Getting into the Game: The Precursors of Immersion into Violent Video Games and the Effect of

Immersion on Post-Game Aggression

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 hours many of us spend watching movies and television, playing video games, and reading books illustrate the prevalence of fantasy in our lives. But does spending so much time in fantasy worlds shape our real-world thoughts and behaviour and, if so, how? The present research tests the idea that the extent to which people become immersed into a fantasy activity – projecting themselves into the fantasy and experiencing it as if it were real – or distances themselves from a fantasy experience - reflecting on the fantasy from an outsider's perspective - determines whether the experience influences their subsequent thoughts and behaviour. I begin with an overview of several lines of research, including the broader literature on the psychology of fantasy, theory and research on self-immersion and self-distancing processes, and research on the effects of playing violent video games on real-world aggression. Building on this work, I develop several novel hypotheses. First, I hypothesize that greater prior experience with a fantasy activity should be associated with more immersion into that activity and with expressing more fantasy-congruent behaviour after engaging in that activity. Second, I hypothesize that immersion should mediate the relationship between prior fantasy activity experience and behavioural effects of engaging in fantasy. Finally, I hypothesize that immersion into a fantasy activity can be experimentally manipulated to test its causal influence on post-fantasy behaviour.

In Study 1 I test these hypotheses by measuring violent videogame experience, experimentally manipulating the visual perspective from which players experience a violent video game, and testing the effects of these variables on participants' immersion into the game and their post-game behavioural aggression. I found that immersion into a violent video game significantly mediates the relationship between prior experience with video games and post-game behavioural aggression. However, visual perspective was an ineffective manipulation of immersion. In Study 2 I conducted an online study which aimed to replicate the results of the first study while attempting to manipulate player immersion through a set of immersing or control instructions. The results replicated the first study, with immersion again mediating the relationship between prior video game experience and post-game aggression, but again the

manipulation of immersion was ineffective. In Study 3 I used a different approach to manipulate immersion that involved manipulating the game's context to be either fantasy-themed or mundane-themed, which was predicted to be particularly immersive and distancing, respectively, for participants who chronically seek out fantasy-themed activities. This manipulation was partially effective, insofar as those who chronically engaged in fantasy-themed activities reported significantly greater immersion into the game and also behaved more aggressively after playing the fantasy-themed game (vs. the mundane-themed game). Furthermore, for these participants the effect of condition on immersion mediated the effects of condition on post-game aggressive behaviour. Taken together, these studies provide the first evidence that immersion into a fantasy activity predicts the extent to which the content of that fantasy affects actual behaviour. Finally, I discuss the theoretical and practical implications of this research, as well as some of its limitations and future directions.

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Table of Contents

List of Figures

List of Tables

Introduction

"Fantasy is hardly an escape from reality. It's a way of understanding it."

- Lloyd Alexander, fantasy author

"Of course it is happening inside your head, Harry, but why on earth should that mean it is not real?"

- Albus Dumbledore, *Harry Potter and the Deathly Hollows,* chapter 35

Fantasy is an integral part of the human experience. For example, children around the world imagine themselves as parents, working adults, and super-heroes, playing with others in shared fantasies where basements become dungeons, sticks become swords, and boxes become spaceships (Smith, 2010). When others are not around, children fabricate imaginary companions with whom they play (Smith, 2010; Taylor, 1999). Far from a childish pastime, people engage in fantasy across their lifespan (Göncü & Perone, 2005; Smith, 2010). For millennia, orators from cultures around the world regaled their tribe-mates with myths of supernatural beings and fantastic events. These storytellers gave way to playwrights and poets centuries later, who penned timeless fantasies of love, valour, and tragedy. Script-writers and directors brought storytelling into the 21st century, creating fantasy products that motivate 80.1% of Americans aged 18 or older to watch television for an average of 3.5 hours per day (Bureau of Labor Statistics, 2012) and to purchase 1.34 billion movie tickets annually (Nash Information Services, 2014). Millions immerse themselves into fantasy worlds in other ways, creating their own fantasy worlds, gathering to play roleplaying games, or experiencing shared fantasy worlds in fan communities (Bacon-Smith, 1992; Jenkins, 1992, 2006; Tulloch & Jenkins, 1995). The video game market, projected to exceed $100 billion in 2014 (Gartner, 2013), offers players thousands of adventures in which to immerse themselves, while online simulations such as Second Life give millions of users the chance to experience a fantasy life unconstrained by reality (SecondLife, n.d.). In these activities and countless others, people willingly suspend their disbelief and engage in fantasy activities as part of their daily routine, often paying for the privilege to do so.

Despite the ubiquity of fantasy and the resources people devote to pursuing fantasy activities, people may not consider how the different ways they engage in fantasy may have real-world implications. Because fantasy activities tend to be leisure activities considered irrelevant to real-world issues (Kleiber, 1999), people may assume that the way they experience fantasy is inconsequential. This perceived inconsequentiality may be compounded by the assumption that being able to distinguish fantasy from reality means that the content of fantasy activities is distinct from, and has no bearing on, real-world events. For example, when asked whether fantasy violence is related to real-world aggression, video game players often cite their ability to distinguish fantasy violence from real-world violence as evidence that there is no relationship:

> A video game cannot be blamed for causing violence, nor can a movie, book or TV show. The individual is to blame in the case of someone who willingly went against their common sense and knowledge that what you do in a video game is fiction and should never be re-enacted in reality. In the case of someone who doesn't know the difference between fiction and reality, like a child for example, it's up to the parent to teach the child the difference… (J. Jessen, forum comment)

> Most children understand the difference between reality and fantasy in the concrete or formal operational stages (around 7 or 12 years old), so a child is most likely smart enough to know that beating up a virtual character using the toggles and buttons on the control is different from clenching fists and swinging punches. (Ashe, *PressDemocrat.com* blog post)

People learn to distinguish fantasy from reality as early as 12 months (e.g., Smith, 2010; Woolley & Wellman, 1990), and indeed the inability to distinguish fantasy from reality in adulthood is rare and often associated with psychological illness (e.g., Waldo & Merritt, 2000). As such, people may assume that, except in the case of young children or people with psychological illnesses, their fantasy activities have no bearing on their real-world thoughts and behaviour.

The idea that fantasy does not affect people's real world experience and behaviour is contradicted by much anecdotal evidence, including news reports that street racing increased following the release of the action-adventure movie *The Fast and the Furious* (Brown, 2013; The Guardian, 2001) and the following sample posts from an online forum (with a total of 3,500 posts) about the science fiction movie *Avatar,* where individuals were invited to discuss "Ways to cope with the depression of the dream of Pandora [the film's fictional world] being intangible":

> After I watched Avatar the first time, I truly felt depressed as I "wake" up in this world again. So after few days, I went to the cinema and watched it again for the second time to relieve the depression and hopeless feeling. (Okoi, Avatar Forums post)

> I'm just starting to recover from the effects of this film, and it's been over a week! The really strange thing is that I've always been fairly stoic and cynical, but after seeing Avatar for the first time (seen it three times now), it really struck a chord. I'm supposed to be writing my dissertation … but all that's really happened is that I've forgotten what I felt… (paradiselost, Avatar Forums post)

Other anecdotal examples illustrate potential positive effects of fantasy on reality:

> I ALWAYS watch movies as motivation. Watching "Bloodsport", the Rocky movies, "Karate Kid"… all these movies and many more get me going. (Full_Power24, BodyBuilding.com forum)

> Homefront [Video game]. After seeing those families and the impact that a foreign invasion has on everyone, I instantly knew where I stood if/when the time comes for me to defend the rights, liberties, and lives of my children against an oppressive force… Say what you will about the game itself, but it brought my heart into my throat and made me so emotional that I still haven't brought myself to finishing it… (strozykowski, Reddit post)

Fantasy may even motivate individuals to make consequential life decisions. For example, NSA employee Edward Snowden explained that his decision to leak classified documents revealing the scope of the NSA's spying on American citizens at great personal cost was, in part, inspired by his experiences playing video games in which "[t]he protagonist is often an ordinary person, who finds himself faced with grave injustices from powerful forces and has the choice to flee in fear or to fight for his beliefs" (Kakutani, 2014).

The individuals in these examples recognize that their fantasy activities are not reality, but they nevertheless acknowledge the influence these activities have on their real-world emotions, motivation, and behaviour. These testimonies illustrate that blurring the line between fantasy and reality is not exclusive to childhood, nor is it solely caused by the inability to distinguish fantasy from reality. Furthermore, research suggests that, consistent with these anecdotal accounts, fantasy activities can have real-world consequences. For example, empathy research shows that being able to take on the perspective of a fictional other involves imagining that their feelings and motivations are your own (Igarashi et al., 2011), and comprises a subscale on the Interpersonal Reactivity Index (IRI, Davis, 1980, 1983), one of the most commonly-used measures of empathy. The ability to empathize with fictional others is associated with the ability to recognize real others' emotions (Lee, Guajardo, Short, & King, 2010), to experience emotional contagion (Haker & Rossler, 2009) and the ability to experience distress during a virtual version of the Milgram paradigm (Cheetham, Pedroni, Antley, Slater, & Jäncke, 2009). Other research has shown that engaging in fantasies - experiencing vivid mental images about one's future (e.g., being in top physical health) - can lead to greater commitment to one's goals (e.g., a health goal such as quitting smoking) when those fantasies are contrasted with incompatible aspects of one's present reality (e.g., current smoking behaviour, Oettingen, Mayer, & Thorpe, 2010). While this represents only a small subset of a much broader literature on the real-world correlates of fantasy engagement, it illustrates that healthy adults do routinely engage in fantasy, often with real-world implications.

In this dissertation I propose to test a novel account of how the manner in which people engage in fantasy activities may determine whether those activities predict subsequent cognitions and behaviour. I hypothesize that people routinely blur the lines between fantasy and reality when they immerse themselves into fantasy activities – mentally projecting themselves into the fantasy activity, becoming highly psychologically absorbed in the contents of the fantasy and allowing themselves to experience those contents as if they were real. Specifically, I explore whether there are factors that predict the extent to which people immerse into fantasy activities and test whether examining immersion helps to predict whether or not those activities have carryover effects that influence actual behaviour. In the sections that follow, I review the existing literature to make the case that examining fantasy immersion, both its predictors and outcomes, can help us better understand the phenomenon of fantasy-reality blurring in non-clinical adult populations. First, I review the literature on fantasy, providing evidence that fantasy activities can affect real-world thoughts and behaviour. I propose that despite learning to distinguish fantasy from reality in childhood, people blur the line between fantasy and reality when they experience fantasy in an immersed mode as opposed to a more distanced mode, where they treat the fantasy as an object of reflection, looking at it from an outside perspective. Second, I investigate self-immersion and self-distancing in the context of emotion regulation, reviewing the existing literature on that topic to develop my hypothesis that analogous immersion and distancing processes may be experienced in fantasy activities. Last, I review research on violent video games, a fantasy activity that represents an ideal domain for testing the role of immersion in fantasy because of its well-established research paradigms and its being a particularly immersive medium by design.

Fantasy in a Clinical Context, Children, and Healthy Adults

Given that psychologists have approached the study of fantasy from diverse perspectives, a plethora of different definitions exist. For example, Freud construed the process of fantasizing as a primitive means of desire satisfaction in a space free from reality-testing (Freud, 1911/1958), seeing fantasy as a relatively automatic, subconscious process. In contrast, others have defined fantasy as "the

construction of a fantastical space, where possibilities and the 'what ifs' can develop lives of their own'',

seeing fantasy as deliberate and intentional, often for the purpose of creating meaning (Bonovitz, 2010).

Psychologists approaching fantasy from an evolutionary perspective have defined fantasy as deliberately

entertaining counterfactuals and their consequences (Picciuto, 2009). Others, attempting to quantify the

effects of specific types of fantasies, more narrowly constrain their definition as the thoughts and mental

images one has about the future (Kappes, Stephens, & Oettingen, 2011). While a full review of the

different ways fantasy has been construed by psychologists is beyond the scope of this dissertation, it is

important to provide an operational definition of fantasy before making claims about fantasy immersion,

its antecedents, and its consequences. Presently, I define fantasy as the conscious and deliberate

entertaining of non-reality, whether through mental imagery, suppositions, role-playing, or other means.

This definition contrasts fantasy with delusions and dreaming, which are less deliberate experiences of

non-reality (Butcher, Mineka, & Hooley, 2007; Hartmann, 2010). As such, I am construing fantasy

activities as deliberate, involving suspension of disbelief in non-reality whilst knowing, if not consciously

acknowledging, that the content is not real. Having defined fantasy thusly, I next review evidence that

engaging in fantasy, despite its non-real status, may nevertheless have real-world implications.

Psychodynamic theorists were the first psychologists to recognize the potential for fantasy to

influence real-world behaviour. Many psychoanalysts see fantasy as a mechanism for satisfying the id's

needs without engaging in socially undesirable behaviour (Berner & Koch, 2009; Shustorovich &

Weinstein, 2010). Fantasy, viewed from this perspective, is naturally-occurring and can be both a

manifestation of, and solution to, psychological illness. Psychoanalytic treatments often involve helping

clients develop, interpret, or resolve tensions in their fantasies, with the client encouraged to bring the

clinician into their fantasies (Frisch-Desmarez, 2010; Heider, 2003; Stern, 2010).

More recently, clinical psychologists have studied the relationship between fantasy and

problematic behaviour. One approach focuses on the content of fantasies, suggesting that particularly

extreme fantasies may encourage undesirable behaviour. For example, aggression researchers theorize

that violent fantasies are associated with and may even cause violent behaviour in children (Jones, Brown, Hoglund, & Aber, 2010; Smith, Fischer, & Watson, 2009; Su, Mrug, & Windle, 2010) and criminal populations (Kelty, Hall, & Watt, 2011). Similarly, researchers investigating sexual dysfunction have suggested that violent or criminal sexual fantasies are associated with, and may contribute to sexual risk-taking (Adam, Murphy, & de Wit, 2011), sexual coercion (DeGue, DiLillio, & Scalora, 2010; Mattek, 2003), and criminal behaviour (Briggs, Simon, & Simonsen, 2011; Maniglio, 2010).

A second approach to studying the effects of fantasy on pathological behaviour focuses not on the content of fantasies but on the frequency of fantasy engagement and its relation to the inability to recognise or inconsistency in making the distinction between fantasy and reality (Lynn & Rhue, 1988; Wilson & Barber, 1982). Fantasy-prone individuals, those who frequently become so deeply immersed in vivid fantasies that they are often unable to distinguish fantasy from reality (Kelley, 2010) exhibit an array of problematic thoughts and behaviours, including paranormal beliefs (Gow, Hutchinson, & Chant, 2009), personality disorders (Waldo & Merritt, 2000), hallucinations (Merckelbach & van de Ven, 2001), and delusional thinking (Labuschagne, Castle, Dunai, Kyrios, & Rossell, 2010). Far from representing normal fantasy engagement, fantasy-prone individuals make up about 4% of the adult population (Wilson & Barber, 1982). As such, while the clinical literature has shown that pathological immersion into fantasy predicts undesirable behaviour, it has little to say about the predictors and outcomes of immersion into fantasy in non-clinical populations.

In contrast to clinical psychologists, developmental psychologists have long been interested in studying normal development of the ability to distinguish fantasy from reality in children (Field, 1994; Haight & Miller, 1993). Pretend play is fairly universal among children (Smith, 2010), and contributes to children's psychological well-being (Smith, 2010), social development, emotion regulation and communication (Gottman, 1983; Smith & Mathur, 2009), development of empathy and theory of mind (Ball, 2000; Gleason, 1998; Niec, 1998), language development, role-taking, and creativity (Smilansky, 1968), and reasoning and vicarious learning (Harris, 2000, 2007; Richert & Smith, 2011). While most

7

children engage in fantasy-themed play, they are nevertheless aware that the contents of their fantasies are not real and are capable of making fantasy/reality distinctions as early as 12 months (Smith, 2010; Woolley & Wellman, 1990).

