992) and, by definition, involving an active user as opposed to a passive observer and the direct rewarding of the user-as-actor (as opposed to vicarious reward for the viewer passively observing) (Dill & Dill, 1998). Given the large body of theory suggesting the importance of perspective in the representation of events, of the self and of others, and given the numerous ways interactive media differ from traditional media, one could predict very different effects and mechanisms for interactive media. For example, one could predict, given the increased presence of participants playing video games (relative to watching videos), there may be reduced effects of visual perspective on cognitions and behaviour due to the fact that an interactive media is more engaging and involves more multitasking, with many more potentially salient features (e.g. difficulty, response modality). At very least, the interactive nature of video games should be more taxing on cognitive resources than passively watching a movie, which may reduce visual perspective effects that involve consideration of an action's broader implications. With the rapid advancement of immersive and interactive video technology and the growing rate of its integration into our day-to-day life it will become increasingly important to understand how this new medium can affect our attitudes, cognitions and

22

behaviors and to understand the role of visual perspective as an important mechanism. This study has demonstrated that at least some of the effects of visual perspective generalize from traditional media to more interactive media, showing the robustness of visual perspective effects and hinting at how deeply-structured such functions may be in our perceptual systems. With the discovery of mirror neurons, neurons firing both when an action is self-generated and when it is observed in another person, and their proposed role in a "system that matches observed events to similar, internally generated actions... [forming] a link between the observer and actor" (Rizzolatti & Arbib, 1998), it seems reasonable to assume that an equally deeply-structured system representing visual perspective exists and that such a structure would indeed be modality-independent and have broad-ranging effects on cognition and behaviour. Research on interactive media, demonstrating the modality independence of visual perspective effects and the broad range of potential effects it can have are an important contribution to this growing and increasingly important literature.

Undesirable behaviour. I have demonstrated that the effects of interactive video gaming technology on perceptions and behaviour intentions are more complex than simply a matter of internalizing and mimicking the simulated behaviour. Instead, information about the situation's meaning, as construed through either top-down or bottom-up processes, influences a person's motivation and relevant cognitions about the subject. This may influence behaviour accordingly. In the case of my study, because the third-person perspective sensitized videogame players to the risky implications of the simulated behaviour there was a reduction in desire to engage in the behavior relative to those who played from the first-person perspective. This is another relatively novel finding of my study. Libby and colleagues demonstrated in past research that the third-person visual perspective can lead to an increase in desirable behaviour (Libby et al., 2007). To my knowledge, however, there has been no past demonstration that the third-person perspective can lead to a decrease in undesirable behaviour. Such a finding is important as a test of the mechanisms proposed by Libby and colleagues in their visual perspective research. Additionally, this finding has potential implications for interventions or other situations attempting to curb the motivation for undesirable behaviour. Not only does this research

suggest that playing video games may have fewer negative implications for the player than initially expected, but it offers a glimpse at exciting possible applications which future research can test the plausibility of.

Limitations in the Current Video Game Literature

With regard to the video game violence literature, my findings have several implications for the interpretation of the current literature and posits several interesting directions for the future of the field. Looking at the current literature on the behavioural effects of video games, it can be said to have several critical limitations, which I will address in turn.

The literature investigating the effect of video games on behaviour focuses almost exclusively on the link between violent video games and violent behaviour. Given the popularity of the issue of video game violence in the media, whether it's in the form of questioning the gaming habits of Dylan Klebold and Eric Harris of the Columbine massacre (Cullen, 2009), expressing outrage at the season's most gory and grotesque game (*The Daily Show with Jon Stewart,* June 30, 2011), or examining the similarity between shooter games and the training simulators used by the United States Army, along with the vehemence with which the video game industry and gamers alike deny any ill effects of video games on behaviour (Anderson et al., 2007), there is demand for researchers to provide indisputable evidence for either side of the debate. As a result, a tremendous amount of research now shows quite definitively that there is a link between video game violence and violent behaviour (Anderson et al, 2010). In the attempt to build the case for the link between video game violence and aggression, researchers have employed longitudinal designs to show long-term behavioural impacts of violent video games (Krahé, 2011; Anderson et al, 2011), they have shown that video games can lead to different *kinds* of aggression (Farrar et al., 2006) and they have even demonstrated that violent video game exposure can predict seriously violent and criminal delinquent behaviour (Huesmann et al, 2011). Unfortunately, there has been tremendous resistance to this literature by both the video game industry and by many laypersons whose position, summarized by Justice Scalia of the United States Supreme Court, still insist that the accumulated evidence of nearly three decades of research on video game violence "cannot show a direct