While children may be able to distinguish fantasy from reality, they may nevertheless choose to temporarily suspend disbelief and act as if the fantasy were reality, as when a child says "Let's pretend that…" (Smith, 2010). Through such statements, children indicate that they acknowledge subsequent activities will involve elements of non-reality, but they are also stating their intention to nevertheless immerse themselves in the activity for recreational purposes. Analogous to the emotion regulation literature (e.g., Kross, Ayduk, & Mischel, 2005), which I will discuss in the next section, I refer to this as an immersed mode of experiencing fantasy: when a person engages in fantasy from a subjective vantage point located within the fantasy activity itself, temporarily experiencing non-reality as reality by "seeing" it with his or her own eyes and interacting with the fantasy world as though it were his or her present reality. In this immersed mode, people know that an activity is non-reality, but this fact is largely kept outside of immediate conscious awareness. This immersed mode is distinct from delusion, wherein a person is unable, even on reflection, to distinguish fantasy from reality. Children quite naturally adopt this immersed mode of experiencing fantasy, as evidenced by their seeking out and experiencing strong affective responses to engaging fantasy media (Wilson, Hoffner, & Cantor, 1987). Children also frequently facilitate fantasy experiences through the use of props or by setting rules and context for pretend play beforehand (Smith, 2010) to minimize incidents that remind them of the non-real nature of their activity and which may break their immersion.

While children often experience fantasy in an immersed mode, they may sometimes experience fantasy in a distanced mode, which also has parallels in the emotion regulation literature (Kross, Ayduk, & Mischel, 2005). In a distanced mode of fantasy engagement, the person adopts a perspective looking at the fantasy from the outside, making it into an object of reflection and analysis that leads to experiencing psychological distance from the contents of the fantasy. While it may take time to develop the ability to

experience fantasy in this more reflective, distanced mode, research suggests that children do normally develop this ability (Cantor & Wilson, 1988; Wilson, Hoffner, & Cantor, 1987). For example, younger children may adopt non-cognitive ways to distance themselves from a frightening scene, such as by holding a toy, which provides them with sufficient real-world stimulation to prevent them from immersing into the story (Cantor & Wilson, 1988). Older children may resort to more cognitive methods of distancing, including verbally expressing the non-real nature of a frightening fictional scene (e.g., "Monsters aren't real!") to undermine their immersion (Cantor & Wilson, 1988). In sum, this research suggests that both the ability and the tendency to experience fantasy in both immersed and distanced modes are present early in life.

While it has not previously been systematically studied, anecdotal evidence suggests that, like children, adults can also experience fantasy in either an immersed mode – imaginatively projecting themselves into the fantasy activity – or a distanced mode – imaginatively stepping outside the fantasy experience and reflecting on it from the perspective of an external observer. Immersion into fictional worlds allows people to derive pleasure from experiencing non-real sights, interactions, or activities from their own perspective, responding to them as if they were real events. And, like children, many adults utilize props to support their immersion, replacing boxes and sticks with movie theatres and video game consoles. The following examples illustrate how adults cultivate techniques to deliberately increase their immersion into fantasy:

> Let the real world go… make time to play a game and only that, put your phone on silence or throw it away. If there are people in the house close the door and maybe headphones… Whatever happens in the game, book or movie is the law. (Aronleon, GiantBomb.com forum)

> I would make minor tweaks to my character after every single match, although it wasn't very robust, just emblems and colors, it really made me feel like the character on screen was a conduit for me, and I only truly feel like I am immersed in a world where I'm playing as myself. Ever

since those days I'm immediately drawn to games with character customization. (Mikeosaur, RoosterTeeth forum)

[On live-action roleplaying] Larp immersion typically takes place in a carefully prepared larp environment without out-of-game distractions… and typically with a group of other good roleplayers. Immersion is a goal, actively sought… You're really there. You're feeling hot and cold, you can smell the evening campfire. And of course, you can actually fight those zombies… the border between player and character becomes more and more transparent… it allows for a much deeper experience. (Zalac, web log comment)

These examples illustrate some of the strategies adults use to enhance their immersion into fantasy worlds, which include purchasing pre-made fantasies (e.g., movies, books), creating situations that facilitate immersion, (e.g., turning off one's phone, wearing headphones to drown out background noise), and engaging in collective fantasy with others (e.g., multiplayer games, fan conventions).

While adults may often seek to experience fantasy in an immersed mode, they also sometimes distance themselves from fantasy activities as they engage in them. Reappraisal of the fantasy's contents, meta-awareness of its fantasy nature, and making the fantasy into an object of reflection all constitute a distanced mode of experiencing the fantasy. People may seek to experience fantasy in a distanced mode for a number of reasons. For example, people may adopt a distanced perspective in order to critique a fantasy's quality and compare it to other fantasy activities. Alternatively, people may seek to distance themselves from a fantasy experience in order to reduce undesirable affective or physiological responses to its contents, as the following examples illustrate:

[On scary movies] I also personally try to look for plot holes and flaws where I can, then I laugh at the movie and suddenly, it's not as bad. I don't do well in scary movies otherwise. (Skobvs, EscapistMagazine.com forum)

I think all of us have been guilty of getting angry at video games at one point. The pure

frustration of being belittled by a game… At the end of the day you just need to remember that it

is just a game. You win some you lose some. There are more important things out there.

(GrandJury, Gamespot.com forum)

Imagine the actors are trying not to laugh at how melodramatic the scene is… Notice how the

music tries to manipulate you into feeling sadder – it's all contrived to make you feel so sad. Yep,

it ruins the movie, but it might keep you from crying. (zilmag, Yahoo.com answers)

It should be noted that while I have reviewed anecdotes illustrating how both adults and children

may engage in fantasy activities in both immersed and distanced modes, I make no strong claims about

which of these modes occurs more frequently in everyday fantasy experience. I do not believe that either

mode is necessarily a "default" mode; rather, it is likely that the decision to immerse or distance from an

experienced fantasy activity is contingent upon an interaction of contextual variables (e.g. the affective

content of the experience) and individual difference variables (e.g., motivation, accessibility of learned

strategies). Moreover, establishing the conditions under which one mode or another is predominant is

beyond the scope of the present research. It is sufficient, for present purposes, to state that despite having

developed the ability to distinguish fantasy from reality, people sometimes engage in fantasy in an

immersed mode, experiencing it from an imagined point-of view that is situated within the fantasy itself,

which should tend to temporarily blur the line between fantasy and reality, and at other times they engage

in fantasy in a more distanced mode, stepping back to consider the fantasy contents as an object of

reflection instead of being imaginatively caught up in the fantasy experience. Finally, I should emphasize

that in the course of participating in a fantasy activity, a person's mode of fantasy experience might

alternate between relatively immersed and relatively distant levels of engagement in the fantasy activity

depending on shifting internal and external influences. For example, while watching a movie with my

friend, I may find the film particularly captivating based on my prior experience with films of the same

genre. As such, I immerse myself into the film, experiencing the fantasy world of the film as my present

reality and forgetting for the moment that I am sitting on a couch watching a movie with my friend. In this instance, an internal influence - my own experience with films of this genre - has facilitated my immersion into the film. As we watch, however, my friend scoffs in disapproval. In response, I may mentally step back and reflect on what is currently happening in the film as an objective observer to determine what aspect of the film has upset my friend. In this case, an external influence, my friend's disapproval, has motivated me to distance from the film's content in search of the source of my friend's disapproval. This example illustrates that neither immersion nor distancing should be considered as "default", but rather, should be considered as the product of interacting internal and external variables.

The reviewed research suggests that while the ability to distinguish fantasy from reality develops early in childhood, adults regularly experience fantasy-reality blurring, usually intentionally and for recreational purposes. I have also suggested that there are two distinct modes in which people can experience fantasy: an immersed mode, where the person experiences the fantasy as reality by centring their perspective within the fantasy world, and a distanced mode, where the person's perspective is that of an observer viewing the fantasy activity from the outside. The distinction between these two modes, I argue, is analogous, though not identical, to the distinction drawn in the emotion regulation literature between self-immersion and self-distancing. In the next section, I review the emotion regulation literature, explaining the relevance and potential application of ideas from this research to the domain of fantasy.

Self-Immersion, Self-Distancing, and Fantasy

Psychologists who study emotion regulation have drawn a distinction between self-immersed and self-distanced modes of experiencing life events. Self-immersion refers to the extent to which people experience an event from an egocentric perspective, as if seeing it through their own eyes (Kross, Ayduk, & Mischel, 2005). This perspective is contrasted with self-distancing, wherein a person experiences and processes an event from an ego-decentered position, seeing it occur from a reflective distance as if through the eyes of a disinterested observer (Kross, Ayduk, & Mischel, 2005). Research on this topic has

largely aimed to test the hypothesis that when recalling negative past events, doing so from a self-distanced perspective rather than from a self-immersed perspective leads to less rumination and conflict escalation (Ayduk & Kross, 2010a). Self-immersing into a recalled negative event by phenomenologically merging the present self with the self in the recalled scene leads to maladaptive rumination, wherein people repeatedly focus on their negative feelings (Smith & Alloy, 2009), perpetuating negative mood states and undermining the ability to problem solve (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). In contrast, adopting a self-distanced perspective by phenomenologically separating the present self from the self in a recalled negative event, allows one to construe the event at a more abstract level, facilitating emotion regulation and effective reflection without rumination (Ayduk & Kross, 2010a).

To illustrate the effect of adopting a self-immersed versus a self-distanced perspective on subsequent affect, cognition, and behaviour, Mischkowski, Kross, and Bushman (2012) had a confederate provoke participants by insulting them during an in-lab task. Participants were then randomly assigned to recall the task, either adopting a self-immersed perspective ("see the situation unfold through your own eyes as if it were happening to you all over again") or a self-distanced perspective ("watch the event unfold from a distance… watch the situation unfold as if it were happening to the distant you all over again"). As predicted, participants who adopted a self-distanced perspective showed less implicit aggression, less aggressive affect, and less aggressive behaviour than those who adopted a self-immersed perspective. Comparable results have been obtained when asking participants to recall more distant anger-related experiences (Ayduk & Kross, 2010a), depression-related experiences (Kross & Ayduk, 2009), and positive experiences (Gruber, Harvey, & Johnson, 2009). Researchers have also shown the effects to be both short-term and long-term (Kross & Ayduk, 2008), and have measured individual differences in people's tendency to spontaneously self-immerse or self-distance (Ayduk & Kross, 2010b).

While the reviewed literature has shown the precursors and implications of self-immersing and self-distancing into recalled events, it has not specifically tested whether these processes operate within a fantasy context – that is, whether immersing into a completely fictional event has similar precursors and

outcomes as self-immersing into a recalled past event. Self-immersion effects *have* been found for self-relevant hypothetical events; for example, in one study participants were asked to discuss how the economic recession would impact their career prospects from either a self-immersed or self-distanced perspective. Self-immersed participants were less likely to recognize the world as existing in a state of flux and were more likely to see the future as fixed and unchanging (Kross & Grossmann, 2012). A similar study had participants imagine an instance of relationship infidelity from either a self-immersed perspective (i.e. their relationship) or a self-distanced perspective (i.e. their friend's relationship) and found that, compared to those who self-immersed, self-distanced individuals adopted wiser reasoning strategies (Grossmann & Kross, 2014). While self-relevant hypothetical events are comparable to fantasy in that they are events that have neither happened nor are presently occurring, they are nevertheless grounded in a plausible future reality. Moreover, self-immersion and self-distancing effects involve recalling or imagining events where the participant is the subject of the event. In many fantasy activities, however, another character is often the subject of the event. This leaves open the question of whether analogous immersion and distancing effects occur in fantasy activities that are not about the self. A related literature on narrative transportation suggests that a phenomenon like immersion may indeed extend to the domain of fantasy.

For at least two decades, scholars from disciplines as diverse as communication, anthropology, and psychology have sought to understand the process by which readers enter the worlds of fictional stories and return to the real world changed by the experience (van Laer, Ruyter, Visconti, & Wetzels, 2014). Using the field's terminology, these researchers are interested in how transportation –detachment from the real world by becoming engrossed in a fictional narrative – causes readers to change their attitudes and behavioural intentions in accordance with the story's content (Gerrig, 1993; Green, 2008; Green & Brock, 2000, 2002). In a study by Green and Brock (2000), for example, participants read the story "Two Were Left", about an Eskimo boy and his dog stranded without food on an iceberg. In the story, both the boy and the dog contemplate killing one another for food, but in the end, are unable to

bring themselves to kill their companion. Participants were either instructed to read the story as they normally would, allowing them to become transported into the narrative, or to read the story while circling words and phrases that a 4th-grade student would be unable to understand, instructions designed to prevent the reader from becoming transported in the story. After reading the story, participants were then asked about their beliefs regarding real-world issues relevant to the story (e.g., "Life is not worth living without sticking to one's values."). Participants in the normal-reading condition showed greater endorsement of the beliefs than participants in the 4th-grade circling condition, an effect mediated by the extent to which participants reported becoming transported into the story. Other transportation studies have found similar effects, with transportation affecting attitudes, beliefs, and behavioural intentions regarding alcohol and drug consumption (Banerjee & Greene, 2012a, 2012b, 2013; Durkin & Wakefield, 2008), health-related knowledge (Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013), and pro-social behaviour (Johnson, 2012). Research has also suggested that individuals may differ in their transportability, or the susceptibility to becoming transported into, and subsequently influenced by, literary narratives (Dal Cin, Zanna, & Fong, 2004). In sum, transportation research has shown that, whether experimentally manipulated or assessed as an individual difference, the process of deliberately leaving the real world to enter a narrative world can have short-term and long-term effects on real-world attitudes and behavioural intentions.

While transportation research provides evidence that individual differences predict an experience akin to self-immersing into fantasies and that this self-immersing process can have real-world effects, the transportation literature is limited in three important ways. First, the transportation literature has focused extensively on literary narratives, with only occasional studies focusing on other media such as television (Durkin & Wakefield, 2008; van Laer et al., 2014). Given that many fantasy-themed activities frequently involve non-literary media such as video games, one cannot assume that transportation effects necessarily occur for any fantasy activity. A second important limitation in the transportation research is its emphasis on strong mental imagery and empathy with fictional characters as mechanisms. According to

transportation researchers (e.g., van Laer et al., 2014), for transportation and narrative persuasion to occur, readers must be able to empathize with a story's characters (Slater & Rouner, 2002) and to experience a story through vivid mental imagery (Green & Brock, 2002). While empathy and mental imagery may be prerequisites for persuasion via literary narratives, other media, such as video games, may not require the reader to devote significant mental resources to generating mental imagery, as visual imagery is provided by the medium itself. As such, the relationship between mental imagery and real-world effects may be absent in particularly visual media. Similarly, the role of empathy in non-literary domains is unclear, as the interactive nature of video games may allow the player to immerse into the experience for reasons unrelated to their empathy for characters within the narrative. The last and perhaps most important limitation of the literary transportation research is the specificity of the process to narrative persuasion. Whereas the self-immersion framework proposes a general psychological process that explains diverse effects across a multitude of contexts, studies of transportation propose a psychological process specific to persuasion in a narrative context. As such, finding that self-immersion effects generalize to the domain of fantasy may help to frame transportation effects within a broader, more general psychological theory. Taken together, the transportation literature provides evidence for the plausibility of searching for effects analogous to self-immersion effects in the domain of fantasy engagement, which may help to overcome the current narrowness of focus in the transportation literature.

To summarize, research has suggested that experiencing recalled events in a self-distanced or a self-immersed mode is both predicted by individual difference variables and can predict cognitive and behavioural outcomes. While self-immersion research has not yet been extended to the domain of fantasy, research on literary transportation, a conceptually related construct, suggests that we may expect analogous effects of immersion and distancing in the domain of fantasy. Together, these lines of work provide the rationale for my hypothesis that there may be individual differences in the extent to which people immerse into a fantasy activity which, in turn, may predict the tendency to experience congruent real-world thoughts and behaviour after engaging in the fantasy activity.

In the following section, I review the video game violence literature which, while having documented a relationship between experience with violent video games and real-world aggression, has yet to systematically test whether player immersion may mediate the relationship between prior video game experience and aggression after playing a violent video game.

Video Games, Immersion, and Aggression

In this final section, I review research on the relationship between a history of playing violent video games and aggressive behaviour, as well as the relationship between playing a violent video game in a laboratory setting and aggressive behaviour after playing the video game. Video games, which often involve suspending disbelief in the game's non-reality during play, represent a particularly well-studied fantasy activity. I begin by exploring the breadth of video game research, reviewing the individual difference predictors and behavioural effects of this fantasy activity. I outline the paradigms within which this research is conducted and the potential applicability of these paradigms to my own hypothesis. Finally, I end this section by outlining why video games, because of their particularly immersive nature, may represent an ideal medium for testing my hypotheses about immersion into fantasy activities.

In the past few decades, research on the effects of video games has become an area of particular interest, as illustrated by the more than 4,000 peer-reviewed publications returned in a PsycNET search for articles containing the words "computer games" or "video games" since 2000. While a full review of this literature is beyond the scope of this dissertation, it is informative to consider the range of cognitive and behavioural effects and associations that have been demonstrated. For example, research has shown that greater experience with video games is associated with cognitive benefits and detriments, including improved spatial and temporal processing (e.g., Appelbaum, Cain, Darling, & Mitroff, 2013; Green & Bavelier, 2006, 2007), attention control (Chisholm & Kingstone, 2012; Dye, Green, & Bavelier, 2009), perceptual strategy selection (Clark, Fleck, & Mitroff, 2011), short-term and working memory (e.g., Boot, Kramer, Simons, Fabiana, & Gratton, 2008; Sungur & Boduroglu, 2012), distraction suppression (Mishra,

Zinni, Bavelier, & Hillyard, 2011), and decreased emotion processing (Bailey & West, 2013). Other studies test the association between video game play, personality, and behaviour: experience with video games is significantly associated with a player's life satisfaction (Gaetan, Bonnet, & Pedinielli, 2012), self-concept (Durkin & Barber, 2002; Gaetan, Bonnet, & Pedinielli, 2012), antisocial behaviour (DeLisi, Vaughn, Gentile, Anderson, & Shook, 2013), pro-social behaviour (Gentile et al., 2009), positive mental health (Durkin & Barber, 2002), task-independent persistence (Ventura, Shute, Zhao, 2013), experienced moral distress (Gollwitzer & Melzer, 2012), and perspective-taking (Shaffer, 2006). While much of this work is still in its infancy and future research on these subjects will, in many cases, need to overcome issues of confounds, causation, and moderators, as a whole, this research shows that playing video games can have a plethora of real-world effects on players.

By far the most-studied video game effect is the relationship between playing violent video games and aggression. Illustratively, in the most recent meta-analysis on video game violence effects, 381 separate studies comprising more than 130,000 participants were analyzed, revealing a small, but significant ($r = .19$) causal link between playing violent video games and aggressive affect, cognition, and behaviour (Anderson et al., 2010). Video game violence effects are most often interpreted through the General Aggression Model (GAM), a social-cognitive model of aggressive behaviour (Anderson & Bushman, 2002; Anderson & Carnagey, 2004; Bushman & Anderson, 2002). Within this model, the effects of violent video game play on aggression are considered both at a proximal level – aggression in the minutes following violent video gameplay - and at a distal level – individual differences in aggressive personality and behaviour patterns as a result of a history of violent video game play (Anderson, Gentile, & Buckley, 2007; Anderson et al., 2010). At the proximal level, experimental studies often reveal that people who play a violent video game are more likely to show cognitive (e.g., Bluemke, Friedrich, & Zumbach, 2009), affective (e.g., Arriaga, Esteves, Carneiro, & Monteiro, 2006), and behavioural (e.g., Zhang, Li, Song, Li, & Wei, 2009) aggression in the minutes following gameplay as compared to those who played a non-violent game (e.g., Bluemke, Friedrich, & Zumbach, 2009), or those who watched

someone else play (e.g., Zhang, Li, Song, Li, & Wei, 2009). At the distal level, longitudinal and correlational studies have found that the extent to which participants play violent video games predicts delinquent behaviour (e.g., Anderson & Dill, 2000; DeLisi et al., 2013), self- and other-reported fights (e.g., Gentile, Lynch, Linder, & Walsh, 2004), and attitudes toward aggression (e.g., Krahé and Möller, 2004). Longitudinal studies that assess violent video gameplay and aggression variables at multiple times provide evidence supporting the causal influence of playing video games on aggression (e.g., Ihori, Sakamoto, Shibuya, & Yukawa, 2003). While proximal and distal factors may seem unrelated, over time, repeated exposure to violent video games may have long-term effects on a person's aggressive tendencies through the gradual accumulation of aggressive attitudes, beliefs, and schemas (Anderson, Gentile, & Buckley, pp. 40-58). In summary, this research shows that playing violent video games can increase aggression despite the fact that most gamers presumably know that the violent content in their games is not real.

Violent video games represent an ideal context within which to test my hypotheses about immersion into fantasy activities for two reasons. The first reason is pragmatic: This research provides a number of well-validated paradigms and measures of the variables of interest. For instance, in a typical violent video game laboratory study, participants are given one of several video games to play (e.g., violent and non-violent) for several minutes. After playing, participants complete one of several measures of aggression, for example participants' tendency to force another opponent to endure a loud, unpleasant blast of noise (Anderson & Bushman, 1997). Such paradigms allow the researcher to control for previously-assessed variables of interest, such as trait aggression, and to test for potential moderating variables, such as prior video game experience. By testing my hypothesis within this well-validated paradigm, I am better able to make claims about the effects of immersion and experience on post-game aggression without having to first validate these measures myself.

The second reason violent video games represent an ideal domain within which to test my hypothesis is theoretical: Video games are designed to be a particularly immersive experience for players

(Grossman & Degaetano, 1999). The popular role-playing video game, *Fallout: New Vegas*, illustrates this point. In this game players navigate through a post-nuclear radioactive wasteland. The game's designers went to great lengths to make the game as immersive as possible by creating a fantasy world within which the player can interact with as few reminders that they are playing a game as possible. The in-game world is 16 square miles and contains nearly 450 characters with whom the player can interact within a complex social network – befriending some characters antagonizes other characters, and players develop reputations that affect how others interact with them (Fallout Wiki). *Fallout: New Vegas* also allows the player to make meaningful decisions: customizing the appearance of their character, choosing how their character responds to others from a list of possible dialogue options, and freely exploring the game environment in whatever direction or manner they choose. Such design aspects made the game a particularly immersive experience for players:

> "But where it truly shines is in its immersion. I wasted over 150 hours playing *Fallout 3* on a single character. I've wasted about 70 on *Fallout: New Vegas* so far, and I can already see that it is superior in every way – It's more balanced, brings more content, and more freedom. Instead of just the Good, Neutral, and Evil path, the lines are so much more blurred, and if you're immersed, then you will reflect heavily on your choices." (RyuZebian, Metacritic.com)

> "The sheer level of variables, mutability, and branches within this game and its engrossing story is simply mind-boggling. It's a triumph to good storytelling and, more importantly, the sheer magic and power that lies in immersion and activation of the human imagination." (Maltuvion, Metacritic.com)

As reflected in the above quotations, players immersed into the fantasy world of *Fallout: New Vegas* and acknowledged that immersion was a desirable feature of the experience. Game designers seek to create video games to capitalize on consumer demand for these immersive qualities. The focus of designers on immersion is also apparent in the newest generation of game consoles, which attempt to increase player

immersion through input devices aimed at making interacting with the game as natural-feeling as possible. Devices such as the Xbox One Kinect are able to read the player's voice, body position, and movement as inputs into the game. Given these examples of how games are designed to facilitate immersion, it seems particularly likely that immersion plays an influential role in psychological responses to playing video games.

Despite abundant research on video game violence effects and the efforts of game designers to make games as immersive as possible, no empirical work has tested whether immersion into video games mediates the relationship between experience with violent video games and aggression. The little relevant research that exists is only tangentially related to immersion or has not investigated the relationship between immersion and post-game behaviour. For example, research has shown that factors such as game peripherals and image quality affect the illusion of sensory presence within a game environment (Bracken & Skalski, 2009; McGloin, Farrar, & Krcmar, 2013; Taylor & Barnett, 2013; Williams, 2013), which has only sporadically been associated with aggression. Other studies have investigated the role of immersion in identity formation within a game environment (Donard, 2012) or have only qualitatively studied game transfer phenomena through player interviews (Ortiz de Gotari, Aronsson, & Griffiths, 2011). Perhaps most relevant, correlational studies have found that more experienced video game players are more likely to feel immersed in games and to experience greater mindfulness while playing a game (Gackenbach & Bown, 2011). While this last study's results suggest that experienced players are more likely to become immersed in video games, there has been no research showing that to the extent participants become immersed in games, particularly violent ones, they will show greater post-game aggression. There is thus much potential for new insights to emerge from more systematically investigating whether immersion contributes to the psychological and behavioural effects of playing video games.

Overview of the Present Studies

The present research will test five hypotheses that have emerged from the preceding literature review. First, I hypothesize that the more prior experience individuals have with a particular fantasy activity, such as playing violent video games, the more immersion they will experience while engaging in an instance of that fantasy activity. This hypothesis is supported by both the anecdotal evidence provided in the literature review as well as the video game literature. As quotes from people who engage in fantasy activities have suggested, people discover and employ diverse strategies aimed at increasing immersion into their preferred activity. Many of these strategies appear to be learned over time, or are learned through interaction with others who engage in similar activities, which suggests that the more time a person spends engaging in a particular fantasy activity, the better able they are to immerse themselves in that activity as a result of both learned strategies for self-immersion and practice applying these strategies. Evidence for this can be found in the research on the cognitive effects of violent video game play, which has shown that more experienced video game players are more likely to feel immersed in games and to experience greater mindfulness while playing a game than less experienced players (Gackenbach & Bown, 2011).

Second, I hypothesize that experiencing fantasy in an immersed or distanced mode can be experimentally manipulated by changing characteristics of the fantasy activity to facilitate or inhibit people's ability to immerse themselves into the activity. This hypothesis is supported by research on self-distancing and self-immersion processes in emotion regulation and by research on transportation. In studies showing that self-distancing reduces maladaptive rumination, participants are often induced to experience a recalled event from either a self-immersed or a self-distanced perspective through instructions to see the recalled situation through their own eyes or through the eyes of a distant observer, respectively (e.g., Kross, Ayduk, & Mischel, 2005; Mischkowski, Kross, & Bushman, 2012). Subsequent manipulation checks reveal that such manipulations lead to significant differences in participants' self-assessed psychological distance from the recalled event. Similar patterns have been observed in

transportation research, where participants' self-reported transportation into a story can be successfully manipulated through instructions that participants either immerse themselves into a story or evaluate the story's vocabulary (Green & Brock, 2000). Given this converging evidence, I predict that it should be possible to manipulate the extent to which people experience a fantasy activity in either a distanced or immersed mode, either by using a similar manipulation of task instructions or by changing the task itself so that participants experience the fantasy activity from more or less psychological immediacy or distance.

Third, I hypothesize that after engaging in fantasy, individuals who immerse themselves into the fantasy will be more likely than those who distance to subsequently think and behave in ways that are congruent with the fantasy content. This hypothesis is supported by prior research that has examined the role of self-immersion and self-distancing in regulating emotions regarding past or future autobiographical events and by research on violent video games. Research on self-immersion and self-distancing, for example, has shown that adopting a self-immersed perspective causes participants to relive and re-experience the emotions of past events rather than to reassess their responses to the events, leading to stronger affective and physiological responses that are congruent with the valence of the recalled events (e.g., Ayduk & Kross, 2008). This hypothesis is also supported by the video game violence literature, where the episodic component of the GAM suggests that in the minutes following video game play, players experience increased aggressive thoughts, aggressive affect, and physiological arousal, specifically when the game's content contains aggression (Anderson, Gentile, & Buckley, 2007). Taken together, these studies suggest that cognitive and behavioural measures should be more affected by residual activation of these processes for immersed participants than for distanced participants because the latter are less likely to activate content-congruent cognitive and affective processes while engaging in the fantasy activity. I therefore hypothesize that people, to the extent that they become highly immersed in a fantasy activity, should be more likely to experience activity-congruent thoughts, feelings, and behaviours in the minutes following the activity.

Fourth, I hypothesize that the more prior experience individuals have with a particular type of fantasy activity, the more their thoughts and behaviour should reflect the content of a recent experience of that fantasy activity. This hypothesis is supported by prior fantasy research showing the diverse ways that regular fantasy engagement can affect a person's thoughts, feelings, and behaviour. For example, several studies have suggested a link between regularly experiencing violent-themed fantasies and real-world violent behaviour (e.g., Kelty, Hall, & Watt, 2011). Taken together, this research substantiates my prediction that greater experience with a particular fantasy activity should be associated with fantasy-congruent thoughts and behaviour after engaging in that fantasy activity.

Finally, I hypothesize that immersion into a fantasy activity should significantly mediate the relationship between individual differences in prior experience with that particular fantasy activity and a person's tendency to exhibit thoughts and behaviour that correspond to a recent episode of that fantasy activity. The rationale for this hypothesis is grounded in prior research showing that transportation into a narrative mediates the relationship between individual differences in transportability and narrative-relevant attitudes after reading the story (Dal Cin et al., 2004). Generalizing from these results, I suggest that analogous mediation should occur in a fantasy context.

I have, to this point, shown how the five hypotheses are supported by converging evidence from the existing research on fantasy, self-immersion, transportation, and video game violence. Despite the literature contributing to these predictions, the present research is the first to systematically examine all five hypotheses at once, looking at the precursors of, and cognitive and behavioural outcomes of, immersion in the context of a fantasy-themed activity. I test predictions related to these five hypotheses in a set of three experimental studies which use violent video games to represent a recreational fantasy activity. In all three studies, participants are randomly assigned to play a violent computer game in one of two conditions designed to manipulate the extent to which they experience gameplay in an immersed or distanced mode. Participants' immersion is assessed along with their prior experience with video games and their aggressive thoughts or behaviours after playing the violent game. In Study 1, I test my

hypotheses in a laboratory study attempting to manipulate immersion through the visual perspective from which participants play a violent video game. In Study 2, I conduct a similar study online, using a more general sample of participants and a projective measure of aggressive behavioural intentions. In this study I attempt to manipulate immersion directly through a set of written instructions explaining the video game to participants. Finally, in Study 3, I attempt to indirectly manipulate immersion by varying key features of the game's content that I expected to elicit greater immersion into the game for a subset of participants who are chronically sensitive to those features of the game. Specifically, I test the prediction that for participants who are high in chronic fantasy engagement, playing a fantasy-themed version of a video game will be more immersive than playing a mundane-themed version of the same game.

Study 1: Violent Video Games, Immersion, and Behavioural Aggression

Study 1 was my first attempt to test both precursors and effects of immersion into a fantasy activity. The fantasy activity consisted of participants playing a violent video game for approximately 10 minutes, as video games represent a particularly immersive medium and it seemed plausible that participants would be more likely to become immersed into a video game in 10 minutes than they would into a book or a movie. Moreover, by having participants play a video game, I was able to ensure they were all exposed to the same graphical content and the same level of violence, something not possible in a participant-generated fantasy activity such as daydreaming, roleplaying, or creative writing. The present study used a paradigm adopted from violent video game research and adhered to the "best practices" criteria established by top researchers in the field of video game violence studies (Anderson et al., 2010).

To assess possible predictors of immersion into the video game, I drew upon a design comparable to that employed by Dal Cin et al. (2004), where they investigated individual difference variables that predicted state transportation into a narrative while also manipulating state transportation through the type of narrative participants experienced. In the present study, participants' prior experience with violent video games was assessed as a plausible individual difference variable, representing a measure of domain-specific fantasy experience.