causal link between violent video games and harm to minors", referring to the evidence as "not compelling" because they "do not prove that violent video games *cause* minors to *act* aggressively" (*Brown et al. v. Entertainment Merchants Association et al, 2011*). Due to this struggle against popular opinion and lack of understanding of social psychological research, there has been excessive focus on violence in the video game literature to the exclusion of other potentially undesirable behaviour. With the General Aggression Model (which postulates that both proximate and distal causes, biological, environmental, social and otherwise all contribute to the expression of aggression) implicated as the mechanism involved in most obtained effects (Anderson & Carnagey, 2009, Anderson, Gentile & Buckley, 2007), there has been little attention paid to other potential mechanisms, especially when it comes to non-violent but nonetheless undesirable behaviours. For example, racing games seldom include violence but nonetheless may encourage risk-taking behaviour that could potentially increase reckless driving. Additionally, while most violent games do contain violence in some form, violence is often only one of several undesirable simulated behaviours. However, due to the near-exclusive focus on violence, many of these other equally undesirable behaviours go unstudied, with their mechanisms, beyond the scope of the General Aggression Model, relatively unknown. There is the occasional study which draws a link between risk-promoting media and risk-taking cognitions/ behaviour, suggesting that exposure to risk-taking video games increases risk-taking behaviour (Fischer, Guter & Frey, 2010), though such studies are underrepresented in the literature and do not adequately address important moderator variables. It is my hope that studies such as my own extend the current focus of video game research beyond aggression and into the realm of other problematic behaviour.

To its credit, the video game violence literature has focused on some potential moderators of the effect of violent video games on aggression: realism (Barlett & Rodeheffer, 2009), personalized avatars (Fischer, Kastenmuller & Greitemeyer, 2010) culture, sex, and age (Anderson et al, 2010). However, visual perspective is all-too-often overlooked. Beyond the study I have presented here, there is other evidence from cognitive psychology to support my claim that visual perspective matters in videogame playing. Rollings and Adams (2003) suggest that while the first-person perspective of a video game may

be more immersive, its limitation of vision to a 30 degree arc causes players to miss out on a significant amount of environmental information that is allowed in the 120-180 degree arc of the third-person perspective. This increased arc of vision, it is argued, allows players a wider field of vision and to be aware of the situation around them (Lee, 2007). Lee also suggests that a game's viewpoint may have an impact on arousal and the valence of a player's emotions, such that the first-person perspective led to greater arousal and more extreme emotional valence than the third-person perspective.

Given that the psychological literature seems to suggest the potential importance of visual perspective in a medium as dynamic as video games and the fact that the video game industry actually makes genre distinctions based on visual perspective (e.g. first-person shooters, third-person shooters), it is surprising that only a paucity of studies exists investigating the effects of visual perspective on subsequent behaviour. The studies which do exist have been limited, both in number and in methodology. For example, one study demonstrated that the first-person viewpoint is more engaging and leads to a greater sense of presence in the game, though it did not look at the potential behavioural implications of this (Lee, 2007). This literature is also limited by studies which do not manipulate visual perspective within the same game (e.g. Barlett et al 2009, who looked only at third-person games when studying the length of short-term aggression affects after video games, Barlett & Rodeheffer, 2009, who used only third-person games in their study of the effects of realism in video games on aggression), or which do not use actual games (Bluemke, Friedrich & Zumbach, 2010, who, in addition to not manipulating perspective within the same game, used only lab-generated "games", not based on any real computer or video game, in their study showing that aggressive video games lead to increases in implicit aggressive self-concept). In light of the limitations of the literature regarding visual perspective on attitudes, cognition and behaviour outside the game, I believe my current study and those to follow build a case for visual perspective as an important moderator of the effect of video games on behaviour.