To experimentally manipulate immersion, I employed a methodology that was inspired by a commonly used manipulation of self-immersion in the emotion regulation literature. Many studies of self-immersion and self-distancing operationalize these variables by inducing participants to visualise a personal experience either from an experiencer's perspective or from a distanced observer's perspective. For example, in a study that examined the role of self-immersion and self-distancing in regulating anger, researchers induced participants to recall a recent transgression committed against them by visualizing that event either through their own eyes or through the eyes of a distanced observer (e.g., Mischkowski, Kross, & Bushman, 2012). Conveniently, some video games allow the player to toggle between

experiencing the point-of-view of their character within the game, which is often described as the first-person perspective, and experiencing the point-of-view of an observer watching their character from an outsider's perspective, which is often described as the third-person perspective. I capitalized on this feature as an analogue of the visual perspective manipulation typically used to induce self-immersion and self-distancing in emotion regulation studies. Surprisingly, there has been a lack of psychological research systematically assessing whether manipulating a game's perspective affects player immersion and post-game aggression. Despite this, first-person shooter games are often assumed to be associated with player immersion and aggression effects in both academic research (e.g., Grossman & DeGaetano, 1999; Kirsh, 2006; Tamborini et al., 2004) and in popular media, as the following examples illustrate:

> The mass shootings in recent years in Newtown, Conn. and Aurora, Colo., were both committed by young men who had regularly played first-person shooters. (Bilton, 2014)

> In an Early Day Motion sponsored by MP Keith Vaz [in response to a mass shooting in France] he said the government should provide for closer scrutiny of aggressive first-person shooter video games. (Allen, 2012)

In the present study, participants were randomly assigned to play the same video game from either a first-person perspective, analogous to the self-immersion condition from past research, or a third-person perspective, analogous to the self-distanced condition from past research, holding constant all other features of the game. Immersion was assessed using measures adapted from the existing literature on self-immersion (e.g., Mischkowski, Kross, & Bushman, 2012).

While my goal is to test the precursors and effects of immersion into video games, a number of related phenomenological aspects of playing video games may also be at play. Research on literary transportation, for example, has suggested that identifying and empathizing with characters in narratives is critical to experiencing narrative transportation, as is the experience of vivid mental imagery and sensory presence within the fantasy environment (van Laer et al., 2014). While likely related to

immersion, and likely to contribute to feelings of immersion into a fantasy environment, identification refers to the ability to appreciate the emotions and motivations of characters in a narrative, while sensory presence refers to the ability to conjure up and perceive images of a fantasy environment as being real. Immersion, in contrast, involves the extent to which the event constitutes the here-and-now reality that the self is psychologically involved in, or the experiencing of the event from a vantage point situated within the fantasy (e.g., Ayduk & Kross, 2010a). Given that all three of these variables, immersion, sensory presence, and character identification, are likely simultaneously experienced by video game players, and given that I am interested specifically in immersion, I assessed participants' experience of these three phenomenological variables, allowing me to test immersion effects while controlling for sensory presence and character identification. Two other game phenomenology variables, game enjoyment and perceived difficulty, were also assessed as potential third variables. Inexperienced players may have found the game too difficult or unenjoyable, which could have led to boredom with the study and, as a result, could have accounted for the predicted aggression differences between experienced and inexperienced players instead of immersion.

To assess post-game aggressive thoughts and behaviour, participants completed two of the best-validated measures of cognitive and behavioural aggression: a measure of the cognitive accessibility of aggressive words and a measure of physical aggression against a competitor in a lab task, respectively. Finally, individual differences in aggressive personality were controlled for statistically and were based on participants' trait aggression scores as assessed several weeks prior during mass testing.

Based on the hypotheses developed in the study overview, I tested five predictions:

1) Participants' prior experience with violent video games will positively predict the extent to which they report immersion into the violent video game.

2) Participants playing the game from the first-person perspective should experience greater immersion than those playing from the third-person perspective.

3) The extent to which participants report immersing into the violent video game should positively predict their post-game aggression, even when controlling for related game phenomenology variables such as character identification and game enjoyment.

4) Participants' prior experience with violent video games should also positively predict their post-game aggression.

5) The extent to which participants report immersing into the video game should mediate the relationship between prior video game experience and post-game aggression, even when controlling for related game phenomenology variables.

Method

     Participants. Participants were 197 Waterloo undergraduates (114 female) recruited from a participant pool that included students ranging from first year to senior year. Participants completed the study in exchange for psychology course credit.

     Procedure. During a mass testing session participants completed a measure of trait aggression. A few weeks later, in the study's recruitment materials, participants were told that they would be participating in an in-lab study investigating the effect of video game play on reaction time. Participants were told they would be randomly assigned to play one of several possible video games, followed by several measures of reaction time, and finally they would complete measures of game engagement and prior experiences. Two deceptions were used in this cover story: 1) informing participants that the aggression measures were reaction time measures and 2) telling participants that they were randomly assigned to play one of several possible games when, in fact, all were assigned to play the same game. These deceptions attempted to avoid demand characteristics or the activation of pre-existing beliefs about the effect of video game violence on aggression.

All participants played a modified version of the popular PC shooter game *Half-Life 2* for approximately 10 minutes. The game was modified through Hammer Editor, the game's built-in editing tool, which allowed me to control the layout and setting in which the game's action took place. The environment within the game was relatively sterile and devoid of potential primes or distractions, consisting of concrete-textured floors, walls with brick barriers for cover, and a series of long, fully-enclosed, well-lit corridors interspersed with large, open rooms. Enemies wearing futuristic-looking, face-obscuring armour and armed with shotguns were placed throughout the level (see Appendix A, p. 101). The game's activity involved the player navigating through this setting, shooting at their enemies and avoiding being shot themselves. The enemies were programmed to fire at the player as the player approached. Players were given unlimited health so their character could not be killed by the enemy players, and unlimited ammunition for their pistol. Participants were randomly assigned to one of two conditions (1st person vs. 3rd person) in a between-subjects design. In the first-person perspective, players saw the game as if through the eyes of the character, while in the third-person perspective, players saw their character on-screen from a "chase camera" which followed behind the character (see sample 1st and 3rd person shots in Appendix B, p. 102). Before playing, participants read a short description which indicated that the game took place during an alien invasion of Earth in which innocent people were being killed by the invaders[1]. The research assistant then demonstrated the game's controls and allowed them to familiarize themselves with the controls before beginning the game session.

After approximately ten minutes of playing, the research assistant stopped the game and presented participants with a word completion task that assessed aggressive thought accessibility. The

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[1] A second between-subjects variable unrelated to the present hypotheses was also manipulated: the framing of the player's character as either a heroic character or as a villainous character. In the heroic condition, participants were told "You are a member of the National Guard and you have been tasked with patrolling the city, shooting as many alien invaders as you can in order to protect civilians and restore order." In the villainous condition, participants were told "You are a member of this alien invasion force, the Dominon, and in the game your goal will be to kill as many of the National Guard troops as you can so that you can continue your invasion of the Earth unimpeded." This manipulation had no effect on any of the variables of interest.

research assistant told participants the task was a measure of thinking speed, and participants were asked to complete as many word fragments as possible in 3 minutes.

Next, participants completed what they believed was a measure of reaction time that involved competing against another participant (actually the computer) in a reaction time challenge where the winner was permitted to blast their opponent with an intense burst of unpleasant noise. The task itself was a measure of behavioural aggression and took approximately ten minutes.

Next, the research assistant gave participants a booklet of questions that asked participants to evaluate the video game they had played and report their prior experience with video games. The booklet contained measures of game phenomenology, affect, character identification, guilt, enjoyment, appropriateness of in-game aggression, fantasy engagement, an evaluation of the game, and prior experience with video games.

Finally, participants were fully debriefed about the study's deception. During the debriefing, research assistants probed for participant suspicion, asking participants what they thought the research question was and, if they indicated that they felt suspicious about the study's purpose, to indicate what part of the study they were suspicious about. Research assistants flagged 10 participants who reported either familiarity with the study procedure or who indicated, during or after the competitive reaction time task, that they did not believe they were playing against an actual opponent. These 10 participants were dropped a priori from subsequent analyses.

Measures.

Trait aggression. As part of a mass-testing questionnaire, participants completed the Buss-Perry Aggression Questionnaire, a well-validated measure of trait aggression consisting of 29 items answered on a 5-point Likert scale (*1 – Extremely Uncharacteristic of Me, 5 – Extremely Characteristic of Me,* e.g., "I have trouble controlling my temper", Anderson & Dill, 2000; Buss & Perry, 1992, $\alpha = .93$: see Appendix C, p. 103).

Aggressive thought accessibility. To measure aggressive thought accessibility, participants received a page of 98 partially-completed word fragments and were asked to complete as many as possible within 3 minutes (e.g., h _ r _). Prior research has validated this as a measure of aggressive thought accessibility in video game research (Anderson, Carnagey, & Eubanks, 2003; See Appendix D, p. 104). Participants' scores are calculated by giving them a score of +1 for every unambiguously aggressive word completed (e.g., "hurt"), a score of +0.5 for every ambiguous word completed (e.g., "hurl"), and a score of 0 for every non-aggressive word completed (e.g., "here"). Research assistants coded the words using a pre-established coding guide (Anderson, 1999). Scores were summed and divided by the total number of words completed, yielding an index of aggressive thought accessibility.

Behavioural aggression. In the Taylor Competitive Reaction Time Task (TCRTT; Anderson & Bushman, 1997; Bushman & Baumeister, 1998), participants were informed that their reaction time would be assessed in a competition against an anonymous online participant drawn at random from a network of psychology research participants to see who could respond fastest to a box that changed colour. Whoever clicked first would get to deliver a blast of noise to their opponent. Participants were then shown how to set the intensity and duration of the noise blasts to be delivered to their opponent, on scales with 11 discrete settings, where "1" to "10" corresponded to 60 dB to 105 dB for intensity and 0.5 seconds to 5 seconds for duration. "0" was also an option for both intensity and duration. Participants could also see the intensity and duration settings their opponent had chosen for them after each trial (see Appendix E, p. 105). The program ensured participants lost the initial trial, and were presented with an unpleasant blast of noise which, on the screen, was revealed to be of maximum duration ("Level 10", 5 seconds) and maximum intensity ("Level 10", 105 decibels). Participants then completed 24 more trials, setting the intensity and duration levels of the noise they wanted to deliver to their opponent before each trial (25 trials, $\alpha_{INT} = .97$; $\alpha_{DUR} = .96$). The game was programmed so that participants won half of the trials, the order of which was determined at random. The intensity of the opponent's noise blasts fluctuated from trial to trial but became less intense over time. Because the intensity and duration of the

blasts set by participants were very highly correlated (r = .81), these two scores were standardized and averaged to form a composite behavioural aggression score for each participant.

Immersion. Immersion into the video game was measured with 3 Likert scales, adapted from previous research, which asked participants to indicate the extent to which they experienced feelings of immersion while playing the game. The first asked participants to "indicate the extent to which you experienced gameplay… *1 - Predominantly as an immersed participant*, *7 – Predominantly as a distanced observer*" (from Ayduk & Kross, 2010b). A second item asked participants to "indicate how far away from the gameplay you felt… *1 – Very close, as if through my own eyes*, *7 - Very far, as if an observer*" (from Ayduk & Kross, 2010b). The third item asked participants to indicate the extent to which they felt that "I really got into the game" (*1 – Not at all*, *7 – Very much;* adapted from Brockmyer, Fox, Curtiss, McBroom, Burkhart, & Pidruzny, 2009). The items were re-scored such that higher values indicated more immersion, and were combined to form a measure of immersion into the video game (α = .79).

Other game phenomenology variables. In addition to the self-immersion items, participants completed measures assessing 2 other, related features of game phenomenology: 1) identification with the game character (4 items; e.g., "I could identify with the game character"; Fischer, Kastenmuller, & Greitemeyer, 2010; α = .79), and 2) sensory presence in virtual environments (3 items; e.g., "How much did you feel as if you were walking when your character walked?"; Jin & Park, 2009; α = .90). All items were assessed on a 7-point Likert scale (*1 – Not at all*, *7 – Very Much*; See Appendix F (p. 106) for all the game phenomenology items.

Game enjoyment. Five items answered on a 5-point Likert scale (*1 – Totally Disagree, 5 – Totally Agree)* measured participants' enjoyment of the game (e.g., "To what extent would you agree that playing the computer game was very interesting"; Tauer & Harackiewicz, 1999, Appendix G, α = .91, p. 107).

Game difficulty. The experienced difficulty of the game was assessed with a single item (i.e., "Difficult") embedded among 7 other items (e.g., "Violent"; "Action-Filled") in a questionnaire that asked participants to evaluate how well each of the listed words described the video game from earlier in the session. Participants evaluated the difficulty and other features of the game on a 7-point Likert scale (*1 – Defintely Not, 7 – Extremely*; Appendix H, p. 108).

Video game experience. Participants were asked to use a Likert scale that ranged from 1 ("no experience at all") to 10 ("extremely experienced"), to rate how much experience they had with: 1) 1st Person Shooter Games, 2) 3rd Person Shooter Games, 3) Violent Games, and 4) Non-Violent Games. Participants' ratings of experience with 1st and 3rd person shooter games and with violent video games were averaged together to form a 3-item composite index of violent video game experience. ($\alpha = .92$).

Additional measures. A variety of other exploratory measures were also assessed in the present study, and are described in full in the attached appendices. These included measures of affective response (Appendix I, p. 109), chronic fantasy engagement (Appendix J, p. 110), self-character merging (Appendix K, p. 111), game-related guilt (Appendix L, p. 112), dehumanization of enemy characters (Appendix M, p. 113), perceived appropriateness of game aggression (Appendix N, p. 115), and perceived character and game realism (Appendix O, p. 116).

Results

The manipulation of visual perspective had no effect on immersion, the other game phenomenology measures (all ps > .19), or post-game aggression ($p = .11$). Additionally, the manipulation of visual perspective did not interact with prior video game experience to predict game phenomenology or post-game aggression (all ps > .20). As such, I collapsed across visual perspective for all subsequent analyses.

Descriptive statistics and preliminary analysis. Participants' evaluations of the game in this study and the following studies are provided in Appendix P (p. 117) to allow perceived game quality to be

compared across studies. Summary statistics for the principal measures from Study 1 are provided in Table 1 (p. 90), and correlations between these measures are provided in Table 2 (p. 91). While participants' aggressive word completions correlated with behavioural aggression, they were not significantly correlated with video game experience, nor with any other variable except for sensory presence. As predicted, aggressive behaviour scores were significantly positively correlated with participants' immersion, sensory presence, and character identification scores, as well as with game enjoyment and prior video game experience.

Regression analysis. I ran a pair of regression analyses to examine my predictions about the relationship between video game experience, game phenomenology, and post-game aggressive behaviour. In the first regression, I used structural equation modelling software to create a model that allowed game experience to predict the three game phenomenology scales, enjoyment, and difficulty, all while controlling for trait aggression (see Figure 1, p. 85). The predicted variables' error variances were allowed to covary in the model. Players' prior video game experience positively predicted immersion ($\beta = .27$, $t(160) = 3.69$, $p < .01$), character identification ($\beta = .15$, $t(156) = 2.02$, $p = .04$), and enjoyment ($\beta = .24$, $t(156) = 3.20$, $p = .01$), and was negatively associated with perceived game difficulty ($\beta = -.46$, $t(156) = -6.60$, $p < .01$). The relationship between experience and sensory presence was not significant ($p = .64$).

In the second regression analysis, I allowed the same three game phenomenology scales, game enjoyment, and difficulty to simultaneously predict behavioural aggression while controlling for trait aggression (see Figure 1, p. 85). This time, immersion ($\beta = .35$, $t(156) = 3.50$, $p < .01$) emerged as the only significant predictor of behavioural aggression (all other ps > .13).

Mediation analysis. Because immersion scores predicted post-game aggressive behaviour and because video game experience was significantly related to both behavioural aggression and immersion, I next tested a series of mediation models which allowed immersion to mediate the relationship between video game experience and post-game behavioural aggression. Mediation was tested using the PROCESS

macro for SPSS to generate 95% confidence intervals of the effect sizes of all direct and indirect effects using 10,000 bootstrap resamples (Hayes, 2013). In all models, video game experience was the independent variable, behavioural aggression was the dependent variable, and trait aggression was entered as a covariate. In the first model, immersion was tested as the sole mediator, and was found to significantly mediate the relationship between experience and behavioural aggression ($B = .03$, $SE = .01$, 95% CI: .014 to .068). In a second model, immersion and the other two game phenomenology measures were entered as mediators (see Table 3, Model 2, p. 92). Immersion remained a significant mediator ($B = .03$, $SE = .01$, 95% CI: .012 to .072), but character identification and sensory presence were not significant mediators. In a final model, participants' enjoyment of the game and their perceptions of the game's difficulty were added to the model to test them as possible confounds (see Table 3, Model 3, , p. 92). Again, immersion remained a significant mediator of the relationship between video game experience and post-game behavioural aggression ($B = .03$, $SE = .01$, 95% CI: .010 to .068) while the other variables tested, with the exception of difficulty ($B = -.03$, $SE = .01$, 95% CI: -.061 to -.003), were not significant mediators.

Discussion

Study 1 provided the first correlational evidence that immersion into a fantasy activity mediates the relationship between prior experience with that type of fantasy activity and subsequent fantasy-congruent behaviour. The data supported four out of five of the predictions.

My first prediction, that greater experience with violent video games would predict greater immersion into the game, was supported. Participants' prior video game experience positively correlated with their immersion into the game. It is also worth noting that while game experience positively predicted immersion into the game, game experience also positively predicted identification with the player's character. Interestingly, game experience did not significantly predict sensory presence within the game environment. It is possible that the visual and auditory information provided by the video game

itself reduces the impact of experience with the medium on sensory presence, given that players are not required to generate mental imagery, unlike in other fantasy contexts such as narrative transportation.

My second prediction, that participants playing the game from the first-person perspective should experience greater immersion into the game than those playing from the third-person perspective, was not supported. There were no significant differences in immersion, the other game phenomenology variables, or post-game aggression between participants in the first-person and third-person condition. While I had expected the manipulation of visual perspective to affect participant immersion, consistent with analogous perspective manipulations from the emotion regulation literature (e.g., Mischkowski, Kross, & Bushman, 2012), it is possible that visual perspective effects on immersion were overwhelmed by other factors that may have influenced participant immersion. Such factors include the flood of detailed graphical and auditory information players received about the game environment, their character, and other characters, and the implausibility and novelty of the simulated actions to participants, all of which may have affected player immersion or, at very least, reduced the salience of the game's visual perspective. It is also worth noting that, due to its interactive nature, which provided the player with experiential feedback, participants playing from the third-person perspective may have experienced immersion into the game that they might not have gotten had they merely observed the game being played, a condition which might be more analogous to the operationalization of self-distanced perspective-taking in prior emotion regulation research. Finally, unlike in previous emotion regulation research, where participants were asked explicitly to adopt one perspective or another when recalling or imagining a scene, in the present research participants did not have their attention explicitly drawn to the visual perspective of the game they were playing, which may also have contributed to the manipulation's lack of effect. Taken together, there are a number of possible explanations for why visual perspective was ineffective as a manipulation of participants' immersion into the video game. In Studies 2 and 3 I attempt to manipulate immersion in other ways that attempt to overcome some of these weaknesses.

My third prediction, that greater immersion into the violent video game should predict greater post-game aggression, was supported. Regression analyses revealed not only that immersion significantly predicted greater post-game aggressive behaviour, but that this effect was significant independent of related game phenomenology variables such as character identification and sensory presence. Surprisingly, while the predicted effects were found for behavioural aggression, they were not found for the cognitive measure of aggression, as assessed by the aggressive word completion task. A recent meta-analysis of video game violence studies has shown that the relative effect size of cognitive measures of aggression ($r = .175$) may be smaller than that of behavioural measures ($r = .244$; Anderson et al., 2010), which may explain why the obtained results were significant only for the measure of behavioural aggression. As another possible explanation, the word completion task is designed to measure aggressive thought accessibility, but given that all participants played a violent video game, it may be that all participants had readily-accessible aggressive thoughts. As evidence for this possibility, the mean proportion of aggressive words to non-aggressive words completed in the present study ($M = .22$, $SD = .07$) was, when compared to prior research using the same measure, even higher than it was for participants in a "violent game" condition, although they showed just as much variation ($M = .15$, $SD = .06$, Anderson et al., 2004). What may have differed between participants in the present study, however, was the extent to which they translated aggressive thoughts into aggressive action, suggesting that the relationship between immersion and post-game aggressive behaviour may not be due to an increased accessibility of aggressive thoughts but rather to a failure to inhibit aggressive thoughts from becoming aggressive behaviour. In Study 2 I test whether immersion into a violent video game is related to participants' responses on a different cognitive measure of aggression, one that assesses the generation of aggressive behavioural intentions instead of mere aggressive thought accessibility.

My fourth prediction, that more experience with violent video games should positively predict participants' post-game aggression, was also supported. Even after controlling for individual differences

in trait aggression, participants' violent video game experience predicted greater post-game aggressive behaviour, in line with past violent video game research (e.g., Anderson, Gentile, & Buckley, 2007).

My final prediction, that immersion into the video game should mediate the relationship between prior video game experience and post-game behavioural aggression, was supported. Immersion into the violent video game significantly mediated the relationship between prior video game experience and post-game aggressive behaviour, even after taking into account individual differences in trait aggression and even after controlling for other aspects of game phenomenology simultaneously as mediators.

Taken together, Study 1 provides evidence for individual differences in and behavioural consequences of immersion into a fantasy activity in the domain of violent video games. While a strong first foray into this subject, the study was limited by an ineffective manipulation of immersion and an ineffective measure of cognitive aggression. In Study 2, I attempted to overcome these limitations while conceptually replicating the present findings using a different sample and a novel paradigm.

Study 2: Online Replication and Generalization

While Study 1 provided initial support for my claim that immersion into a violent video game significantly mediates the relationship between prior video game experience and post-game behavioural aggression, Study 1 failed to manipulate participant immersion. Study 2 attempted to conceptually replicate Study 1 with several important extensions. While the overall paradigm generally remained the same – participants played a violent video game, completed a measure of post-game aggression, a measure of immersion into the game, and a measure of prior game experience - I made three important changes to the study's procedure.

The first key change to the Study 1 procedure involved changing the manipulation of participant immersion. In Study 1 I attempted to induce an immersive, "inside the fantasy" or distanced, "outside of the fantasy" experience by manipulating a parameter of the video game, specifically the perspective from which it was played. In Study 2 I attempted to more directly induce participants to experience either immersion or distancing from the game by providing guided instructions. I adapted this manipulation from narrative transportation research, which, in its original form, randomly assigned participants to read a set of instructions that told them to either immerse themselves into a literary text or to critically assess the same text with regard to its appropriateness for elementary students (Green & Brock, 2000). Adapting this method to the present study context, participants were randomly assigned to read a set of instructions that either told them to immerse themselves in the game, focusing on experiential aspects within the game itself, or told them to adopt a meta-level perspective that involved scrutinizing the features of the game and reflecting on how those features might influence a player's experience. By giving instructions that directed participants to either absorb themselves in the experience of the game itself or to adopt a more distant, analytical perspective, thinking about how the features of the game might work to shape a player's experience, I hoped to experimentally induce participants into a state of relative immersion or relative distance from the game and thereby overcome a significant limitation of Study 1. I predicted that participants who were instructed to immerse themselves into the game would report more game

immersion than those who were instructed to analyse the game's features and, as a consequence of these phenomenological differences, participants in the immersion condition would go on to express greater post-game aggression than those in the distance condition.

A second key change involved running Study 2 online instead of in a laboratory. Instead of recruiting undergraduates, participants were recruited through Amazon's Mechanical Turk website and completed the study using online survey software as opposed to coming into a laboratory. This change allowed the hypotheses to be tested in a much broader sample of the general population. If the results of Study 2 replicated those of Study 1, this would allow me to generalize my findings beyond an undergraduate population. In running the study online, it was necessary to change the violent video game participants played, as it would not be possible to install and run the custom game from Study 1 onto participants' computers. Instead, participants were asked to play a browser-based violent game that involved shooting zombies. As a whole, while this online paradigm is conceptually similar to the in-lab paradigm, there have been no previous attempts in the violent video game literature to conduct a video game violence study online using browser-based games, online surveys, and post-game aggression measures.

In a final change to the procedure, participants completed different measures of the variables of interest. As the TCRTT could not readily be implemented in an online setting, and given that the word completion task only measured aggressive thought accessibility, participants instead completed a projective measure that assessed their aggressive behavioural intentions. While behavioural intentions are certainly not the same as actual behavioural aggression, if the same pattern of results were found as with the behavioural measure in Study 1, this different operationalization would provide converging evidence for the relationship between immersion into a violent video game and post-game aggressivity, bolstering confidence in this effect. Minor changes were also made to the violent video game experience measure, which was expanded to include a number of behavioural indicators of violent video game experience,

such as the number of hours of violent video games played per week. Despite these modifications to the Study 1 procedure, my predictions remained the same as in Study 1.

Method

Participants. Participants were American users of Amazon's Mechanical Turk, a crowdsourcing website which allows users to search for and complete relatively short, simple tasks (e.g., 10-30 minutes) for small amounts of money (e.g., $0.25-$0.50 cents). Prior research has validated this recruitment technique, showing that Mechanical Turk participants are intrinsically motivated and at least as reliable as undergraduate participants while being more demographically diverse (Buhrmester, Kwang, & Gosling, 2011; Paolacci & Chandler, 2014). Participants completed the online study in exchange for $1.00. While 404 participants began the study, only 297 completed it. Four participants indicated that they did not give consent for their data to be used. The remaining 293 participants consisted of 152 women, 138 men, 2 transgender, and 1 person identified as "other". Participants ranged in age from 18 to 76 ($M = 35.9$, $SD = 12.5$).

Procedure. Participants were recruited via a job posting on the Mechanical Turk website entitled "Browser-Based Video Game Study". Those who accepted the job were directed to a Qualtrics survey. Participants read that the study would entail playing a violent browser-based video game, followed by several measures ostensibly assessing creativity, before finishing up with an evaluation of the browser-based game, a measure of prior computer game experience, and a personality measure.

After consenting, all participants were told the following about the game:

In this game your goal is to defeat zombies and locate survivors of a zombie attack. You will play through several waves, each representing a single day. In addition to defending against zombies, you must also maintain your weapons and shelter and send out search parties. You will be asked to play through 7 waves, or 1 week of game time, which should take approximately 10 minutes.

Participants were then randomly assigned to read one of two additional sets of instructions about the game. In the "immersed" condition, participants read instructions, adapted from Green and Brock (2000), designed to immerse participants into the fantasy world of the game:

In this game you are a survivor of the zombie apocalypse. Zombies, animated human corpses who feed on the flesh of the living, have taken over the country. Help is on the way, but it will take more than a month for help to reach you. Until then, you must do what you can to survive: defending against hordes of zombies as they shamble toward your shelter, banding together with other survivors you find, and searching the nearby town for weapons and other supplies. As you play this game, we would like you to become as involved as possible in the game. While playing the game, use your imagination. Focus on what's happening to you in the game, think about how you might feel in this situation, and about how the other survivors are feeling. Put yourself right in the action of the story: you are struggling to survive the zombie apocalypse!

Participants in the "distanced" condition read a different set of instructions that were designed to make them reflect on the game's design features and how those features may impact the typical player's experience, a task which would require them to consider the gameplay experience from a perspective outside of the fantasy itself:

This is a combination of a survival game, a 1st person action/arcade game, and a strategy game. The game is played in waves, alternating between a defending phase, where you must stop several approaching enemies, and a planning phase, where you must choose how best to allocate limited manpower to several tasks. Computer game critics commonly evaluate computer games based on their design. Well-designed games have intuitive controls, appropriate difficulty, and an informative, but uncluttered interface. We are asking you to play the following computer game and critique its design. While playing this game, concentrate on the aspects of the game's design

that make it a good experience for the player: where things are on the screen, how information is given to the player, its level of difficulty, and the game's controls.

Participants in both conditions were reminded to play the game until they were defeated or until they had made it to Wave 7, which took about 10 minutes, before returning to the survey. They then clicked on a link which took them to the browser-based game *Dead-Zed* (see Appendix Q, p. 118, for screenshots). The game instructed participants how to play: clicking on zombies to shoot them as they approached the player's shelter in waves. Between waves of zombies, participants were shown a map of the town and were able to instruct other survivors to search nearby houses for weapons and additional survivors. Each wave of the game ended when zombies overwhelmed the player or when the player had killed all zombies on-screen. The game announced the wave number at the start of each wave.

To check whether participants had played the game, upon returning to the survey participants were asked to indicate which of three screenshots was taken from the game that they had played and they were asked whether they lasted through to Wave 7 of the game. All participants selected the correct screenshot. Ten participants reported that they had not lasted to Wave 7. Including these participants in the analysis did not significantly change the results, and so these participants were retained in all analyses presented here.

Participants next completed an online version of the aggressive word completion task used in Study 2. After reading the task instructions, which told participants that the task was "a measure of your creative ability", participants were taken to the task, which they were told would automatically advance after three minutes had elapsed. Participants were unable to advance the screen themselves, and the screen advanced after three minutes had elapsed.

Next, participants completed an 18-item negative affect version of the PANAS-X (Watson & Clark, 1991) as an explicit measure of their negative affect following gameplay.

Next, participants completed a measure of projected aggressive intentions adapted from Cohen, Nisbett, Bowdle, and Schwarz (1996). In this measure participants read a story about a man who witnessed another man trying to kiss his fiancée at a party. Participants were then asked to write what happened next in the story by entering their response into a textbox. No time or length constrictions were placed on participants. This task was labelled as a "Creative Writing Task", obscuring its actual purpose.

Next, participants completed a short evaluation of the browser-based game, rating the degree to which the game was: pleasant, anxiety-provoking, difficult, enjoyable, violent, and gory. Participants then completed the game phenomenology scales from Study 1 measuring character identification, sensory presence, and immersion. They also completed an assessment of video game experience that assessed a range of items about their past history of gaming, number of games and equipment presently owned, the last time they played video games, the same measure of aggressive game experience used in Study 1, and the presence of violent content in their 3 favourite computer games.

Finally, participants completed the frequency of fantasy engagement scale from Study 1 and the trait aggression measure from Study 1. Participants were then asked to indicate what they thought the purpose of the study was. While 56.7% of participants guessed that the study was somehow related to video game violence, no one correctly guessed the true purpose of the study or indicated that it had anything to do with player immersion. As such, all participants were included in the analyses. Participants then had the full purpose of the study explained to them, were presented with a post-study consent page, and then returned to the Mechanical Turk website to collect remuneration.

Measures.

Aggressive thought accessibility. The word completion task from Study 1 (Anderson et al., 2003; 2004) was used to assess aggressive thought accessibility. Results were scored in the same manner as in Study 1, generating a ratio of aggressive word completions to total word completions.

Projection of aggressive behavioural intentions. To analyze participants' aggressive behavioural intentions after playing the computer game, participants indicated what would happen next in a scenario adapted from Cohen et al. (1996) in which a man witnesses another man attempting to kiss his fiancée at a party (1996; see Appendix R, p. 117). Four independent raters were asked to read participants' story completions and to answer the question "How aggressive was this participant's response?" (*1 – Not at all*, *7 – Very Aggressive, α = .95*). Coders were highly reliable, and responses ranged from the lowest aggression rating (e.g., "Steve approached Larry and noticed immediately that he had been drinking. Steve suggested to the host that Larry was drunk and they should arrange a taxi for him") to the highest (e.g., "Steve went out to his car to get the shotgun. He walked into the house, walked over to Larry and aimed the shotgun at his face. He then pulled the trigger and watched Larry's skull explode across the room."). This is considered to be a projective measure of aggressive behavioural intentions (Cohen et al., 1996).

Immersion. I used the same three-item measure of players' immersion into the game as in Study 1, which had a similar level of reliability ($\alpha_{IMMERS} = .76$).

Other gameplay phenomenology variables. I used the same measures of sensory presence and character identification as in Study 1, with one modification: One item from the original sensory presence scale was not included ("How much did you feel as if you were walking when your character walked?") because in the online game, participants' characters shot at zombies from a fixed position and thus never walked. The two scales had similar levels of reliability to Study 1 ($\alpha_{IDENT} = .88$; $\alpha_{PRES} = .77$).