A final limitation of the current video game literature is its largely unrealistic prescriptions for reducing undesirable behaviour. On the one hand, the literature seems to suggest that the link between the video game violence and aggression is inevitable, or that the only way to reduce aggression is to

reduce the amount of time spent playing these games (Anderson et al., 2007; Anderson et al., 2010; Steinfeld, 1972). Such prescriptions are unreasonable, however, given the growing popularity of video games and the growth of the video game market in the last two decades, not to mention the fact that for many teens and young adults there is an intrinsic motivation to play violent video games that cannot be quelled simply by restricting them. If anything, restriction of the game is likely to have the opposite effect of making them seem more desirable due to psychological reactance (Brehm & Brehm, 1981) and ironic processing (Wegner, 1994). Other research, showing links between prosocial gaming and prosocial behaviour, suggests that putting prosocial messages and goals into video games can foster cooperation and helping behaviors (Greitemeyer & Osswald, 2010). While at first glance this may seem to be a viable option, the research that suggests these effects has been limited to games such as *Super Mario Sunshine*, *Chibi Robo*, *Lemmings* and *City Crisis*, games aimed at younger audiences or, at very least, audiences very different from the type that would be intrinsically motivated to play a first-person shooter game (Gentile et al, 2009; Greitemeyer & Osswald, 2010). Unfortunately, these games simply lack the appeal to adolescents and young adult males who represent the biggest problem with regard to undesirable aggressive and risk-taking behaviour. It is thus ineffective to try and dissuade gamers from playing the games they are intrinsically driven to play through legislative banning, nor does it seem likely to convince them to play games that encourage sharing anytime. It is plausible, however, to consider small changes to the games these audiences already play, or to the way they play, such as encouraging the industry to adopt third person shooter and racing games. This idea is consistent with research by Schmierbach (2010), who found that playing the violent (and very popular) video game *Halo* in a cooperative mode reduced aggression relative to a competitive or solo game mode. This is a perfect example of an in-game solution that involves subtly shaping intrinsically-motivated behaviour rather than trying to stop it altogether. Given the rise in popularity of third-person shooter games in the last decade, this seems like a natural solution that would be amiable to adolescents, who are already motivated to play these games, to the industry, motivated to sell to those gamers and in favour of solutions that do not involve outright banning

of games, and to society at large, which would benefit from a reduction of the undesirable behaviour that is partly a product of the games these kids are going to play.

Future Directions

Given the need in the literature for research which a) tests whether there are other potential undesirable behaviours besides aggression that may be influenced by videogames, b) tests visual perspective as a possible moderator variable of these effects, c) demonstrates that there is a need to better understand the mechanisms driving these effects, and d) prescribes realistic means of reducing undesirable consequences of videogame play, I hope I have adequately demonstrated the need for studies such as the one presented here.

The current study was far from perfect, however, and several apparent limitations will need to be overcome in future research. One important limitation of the study involves the difficulty of the video game, specifically the unequal difficulty across the two visual perspective conditions. With the first-person condition being far less difficult than the third-person condition, difficulty represents a significant confound which will need to be controlled for in upcoming studies, as I cannot be entirely sure the observed differences in risk perception and engagement likelihood were due, as predicted, to the different visual perspectives or whether the differences were due to the third-person condition being more difficult than the third-person condition. Pre-testing playing from the two visual perspectives and making changes to the difficulty setting where necessary to approximately equate the two in future studies will hopefully address this problem. Additionally, future studies may look at what effect, if any, changing the game's difficulty will have on effects outside of the game.

A second weakness of this study includes the lack of a control group. In future studies, it will be necessary to run a no-play control group to determine the direction of the obtained effects and confirm whether, as I am predicting, the effects are driven primarily by the third-person perspective and not the first-person perspective.

A final weakness of the study involves the use of only one genre of game: a racing video game. While it does present an opportunity to study the effects on perceptions of risk after playing a game

28

simulating a risky activity, it would also have been nice to demonstrate the effects using a game from the violent video game literature (as well as others, such as role-playing games or platformer games), to demonstrate the generalizability of this effect beyond the game in question. Future research in this field will look at a greater variety of games. Additionally, it should be possible, with the right tools and the right games, to be able to modify currently popular games which, at the moment, are only available in one perspective or another, to greatly expand this research beyond the realm of games that currently exist on-the-shelf with a visual perspective that can be toggled in-game.

In light of some of the weaknesses of this study, I am currently conducting several follow-up studies which I hope will both replicate these findings using additional measures and expand them using behavioural measures.   In addition to measures from the current study, one of the new studies will include several behavioral measures with consequences (e.g. money earned), and are hoping to find converging evidence with our hypothesis that risk-taking in video games will affect subsequent risk-taking in other domains by showing risk-taking in terms of brinksmanship. Additionally, I plan to include measures of immersion into the game to supplement the current study's covariates, given that immersion has often been touted by laypersons and researchers alike as one of the reasons to be particularly worried about first-person shooter games (as opposed to other violent games).