Experience with games. Computer game experience was assessed in several ways (see Appendix S, p. 120, for entire scale). The 3-item scale from Study 1 was used, asking participants to indicate their experience on a 10-point Likert scale (*1 – No experience at all, 10 – Extremely experienced*) with 1st person shooter games, 3rd person shooter games, and with violent video games ($\alpha = .91$). Participants were also asked to indicate the average number of hours per week they played video games, watched

television, and watched movies, and to estimate what percentage of each of these they considered to have violent content. Participants also indicated the average number of days per week and hours per week they currently spent playing video games, as well as the number of hours per week they spent playing video games in high school and in elementary school. Participants indicated whether they owned a video game console, and estimated how many computer or video games they owned, as well as estimating what percentage of those owned games they estimated contained violent content. Finally, participants listed their 3 favourite computer or video games and, for each one, indicated on a 7-point Likert scale how violent the game's content was (*1 – No violent content, 7 – Extremely violent content)*. Participants' ratings of the violent content of their 3 favorite games were averaged ($\alpha = .63$). Summary statistics for all game experience variables are shown in Table 4 (p. 93).

To create a measure of game experience that incorporated the items relevant to assessing violent video game experience, I first created a variable of average hours spent playing violent video games per week by multiplying players' reported hours per week playing video games by the percentage of time spent playing violent video games specifically. I then created a composite variable averaging each participant's rating of the violent content in their three favorite games. I standardized these variables, along with the three variables that formed the violent video game experience measure in Study 1, and averaged them to form a composite measure of violent video game experience (5 items, $\alpha = .87$).

Game difficulty and enjoyment. The experienced difficulty and enjoyment of the game were each assessed with a single item (i.e., *Difficult, Enjoyable*) embedded among 4 other items (*Pleasant, Anxious, Violent, Gory*) in a questionnaire that asked participants to evaluate how well each of the listed words described the computer game they played earlier in the session. Participants evaluated the features of the game on a 7-point Likert scale (*0-Not at all, 6 – Very much*).

Trait aggression. Participants completed the Buss-Perry Aggression Scale, the same 29-item measure of trait aggression used in Study 1 ($\alpha = .94$).

Additional measures. As in Study 1, additional exploratory measures were assessed including: negative affect (Appendix T, p. 123), chronic fantasy engagement (Appendix J, p. 110), and character and game realism (Appendix O, p. 116).

Results

This study attempted to manipulate immersion into the game through a set of instructions presented to participants before the game. However, this manipulation had no significant effects on immersion or related features of game phenomenology (all ps > .10), and was unrelated to the post-game aggression variables (all ps > .29). As in Study 1, video game experience did not interact with the manipulation to predict game phenomenology variables or post-game aggression (all ps > .22). As such, I collapsed across conditions for all subsequent analyses.

Descriptive analyses. I calculated descriptive statistics for participants' evaluation of the browser-based computer game (see Appendix P, p. 117), which allowed me to compare participants' evaluations of *Dead-Zed* to *Half-Life 2* from Study 1. The data suggest that participants found the zombie-shooting game in the present study more difficult ($M = 4.38$, $SD = 1.63$) than the game in Study 1 ($M = 2.65$, $SD = 1.58$), but also found the game more enjoyable ($M = 4.95$, $SD = 1.63$) than the game in Study 1 ($M = 3.34$, $SD = 1.69$). The two games did not differ with regard to their perceived violent content or gore. Descriptive statistics for the variables of interest are provided in Table 5 (p. 94).

Preliminary analyses. I tested how strongly the video game experience measure correlated with the other variables of interest: aggressive word completion, generating aggressive story themes, trait aggression, the 3 measures of game phenomenology, game enjoyment, and perceived game difficulty (see Table 6, p. 95). As in Study 1, immersion was significantly associated with generating aggressive themes and was also significantly associated with game experience. And, like in Study 1, immersion was not significantly associated with aggressive word completion scores, which were comparable to those in Study 1. By comparison, sensory presence, while similarly associated with generating aggressive themes,

was not significantly associated with game experience. Also, identification, while strongly associated with game experience, was not associated with generating aggressive themes. Game difficulty was associated only with game experience, negatively, while game enjoyment was significantly positively associated with all game phenomenology measures and with game experience, but was not associated with aggressive story themes.

Regression analyses. I next ran two multivariate regression analyses. In the first analysis, run with structural equation modelling software as in Study 1, game experience scores were allowed to simultaneously predict the three game phenomenology variables, game enjoyment, and game difficulty, allowing all of their error variances to covary, while controlling for trait aggression (see Figure 2, p. 86). Game experience was significantly positively associated with immersion ($\beta = .15$, $t(284) = 2.52$, $p = .01$), with character identification ($\beta = .27$, $t(284) = 4.70$, $p < .01$), and with enjoyment ($\beta = .32$, $t(284) = 5.45$, $p < .01$), and was negatively associated with difficulty ($\beta = -.14$, $t(284) = -2.22$, $p = .03$).

In the second regression analysis, the three game phenomenology subscales, game enjoyment, and difficulty were allowed to predict generating aggressive story themes while controlling for trait aggression. When assessed simultaneously, immersion ($\beta = .22$, $t(218) = 2.62$, $p < .01$) was the only significant predictor of generating aggressive themes, (all other ps > .37; see Figure 2, p. 86).

Taken together, these analyses make two suggestions about potential mediation. First, game experience was found to be positively associated with both immersion and identification with the in-game character. Second, like in Study 1, immersion is the most likely game phenomenology variable to mediate the relationship between video game experience measures and generating post-game aggressive themes, given that it was the only phenomenology variable significantly associated with aggressive themes.

Mediation analysis. As in Study 1, I tested several mediation models assessing aspects of game phenomenology as possible mediators of the relationship between video game experience and post-game

49

aggressive themes using the PROCESS macro to generate 95% confidence intervals of the effect sizes via 10,000 bootstrap resampling (Hayes, 2013). Trait aggression was entered as a covariate in all models.

The models tested for mediation of the relationship between game experience and aggressive themes. In the first model, immersion was entered as the sole mediator, and was found to significantly mediate the relationship between video game experience and aggressive story themes ($B = .05$, $SE = .02$, 95% CI: .011 to .099). In a subsequent model, all three game phenomenology variables (immersion, sensory presence, and character identification) were entered as possible mediators (see Table 7, Model 2, p. 96). As in Study 1, immersion emerged as a significant mediator ($B = .04$, $SE = .02$, 95% CI: .007 to .104), but character identification and sensory presence were not significant mediators. This finding held in a third model, when game enjoyment and perceived difficulty were added to the model and immersion again remained a significant mediator ($B = .04$, $SE = .03$, 95% CI: .007 to .108; see Table 7, Model 3, p. 96) while the other variables were not significant mediators.

Discussion

Study 2 replicated the same pattern of results obtained in Study 1, including finding support for the same four out of five predictions and failing to effectively manipulate participant immersion into the violent video game. Notably, this replication occurred using a relatively novel paradigm for the violent video game literature: testing for post-game aggression effects in an online sample of participants playing a violent online game.

As in Study 1, greater experience with violent video games predicted greater immersion into the online game. Experience with violent video games, which now included more specific behavioural report indicators, was also positively correlated with immersion into the game. The same patterns of significance were observed whereby immersion, identification with the character, and game enjoyment were all significantly positively associated with prior violent video game experience, while game difficulty was

negatively associated with prior experience, and sensory presence was not significantly related to prior experience with violent video games.

Unexpectedly, participants who read instructions designed to make them experience the violent video game from an immersed perspective within the fantasy itself did not differ in their self-reported immersion from participants instructed to reflect on how the game's design affected the player's experience. This manipulation was designed to overcome the limitations of the ineffective manipulation from Study 1 by explicitly instructing participants on how to engage with the game rather than using a passive feature of the game to manipulate immersion as in Study 1. There are several possible reasons for the ineffectiveness of the manipulation in Study 2. For example, it is possible that once participants started playing *Dead Zed*, they ignored or forgot about the instructions they had read. If participants were instructed to focus on aspects of the game's interface and design, but participants became immersed in the game experience itself – and evidence suggests that participants did find the game to be fairly immersive (Table 5, p. 94) – they may have been unmotivated, or forgotten completely, to reflect on the game's design, preventing them from distancing. It is also possible that participants did not read and fully understand the task instructions. Given that the study was conducted online, without the oversight of a research assistant to confirm that participants understood the task, participants could have clicked past the instructions without reading them, or may have proceeded to the game without fully understanding what they were being instructed to do. Regardless of the reason for the ineffective manipulation, the repeated failure to directly manipulate participant immersion in both Study 1 and 2 led me to adopt a new approach in Study 3.

Failed manipulation aside, I again found evidence that greater immersion into the violent video game predicted greater post-game aggression. Consistent with Study 1, a regression analysis revealed that immersion into the game significantly predicted more aggressive themes in participants' scenario completions. Additionally, immersion scores did not significantly predict aggressive word completion scores, also similar to Study 1. Given that participants' immersion scores predicted more aggressive

51

scenario completions, these findings support my explanation for the failure to find significant effects on the aggressive word completion task from Study 1: while immersion into a violent video game is unrelated to the accessibility of aggressive thoughts, immersion is positively associated with actual aggressive behaviour (Study 1) and with generating aggressive behavioural intentions (Study 2).

I also replicated the finding from Study 1 that more experience with violent video games predicted greater post-game aggression. Once again, the results held even though I controlled for individual differences in trait aggression. Extending the findings from Study 1, however, the present measure of experience with violent video games included reported behavioural indicators of violent video game experience and thereby strengthens the validity of the measures used to document the relationship between violent video game experience and immersion into a violent video game.

Finally, Study 2 replicated the finding from Study 1 that immersion into a video game mediates the relationship between prior video game experience and post-game aggression. As in Study 1, mediation analysis revealed that even after controlling for other game phenomenology variables as simultaneous mediators, immersion significantly mediated the relationship between prior video game experience and post-game aggression.

Taken together, Study 2 was a successful conceptual replication of Study 1, finding support for the same four out of five predictions. Moreover, Study 2 illustrates the robustness of the obtained effects, showing that they are present in a broader population sample and generalize to different measures of aggression and a different type of violent video game. Despite this, however, Study 2, like Study 1, failed to directly manipulate participant immersion into the violent video game. Evidence for a causal relation between immersion into a violent video game and post-game aggression thus remained elusive. To overcome this limitation in Study 3, I sought an indirect approach to manipulating immersion, focusing on manipulating the game's content as a means of indirectly manipulating player immersion, at least for a subset of participants who were expected to be sensitive to the manipulated feature of the game.

Study 3: Indirect Manipulation of Immersion via Fantasy Context

In Study 3 I attempted to indirectly manipulate player immersion by varying the content of the video game participants played. My attempts to directly manipulate immersion in Studies 1 and 2 may have been unsuccessful because they adapted paradigms that were originally developed in less visual, less interactive media. In Study 3, I experimented with a different approach, testing whether manipulating a game's fantasy versus reality context, a variable that has recently been suggested to play an important role in video game violence effects, might affect a player's experienced immersion into the game.

Video game violence studies have begun to test whether realistic games or fantasy-themed games are more likely to lead to greater post-game aggression. For example, one study examined whether having players kill realistic human targets or fantasy-themed alien targets in the computer game *Marathon 2* led to greater post-game aggressive behaviour (Anderson, Carnagey, Flanagan, Benjamin, Eubanks, & Valentine, 2004). A meta-analysis of such studies, where the fantasy or realistic nature of gameplay features was manipulated, suggested that fantasy-themed games led to greater post-game aggressive behaviour than mundane games (Arbogast, Groves, Chrobak, & Lishner, 2012). I speculated that one possible reason for these findings is that games with fantasy content may be less bound by reality constraints than games with more mundane content. For example, if a player's simulated shooting spree takes place in a fantasy setting, the fantasy context itself may serve as a cue to players that they should not be particularly critical about the plausibility of the behaviour being simulated. In contrast, a simulated shooting spree that is set in a mundane, more realistic setting may regularly remind players, through recognizable elements within the game, about the real world, including the ethical implications or the implausibility of their simulated behaviour or the game's outcome. Converging evidence for this explanation exists within research on the narrative transportation phenomenon, which finds that transportation leads to attitude change by causing the reader to "let down their guard" and disengage the tendency to counter-argue or critically assess the narrative's content (Green & Brock, 2000). This prior research led me to hypothesize that a fantasy-themed game may lead to greater player immersion than a

more mundane-themed game because the real-world setting of the latter may prompt players to critically evaluate the plausibility of the game's contents in relation to known reality constraints, which entails adopting a relatively distanced perspective on the game. In contrast, a game set in a pure fantasy realm may more readily escape critical scrutiny because its fantasy context cues the player to adopt a more encompassing suspension of disbelief.

I speculated that the effect of a game's fantasy versus mundane context on player immersion might depend on how much the player regularly participates in fantasy-themed activities. People who more routinely engage in fantasy activities in their leisure time and place greater importance on fantasy may be more sensitive to whether or not fantasy content is a prominent feature of an activity. When fantasy content is prominent, individuals who chronically pursue fantasy activities may take this as a cue to suspend disbelief and engage their imaginations, which should promote greater immersion into that activity relative to individuals who are less chronically attuned to fantasy. However, if the same activity has more mundane content, individuals who chronically pursue fantasy may find little to interest them in the activity, leading them to experience more psychologically distanced reactions to it, for example critiquing implausible aspects of the game (e.g., the player's imperviousness to enemy bullets), that violate the constraints of its alleged real-world setting, or mentally contrasting the game with more imaginatively engaging games. Thus, I hypothesized that the more chronically a person indulges in fantasy-themed activities in their everyday life, the more sensitive they would be to a manipulation of the amount of imaginative, fantasy-themed content in a specific activity. If the activity contains ample fantasy content, experienced fantasy consumers should find the activity engaging and become highly immersed in it. However, if the content of an activity is more mundane, experienced fantasy consumers should experience relatively distanced reactions to that activity. In contrast, I hypothesized that individuals with relatively limited fantasy experience would be less sensitive to the activity's amount of fantasy content and, as such, the amount of imaginative fantasy content in that activity should have less of an impact on their levels of immersion.

To test these hypotheses, I manipulated the fantasy content of a video game by varying whether the game took place in a fantasy-world setting (i.e. an alien military base) or a more mundane, "real world" setting (i.e. a generic city). In addition, I assessed participants' interest in and prior experience with fantasy-themed activities. If a game's fantasy setting is a cue to suspend disbelief that allows greater immersion into its contents, then, I predicted, immersion would be greater for participants playing the fantasy-themed game than for participants playing the mundane-themed game, particularly if the participants reported higher levels of fantasy engagement in their lives. Specifically, I predicted that people who report more regular indulgence in fantasy-themed activities should become more immersed in a video game with a fantasy theme than one with a mundane theme. In contrast, I predicted that the effect of the fantasy manipulation on immersion would be weaker or non-existent for participants who have less reported fantasy experience. Furthermore, insofar as immersion into a violent video game is hypothesized to elicit greater post-game aggressive behaviour, I predicted that more experienced fantasy consumers should also exhibit more post-game aggression after playing a fantasy-themed violent video game than they show after playing a more mundane-themed game. In contrast, I predicted that participants with relatively less fantasy experience would show little or no condition differences in their levels of post-game aggressive behaviour.

Method

Participants. Participants were 151 University of Waterloo undergraduates who participated in the study in exchange for psychology course credit, of which 94 were female. Participants were drawn from a research pool that included students ranging from first year to senior year students. Participants ranged in age from 17 to 39 years old ($M = 20.3$, $SD = 3.08$).

Procedure. The procedure was identical to Study 1, with two differences. First, visual perspective was not manipulated: all participants played the modified version of *Half-Life 2* from the third-person perspective. The second, more substantive difference, involves the addition of a between-

subjects manipulation of the game setting. Two versions of the game setting were created: a version that took place in a mundane setting and a version set in a fantasy world (See screenshots in Appendix U, p. 124). In the *mundane setting* condition, the map was designed to resemble several blocks of a generic city where participants were able to move between buildings, through alleys, and along roads and could take cover between road barriers, park benches, phone booths, and chain-link fences. In the *fantasy setting* condition, participants made their way through a map that was geometrically identical to that of the mundane condition: enemy placement, obstacle and barricade location, game physics, and difficulty all remained constant between the conditions. However, mundane objects in the map were replaced with science fiction counterparts: buildings were replaced with futuristic-looking arrays of machinery, road barriers, park benches, and phone booths were replaced with force-fields, computer terminals, and stasis pods, respectively, while chain-link fences were replaced with armoured barriers. The enemies participants encountered were identical in appearance, human-shaped enemies clad in full-body, face-obscuring armour who shoot at participants with shotguns, and appeared in the exact same locations. In every other respect, the game designs were identical.