Future directions for this line of research will investigate other potential moderators of behavior outside the game, including perceived fluency of a game by manipulating its difficulty. Additionally, I would like to show the importance of visual perspective within the video game violence domain to demonstrate that the effect is not an artifact of racing or non-violent video games. Finally, I intend to demonstrate the applicability of this research to the reduction of real-world behavioural problems, possibly through longitudinal studies of players who tend to prefer first- or third-person shooter games. Perhaps through these studies and others like them we as a field can do more than just inform law-makers and the public about the potentially harmful effects of video games: perhaps we can start doing something to reduce these harmful effects.

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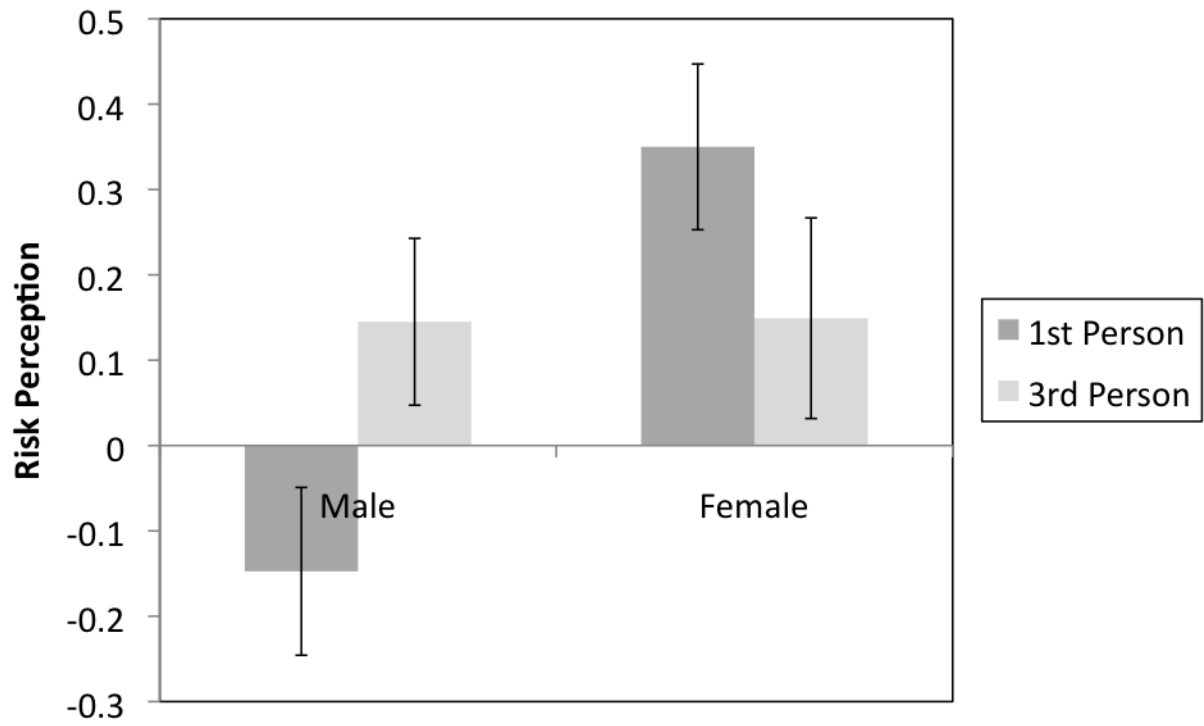
Figure 1: Risk perception results. Effects of gender and visual perspective of video game on average standardized self-reported perceptions of risk in 24 different risky activities.
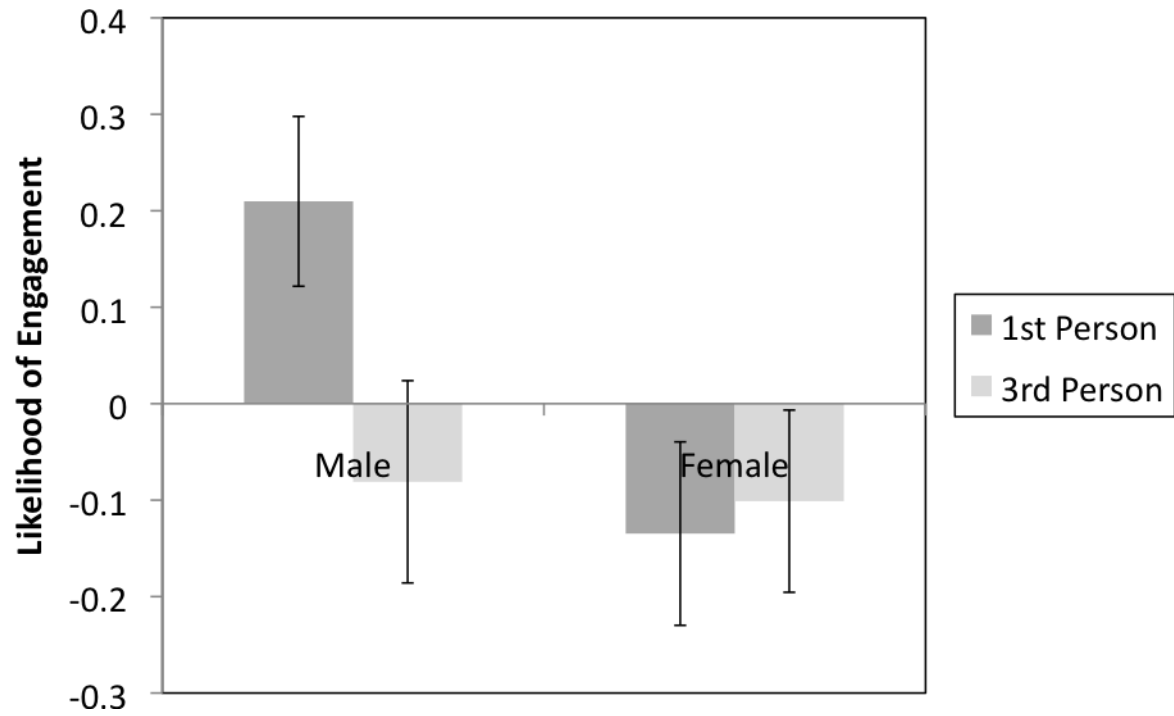
Figure 2: Engagement likelihood results. Effects of gender and visual perspective of video game on average standardized self-reported intentions to engage in 24 different risky activities.
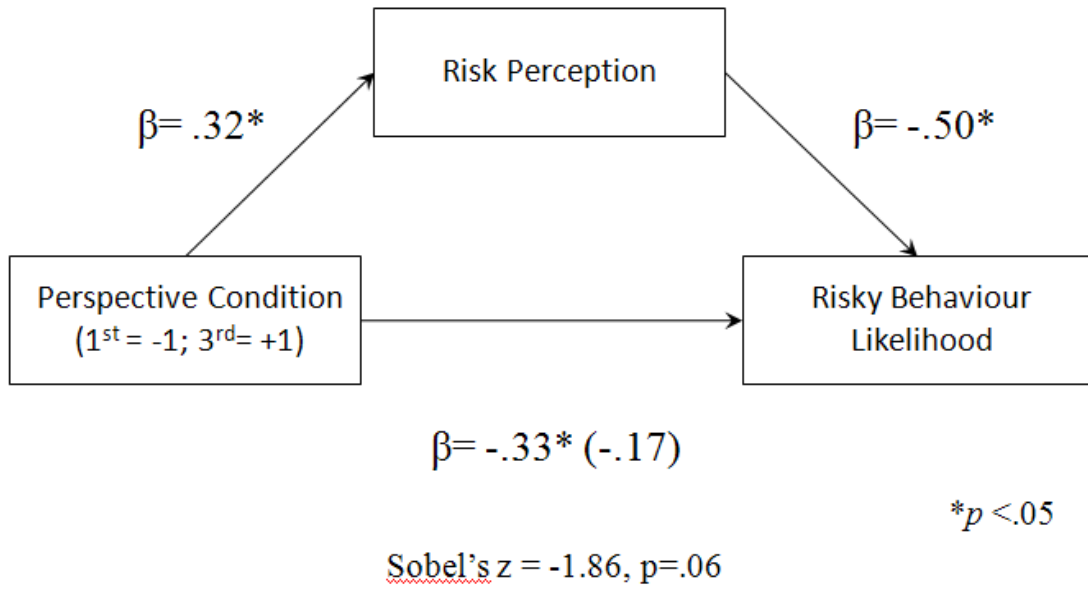
Figure 3: Mediation analysis for males only. Evidence for complete mediation of the effect of visual perspective on average self-reported likelihood of engaging in 24 risky activities by the perception of risk in those same 24 risky activities.