In addition, participants read slightly different descriptions of the two different versions of the games they were about to play. In the *mundane setting* condition, participants read the following description:

> In this game you will make your way through the streets of a city overrun with armed rebels. Your task will be to eliminate the enemy soldiers as you move through the dangerous streets toward the safety of the heart of the city. You can use concrete barricades, overturned vehicles and buildings to take cover from enemy fire. Be vigilant and remember that enemy soldiers could be hiding anywhere.

In the fantasy setting condition, participants read a similar passage, which emphasized the science-fiction features of the map:

In this game you will make your way through an enemy space-port filled with armed guards. Your task will be to eliminate the enemy soldiers as you move through the dangerous space-port toward the escape ship at the heart of the base. You can use force fields, access terminals and bunkers to take cover from enemy fire. Be vigilant and remember that enemy guards could be hiding anywhere.

The study procedure was identical to Study 1 in all other regards: participants completed the trait aggression measure in mass-testing, signed up for the study under the guise of participating in a study investigating the effect of video games on reaction time, and played one of two versions of the computer game for approximately 10 minutes. After playing the game, participants completed an aggressive word completion task, followed by the reaction-time competition task to measure behavioural aggression. Participants then completed the same 3 scales measuring phenomenological features of game experience, followed by measures of aggressive affect, self-character merging, game-related guilt, intrinsic game enjoyment, dehumanization, appropriateness of in-game aggressive behaviour, and chronic fantasy engagement. Finally, participants completed an evaluation of the video game and a measure of prior video game experience before being debriefed about the study's true purpose and use of deception. Research assistants flagged 5 participants who indicated that they were familiar with the TCRTT task and 1 participant who did not complete the violent video game due to disclosing post-traumatic stress disorder. These participants were excluded from the analyses.

Measures.

Trait aggression. The 29-item Buss-Perry Aggression Questionnaire described in Study 1, was assessed several weeks earlier in mass testing, and scores were highly internally consistent ($\alpha = .94$).

Aggressive thought accessibility. Participants' aggressive word completions were scored using the same criteria as in Study 1, generating a ratio of aggressive words divided by the total number of completed words.

Behavioural aggression. Participants' average intensity ($\alpha = .96$) and duration ($\alpha = .95$) settings across the 25 trials of the TCRTT were highly reliable and, as in Study 1, they were combined to form a composite measure of behavioural aggression because of their very high correlation ($r = .90$).

Game phenomenology. Game phenomenology was assessed using the same three scales from Study 1: immersion (3-item, $\alpha = .74$), identification with character (4-item, $\alpha = .70$), and sensory presence (3-item, $\alpha = .88$).

Fantasy activity engagement. I used a self-created 3-item scale assessing the frequency and importance of participants' prior engagement in fantasy activities. Participants were first instructed to consider the fantasy activity they engaged in most frequently and were given examples of fantasy activities (e.g., science fiction movies, roleplaying games). Participants then answered 3 questions about their fantasy experience: "How frequently would you say you engage in this fantasy activity?" (*1 – Almost never*, *7 – Daily*), "Compared to the average person, how much time would you say you devote to this activity?" (*1 – Much less*, *7 – Much more*), and "How important is it to you that you be able to engage in this activity?" (*1 – Extremely unimportant, 6 – Extremely important*) on Likert scales (Appendix J, p. 110). Participants' scores on these 3 questions were standardized and averaged to form an index of chronic fantasy engagement ($\alpha = .77$).

Experience with video games. Participants indicated their prior experience with 1st and 3rd person shooter video games, as well as with violent video games, as they did in Study 1 ($\alpha = .92$).

Enjoyment. Participants indicated the extent to which they enjoyed playing the game on the same 5-item scale as in Study 1 ($\alpha = .85$).

Additional measures. As in Studies 1 and 2, other exploratory measures were assessed including: self-character merging (Appendix K, p. 111), dehumanization of enemy characters (Appendix M, p. 113), affect (Appendix I, p. 109), game-related guilt (Appendix L, p. 112), perceived appropriateness of game-related aggression (Appendix N, p. 115), and perceived character and game realism (Appendix O, p. 116).

Results

        Descriptive statistics and preliminary analysis. Participants' evaluations of the game are

provided in Appendix P (p. 117). Summary statistics for key variables assessed in the study are provided

in Table 8 (p. 97) and correlations between these variables are provided in Table 9 (p. 98). Behavioural

aggression was significantly positively associated with immersion, sensory presence, enjoyment, and

video game experience, and was negatively correlated with difficulty. Aggressive word completions were

only significantly associated with sensory presence and were not systematically associated with the other

variables of interest, though they were comparable to scores from Study 1 and Study 2. Immersion and

character identification were significantly positively associated with video game experience, but sensory

presence was not. Finally, chronic fantasy was positively associated with video game experience, but not

with any other measure.

        Structural equation modeling. To test my predictions about the effects of the fantasy content

manipulation on immersion, I ran a regression analysis using structural equation modelling, allowing

condition (Fantasy = 1, Mundane = 0), mean-centred fantasy engagement, and their interaction to

simultaneously predict the three game phenomenology scales, enjoyment, and difficulty, while controlling

for trait aggression[2]. There was no main effect of condition on immersion ($p = .16$). Unexpectedly,

chronic fantasy experience and condition did not significantly interact to predict participants' immersion

into the game ($\beta = .17$, $t(137) = 1.41$, $p = .16$), nor their sense of sensory presence, identification with the

character, or perceived game difficulty (ps > .23), although the interaction did significantly predict game

enjoyment ($\beta = .26$, $t(137) = 2.20$, $p = .03$). Specifically, the mundane-themed game was enjoyed far less

by high fantasizers (i.e. participants who reported high chronic fantasy engagement) than by low

fantasizers (i.e. participants who reported low chronic fantasy engagement), ($\beta = -.33$, $t(137) = -2.80$, $p <$

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[2] I also ran a regression to test whether video game experience interacted with the game theme condition
to predict self-immersion and aggression measures. No significant interactions emerged in these analyses
(all ps > .38).

.01), though high and low fantasizers did not differ in their enjoyment of the fantasy-themed game (β =

.03, $t(137) = .29$, $p = .77$). Put another way, low fantasizers enjoyed the mundane-themed game

marginally more than the fantasy-themed game (β = -.21, $t(137)$ = -1.77, $p = .08$) while high fantasizers

reported a non-significant opposite tendency, to enjoy the fantasy-themed game more than the mundane-

themed game (β = .15, $t(137)$ = 1.33, $p = .18$).

Despite the lack of a significant chronic fantasy by condition interaction predicting immersion

levels, in follow-up analyses I found that, as predicted, high fantasizers were significantly more immersed

in the fantasy-themed than in the mundane-themed condition (β = .23, $t(137)$ = 2.03, $p = .04$), while there

was no difference in immersion across conditions for low fantasizers (β = .00, $t(137)$ = .02, $p = .98$), as

depicted in Figure 3 (p. 87).

I next ran a regression which allowed condition, fantasy engagement, and their interaction to

simultaneously predict aggressive behaviour while controlling for trait aggression. The main effect of

chronic fantasy engagement (β = -.25, $t(133)$ = -2.20, $p = .03$) and the trending effect of condition (β =

.13, $t(133)$ = 1.62, $p = .10$) were qualified by a marginally significant interaction (β = .21, $t(133)$ = 1.86, p

= .06). As seen in Figure 4 (p. 88) and consistent with predictions, high fantasizers were significantly

more aggressive in the fantasy condition than in the mundane condition (β = .28, $t(133)$ = 2.50, $p = .01$)

whereas there was no effect of condition on aggressive behaviour for low fantasizers (β = -.02, $t(133)$ = -

.15, $p = .88$).

Mediated simple effect. To test whether immersion mediated the simple effect of condition on

post-game aggression for high fantasizers, I used Hayes' (2013) PROCESS macro to generate 95%

confidence intervals of all direct and indirect effect sizes using 10,000 bootstrap samples using a mediated

moderation model. In all models below, condition was the independent variable, chronic fantasy

engagement was a moderator variable, behavioural aggression was the dependent variable, and trait

aggression was entered as a covariate. In the following models, effects are presented for chronic fantasy

values at one standard deviation above the mean[3]. In the first model, immersion, the sole mediator, marginally mediated the simple effect of condition on post-game behavioural aggression for high fantasizers when the confidence interval was expanded to 94% ($B = .13$, $SE = .09$, 94% CI: .001 to .335, $p < .06$). In the second model, which included immersion, sensory presence, and identification as mediators (see Table 10, Model 2, p. 99), immersion was the only mediator to show marginal significance, when the confidence interval was expanded to 94% ($B = .14$, $SE = .10$, 94% CI: .005 to .374, $p < .06$). Finally, when all three game phenomenology variables, game enjoyment, and difficulty were all entered as mediators (see Table 10, Model 3, p. 99), immersion again emerged as the only mediator showing marginal significance, with a confidence interval that was expanded to 93% ($B = .11$, $SE = .09$, 93% CI: .001 to .347, $p < .07$). The direction and magnitude of these effects did not change when the same set of three models was run including violent video game experience as a covariate.

Video game experience and immersion. I next ran a regression analysis similar to those in Studies 1 and 2, which used structural equation modelling software to test a model which allowed prior video game experience and trait aggression to predict the three game phenomenology scales, enjoyment, and difficulty (see Figure 5, p. 89) which, in turn, simultaneously predicted post-game aggressive behaviour. As in Studies 1 and 2, video game experience significantly positively predicted immersion into the game ($\beta = .23$, $t(134) = 2.79$, $p < .01$), identification with characters ($\beta = .19$, $t(134) = 2.25$, $p = .02$), and enjoyment of the game ($\beta = .21$, $t(134) = 2.46$, $p = .01$), was negatively associated with perceived game difficulty ($\beta = -.48$, $t(134) = -6.34$, $p < .01$), and was not significantly associated with felt sensory presence in the game ($\beta = -.07$, $t(134) = -.79$, $p = .43$). Also similar to Study 1, immersion ($\beta = .24$, $t(130) = 3.02$, $p < .01$) was the only game phenomenology variable to significantly predict aggressive behaviour (all other ps $> .24$). Difficulty was trending towards being negatively associated with aggressive behaviour ($\beta = -.15$, $t(130) = -1.71$, $p = .09$), but enjoyment was not ($p = .21$).

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[3] When the same models were run at mean values of chronic fantasy and at one standard deviation below the mean there was no evidence of significant mediation.

I next tested the same set of mediation models I tested in Study 1. In all models, video game experience was the independent variable, behavioural aggression was the dependent variable, and trait aggression was entered as a covariate. In the first model, immersion was tested as the sole mediator, and was found to significantly mediate the relationship between experience and behavioural aggression ($B = .03$, $SE = .01$, 95% CI: .008 to .058). In a second model, immersion, as well as the other two game phenomenology subscales, was entered as a mediator (see Table 11, Model 2, p. 100). Immersion remained a significant mediator ($B = .03$, $SE = .01$, 95% CI: .008 to .064), but character identification and sensory presence were not significant mediators. In a final model, participants' enjoyment of the game and their perceptions of the game's difficulty were also included in the model to rule them out as possible confounds (see Table 11, Model 3, p. 100). Again, immersion remained a significant mediator of the relationship between video game experience and post-game behavioural aggression ($B = .02$, $SE = .01$, 95% CI: .003 to .062) while the other variables tested were not significant mediators.

Discussion

The results of Study 3 replicated the findings of Studies 1 and 2, bolstering support for my claim that immersion mediates the relationship between violent video game experience and post-game aggressive behaviour. Unexpectedly, there was no main effect of the manipulation of the game's fantasy context on either player immersion or post-game aggression. This goes against the results of a previous meta-analysis that suggested that players exhibit more post-game aggression after they play fantasy-themed games than after they play reality-themed gamed (Arbogast et al, 2012). I hypothesized that this effect might be due to players suspending disbelief more when playing fantasy-themed games than when playing reality-themed games, which I speculated should promote greater immersion, accounting for the greater post-game aggression found for participants playing fantasy-themed games in the meta-analysis. The lack of a main effect of the game's manipulated fantasy versus reality context in Study 3 suggests that a fantasy context might not be a cue that leads all players to suspend their disbelief and become more immersed in the game.

I did, however, find some evidence that among a subset of participants, fantasy context might indeed be a cue that promotes greater immersion, thereby increasing post-game aggression. As predicted, participants who reported more chronic engagement in fantasy activities did experience both greater immersion and greater post-game aggression if the game was fantasy-themed than if it was mundane-themed. Moreover, this greater aggression was marginally mediated by the extent to which high fantasizers experienced greater immersion into the fantasy-themed game relative to the mundane-themed game. In contrast, the manipulation of the video game's fantasy context had no significant effect on immersion into the game or post-game aggression for participants low in chronic fantasy engagement. In sum, Study 3 provided the first experimental evidence that when game features evoke greater immersion into a violent video game this may increase a player's post-game aggressive behaviour, providing preliminary, albeit marginally significant, evidence for a causal effect of immersion on post-game aggressive behaviour.

The manipulation is not without its limitations, however. For one thing, the interaction between condition and chronic fantasy engagement was not significant, although it was trending in the predicted direction and a simple effects analysis revealed the predicted effect of condition on immersion and post-game aggression for participants high in chronic fantasy engagement. It is also worth noting that this marginally mediated simple effect was contingent upon a self-reported individual difference variable. While it fit my prediction that participants high in fantasy engagement would be the most sensitive to the presence or absence of fantasy context in a violent video game, given their inferred interest in fantasy-themed activities, there is no way to rule out potential third variables. To demonstrate that this causal process is a general one rather than a process specific to a population subgroup, it would be ideal to develop an immersion manipulation that does not depend upon pre-existing individual differences. I suggest several possible manipulations of this sort in the general discussion.

While the present study is admittedly an indirect manipulation of immersion itself, when coupled with evidence from Studies 1 and 2, its findings suggest the potential importance of considering both the

precursors and potential effects of immersion into a fantasy activity. The implications of these findings, both for the reviewed literature and for practical applications, are discussed next.

General Discussion

The present studies are the first to systematically test the determinants and outcomes of immersion into fantasy activities. The psychological effects of immersion, while well-established when it comes to real-world events, have not, until now, been systematically examined in relation to fantasy experiences. I tested these effects in the domain of violent video games as an example of a particularly immersive fantasy activity with well-documented effects on real-world behaviour.

Three studies provided evidence that immersion into a violent video game significantly mediates the relationship between prior violent video game experience and post-gameplay aggression. Study 1 found that immersion into a violent video game mediates the link between video game experience and post-game aggressive behaviour in a sample of university undergraduates who played a modified version of a popular video game. Players with greater prior violent video game experience were more likely to immerse into the violent game and to experience greater post-game behavioural aggression. Greater immersion into the violent video game, in turn, predicted greater post-game behavioural aggression. Immersion was found to significantly mediate the relationship between prior video game experience and post-game aggression, even after controlling for closely-related game phenomenology variables, including sensory presence and character identification.

Study 2 replicated the results of Study 1 in an online sample of participants using a browser-based violent video game and a measure of participants' generation of aggressive themes when they completed a story after playing the game. While Study 1 and Study 2 provided evidence of statistical mediation for immersion, attempts to manipulate immersion by either manipulating the game's visual perspective or the player's instructions prior to playing the game were unsuccessful.

In addition to replicating the statistical mediation results of Studies 1 and 2, Study 3 indirectly manipulated immersion into the game for a subset of participants who were hypothesized to be sensitive to the feature of the game (i.e., fantasy-themed vs. mundane-themed context) that was varied between

conditions. The first causal evidence that greater immersion into a violent video game may lead to increased post-game aggressive behaviour was found, as participants high in chronic fantasy engagement were more likely to experience post-game aggression after playing a fantasy-themed game than into a mundane-themed game, a simple effect marginally mediated by the extent to which these high chronic fantasizers experienced greater immersion into a fantasy-themed game relative to a mundane-themed game. Taken together, the data suggest that studying immersion, both its precursors and its effects, can help us better understand the psychological processes through which fantasy experiences, such as video games, can impact a person's real-world behaviour.

Contributions to Literature

  Contribution to the psychology of fantasy. The present research contributes to fantasy research in three important ways. First, it extends past work documenting fantasy's real-world effects by suggesting a possible mechanism through which these effects may occur: psychological immersion. Second, by uniting work on immersion processes with work on social-cognitive models of aggression, the present research presents an integrative framework for studying fantasy which has been lacking in previous fantasy research. Finally, by providing an integrative framework for studying fantasy, the present research can generate novel questions about the psychological effects of fantasy.

  As illustrated in the literature review, fantasy research has largely focused on fantasy's effects in clinical populations (e.g., Austin, 2009), in people unable to distinguish fantasy from reality (e.g., Lynn & Rhue, 1988), and in children (e.g., Smith, 2010). Far less research has focused on fantasy in psychologically well-adjusted adults. Furthermore, the little research that exists on psychologically adjusted adult fantasy tends to focus narrowly on specific effects (e.g., empathy, Igarashi et al., 2011. In contrast, the present research, while looking at a specific effect – violent video games and post-game aggression – proposes a mechanism - immersion - which is likely to generalize across the broad range of fantasy activities and mediums. As such, future work on fantasy-reality spillover should further examine

the role of immersion in fantasy, both by testing its applicability to a range of fantasy activities and by testing its potential functions. For example, one could study whether people become particularly immersed in fantasies of their own creation as compared to fantasies created by other people by comparing relative levels of immersion and content-congruent behaviour in participants who play one version of a computer game where they customize their character and choose what to do in the game as compared to another version of the same game, where participants are given a character and a story to follow. Studies such as this illustrate the many fruitful lines of research that could extend our current understanding of fantasy engagement in psychologically adjusted adults by examining the role of immersion into fantasy activities.

A review of the existing psychological literature on fantasy reveals the topic's lack of an overarching, organizational framework. While the fact that psychoanalytic, clinical, developmental, cognitive, social, and evolutionary psychologists have all investigated the subject of fantasy engagement in one form or another makes clear the broad interest psychologists have had in fantasy, little effort has been made to organize findings from these distinct perspectives or to systematically study fantasy engagement and its effects on real world thoughts, feelings, and behaviour. The present work attempts to provide a focus for fantasy research by integrating it with theory and research from two previously distinct broad research programs.

In particular, I believe my research suggests that theory and research on the process of self-immersion may suggest an integrative framework for studying the psychology of fantasy experiences. Framing the present findings as being consistent with and analogous to the broader work on self-immersing and self-distancing processes, for example, may provide new insights into how fantasy activities lead to cognitive and behavioural changes (e.g., Ayduk & Kross, 2010; Kross & Grossmann, 2012). Such insights may lead to novel questions previously unconsidered by fantasy researchers. For example, self-distancing is often studied as a strategy for adaptively regulating one's emotional responsiveness to unpleasant autobiographical events by reducing problematic brooding (Ayduk & Kross,

2010a). While strategic distancing in the context of fantasy activities has occasionally been studied in children (e.g., Cantor & Wilson, 1988), such strategies have not been studied in adults, despite anecdotal evidence that adults do, in fact, engage in such strategies when experiencing a sad or frightening scene in a movie, for example. To test whether adults strategically manage their mode of fantasy experience in service of real-world effects, one could measure adult participants' immersion into a frightening movie after they are instructed to either become frightened or avoid becoming frightened by the film and then measure physiological arousal while participants watch the movie to test whether distancing effectively reduces arousal relative to immersion. Such a study would test the hypothesis that adults are able to strategically manage their immersion and distancing from fantasy activities to achieve specific emotion regulation goals.

Contribution to self-immersion and transportation literature. Self-immersion research has predominantly focused on testing the effects of self-immersing or self-distancing into recalled past events or hypothetical future events on affect, cognition, and behaviour, (e.g., Ayduk & Kross, 2010a; Kross & Grossmann, 2012). To date, the self-immersion research has not investigated whether immersion effects generalize to purely fantasy activities that are unconstrained by reality. Building upon this work, the present research provides evidence that this may be the case, with immersion predicting a greater tendency to subsequently behave in ways that are consistent with the fantasy's content. Additionally, the present research raises an important theoretical question about the role of the self in immersion. Research on self-immersion and self-distancing has suggested that psychological closeness versus distance from the self underlies post-recall effects (Ayduk & Kross, 2010a). However, the present research found that participants showed immersion effects despite not strongly identifying with their character: Across all three studies, participants reported very low rates of identification with their played character, scoring well below the scale's midpoint on average (see Table 1, p. 90, Table 5, p. 94, Table 8, p. 97), though this is perhaps unsurprising, given the played character's violent, presumably undesirable behaviour.

Work by Libby and Eibach (2011) may explain these findings by distinguishing between the experiential self, involved in the phenomenology of experience, and the conceptual self, a framework of traits, goals, and theories about oneself. In recalled events, where there is already a basis for conceptual identification with one's own past self, immersing oneself in a past event at the experiential level is likely to reinforce conceptual identification with one's past self. By contrast, in fantasy activities such as in video games, players may merge their self with that of their character at an experiential level, in order to immerse themselves into the game. However, since there may not be any pre-existing conceptual connection between representations of the character and self-representations, immersing oneself in the character's actions at the experiential level may be less likely to evoke conceptual identification with that character. Thus, while immersion into autobiographical episodes likely involves both experiential and conceptual merging with the recalled self, immersion into fantasy should involve experiential merging with one's character but may or may not involve conceptual merging with one's character. This differential involvement of conceptual identification in the immersion process may be one of the key distinctions between how immersion functions in real events as opposed to how it functions in fantasy activities.

The present research also contributes to the literature on narrative transportation. To date, transportation researchers have treated transportation as a unique process, specific to narrative-induced attitude change and driven largely by vivid mental imagery and empathy with the story's characters (e.g., Green & Brock, 2002; van Laer et al., 2014). The present research challenges these assertions in two important ways. First, the present research suggests that, at least in non-literary domains, empathy with characters and generating mental imagery may not be the only factors that determine immersion into a fantasy activity or subsequent psychological change. Across three studies immersion uniquely predicted post-game aggression even after controlling for player's identification with their character and their felt sensory presence. While these findings certainly do not mean that character empathy and sensory imagery are unnecessary for transportation to occur, they do at very least suggest that measuring immersion

independent of these factors may be a worthwhile avenue for future research on the mechanisms underlying literary transportation. Second, the present research suggests the possibility that transportation may not be a unique process but instead may be a specific application of immersion processes to the domain of fictional narratives. The present studies suggest the importance of testing whether narrative transportation uniquely predicts post-activity thoughts and behaviour beyond what is predicted by measures of immersion. If transportation turns out to just be a manifestation of immersion in the context of responding to narratives, then understanding of transportation may be advanced by situating it within the broader framework of immersion.

Contribution to enriching social-cognitive models of aggression. The current research suggests how insights from self-immersion research can enrich social-cognitive models of aggression. The General Aggression Model, (GAM), one of the most influential social-cognitive models of aggression, seeks to account for the social-cognitive processes through which participation in or exposure to aggressive activities, such as playing violent video games, can lead to immediate and long-term increases in aggressive behaviour. However, the GAM neglects the possibility that the degree to which participation in an aggressive activity leads to social-cognitive and behavioural changes may depend on the individual's phenomenological experience of that aggressive activity. The GAM thus ignores the possibility that an individual who becomes more phenomenologically immersed in an aggressive activity would be more likely to experience increased aggressive inclinations after completing that activity than someone who participated in the same aggressive activity but who felt phenomenologically distant from the aggressive actions while doing so. The notion that participating in acts of aggression can range from highly immersed to highly distanced participation is relevant not just to fantasy forms of aggression, such as the video games in the present studies, but also to real-life forms of aggression. For example, some soldiers may find themselves really getting into a combat role while others may become phenomenologically disengaged while performing the same combat activities. My research raises the possibility that the former group might be more likely than the latter to exhibit spillover aggression when they return to the

civilian life. Such a possibility would, of course, need to be empirically tested. But the example illustrates the point that integrating phenomenological processes into social-cognitive models of aggression could uncover new research questions. By integrating theory and research on immersion processes into social-cognitive models of aggression, my work highlights the potential for a richer theory explaining how fantasy, and other experiences, can affect cognition and subsequent behaviour. Furthermore, the self-immersion literature may help explain the motivations for, and subsequent effects of, immersing into a specific instance of fantasy, while existing social-cognitive models may help explain how the recurrence of such instances may, over time, come to elicit long-term cognitive, personality, and behavioural changes.

Contribution to violent video game literature. While the literature on the effects of violent videogames on aggression has grown at an ever-increasing speed, much of this work has focused primarily on assessing the existence and magnitude of this relationship. Comparatively less work has focused on systematically assessing potential moderators and mediators of violent video game effects on aggression (Zhang et al., 2009), as is evident in the largest review of the video game violence literature, which acknowledged only a handful of moderators, most of which were not theory-driven, nor had they been tested in a particularly systematic way in the literature (e.g., player sex, player age, type of aggression measure used, time spent playing the game, Anderson et al. 2010). In this regard, the present research contributes to the violent video game literature by providing evidence for player immersion as a plausible mechanism driving post-game aggression effects. Surprisingly, almost no experimental research has tested whether immersion and other aspects of game phenomenology contribute to post-game aggressive spillover despite anecdotal evidence from players that immersion is a key aspect of video game experience and despite the fact that video game companies design games to be as immersive as possible. In fact, the word "immersion" and related constructs such as "absorption" and "engagement" do not appear in the aforementioned meta-analysis of 381 studies (Anderson et al., 2010). Given that the

present research found that immersion mediated the effects commonly found in the violent video game literature, the present study suggests the importance of considering immersion in future research.

A second, subtler contribution of the present research to the violent video game literature is the finding in Study 3 of differences in the extent to which those who frequently engage in fantasy-themed activities versus those who less frequently engage in fantasy-themed activities experience immersion and post-game aggression after playing a game that varies in the amount of fantasy-themed content. In Study 3, players high in chronic fantasy engagement experienced greater immersion into the fantasy-themed game than into the mundane-themed game, a difference not observed for players low in chronic fantasy engagement. Additionally, players high in chronic fantasy engagement were also more likely to engage in greater post-game aggressive behaviour after playing the fantasy-themed game than after playing the mundane-themed game. Without looking at the differential effects of manipulating the game's fantasy context for players high and low in chronic fantasy engagement, this potentially important game-level variable might have been dismissed as having no effect on players were it considered solely as a main effect. The violent video game literature focuses primarily on the effects of content-level factors on post-game aggression (e.g., presence of blood, Zhang et al., 2009) or the effects of player-level factors on post-game aggression (e.g., self-esteem, Bastian et al., 2012). In most studies, authors show little theoretical interest in the interaction between player-level variables and game-level variables, as illustrated by the lack of mention of such interactions in the aforementioned review article (Anderson et al., 2010). The evidence from Study 3 suggests that video game researchers should consider devoting more resources to investigating potential interaction effects. The present research provides an illustrative example as to how researchers can use existing theory to generate hypotheses about individual differences of interest and to customize the content of the games used in their studies to create theoretically meaningful content variables that interact meaningfully with individual difference variables.

Practical Applications

Beyond its theoretical implications, the present research also has a number of practical applications. One such application is relevant to the video game industry, which has focused on creating increasingly immersive games for players. As the present research suggests, however, increasing player immersion is potentially problematic, particularly in the domain of violent video games where players are more likely to behave aggressively in the minutes following gameplay. According to the GAM, over time, this increase in post-game aggression can also be expected to translate into more trait aggression, more accessible aggressive thoughts, and more behavioural aggression in other contexts (Anderson, Gentile, & Buckley, 2007). It would be impractical to suggest that video game designers make less immersive games. Such a suggestion would likely be rejected by both gamers, who seek immersion, and by the game industry, which survives by fulfilling consumer preferences.

A more practical solution may be for game studios to intentionally design games with distancing elements that undo the negative effects of their immersive features. Distancing may not need to involve "invisible walls", unexpected and frustrating boundaries in the game-space which remind players that they are playing a game by preventing them from carrying out an action they would otherwise like to perform (e.g., walking beyond the game's map space). Instead, games might incorporate meta-game features that allow players to immerse into the game but regularly break away to remind them that they are playing a game. An example of this can be seen in the game *The Stanley Parable*. In the game, players take the role of an office worker, Stanley, as he attempts to discover the fate of his co-workers, who have all mysteriously vanished. As the player controls Stanley, however, the story's narrator interacts with the player, dictating to the player where to go next and chastising them when they choose not to. Throughout the game, the player is occasionally reminded that they are playing a game, such as when the narrator, annoyed at the player's disobedience, changes the game to mimic other popular computer games, or when the player is dissociated from Stanley in one of the game's possible endings, with Stanley completely unresponsive without the player's input. *The Stanley Parable* sold remarkably well and was critically

73

acclaimed (Hinkle, 2013), suggesting the viability of developing games with player distancing built into the game's design. Future research could experimentally test whether the incorporation of these sorts of occasional distancing elements into studio-developed violent video games has the intended effect of reducing post-game aggression.

Another potential application of the present research involves capitalizing on the fact that player immersion is associated with congruent post-game behaviour to create desirable behaviour. For example, in an earlier study taken from the present line of research, participants were asked to play a motorcycle racing video game. Motorcycle racing is a dangerous activity, the consequences of which were made apparent to players, who regularly crashed or fell off their motorcycle. After playing, players completed immersion measures and measures of both perceived risk involved in a number of risky behaviours and their intention of engaging in those behaviours. Of particular interest was the item "riding a motorcycle without a helmet". Greater participant immersion into the game predicted significantly less intention to ride a motorcycle without wearing a helmet ($\beta = -.20$, $t(99) = -2.03$, $p < .05$). In this context, immersion sensitized participants to the dangers of the reckless behaviour, motivating participants to make more self-protective choices in the real-world.

These findings can be considered in conjunction with research on pro-social video game effects, which has shown that players who play games with prosocial goals instead of adversarial goals experience more positive social outcomes, both short-term and long-term (e.g., Greitemeyer & Osswald, 2009, 2010, 2011). In one set of studies, for example, participants either played a prosocial game, where the goal was to help guide animal-like characters away from danger and toward their goal, an aggressive game, where the goal was to kill the animal-like characters, or a neutral puzzle game. Participants who played the prosocial game were more likely than the other participants to help a research assistant pick up dropped pencils, to offer their time to research assistants to help with a future study, and to intervene and help a person who was being harassed (Greitemeyer & Osswald, 2010). In future research, it would be worth replicating such studies, testing whether the extent to which players immerse into these games

mediates the effect of condition on post-game prosocial behaviour. Were immersion found to significantly mediate these effects, it would suggest the importance of creating prosocial games that are as immersive as possible to maximize the potential increase in the player's prosocial attitudes and behaviour.

Limitations

While the mediating role of immersion on the relationship between prior violent video game experience and post-game aggression was replicated across three studies, and while in the final study I was able to indirectly manipulate immersion with a subset of participants to provide more convincing causal evidence for immersion's mediating role, there remain several significant limitations of the present research which should be considered when interpreting the present research and which should be addressed in future research.

Manipulating immersion. One significant limitation of the present research was the difficulty of directly manipulating participant immersion into the game. It was noted in the discussions of Study 1 and 2 that both a manipulation of a game parameter (i.e., the perspective from which the game was played) and an instructional manipulation of the player's goal when playing the game (i.e., a goal of self-immersing or a goal of critiquing the game) failed to significantly affect players' immersion into the game. While I speculated post-hoc on some of the reasons why these manipulations failed to affect player self-immersion, they nevertheless illustrate the difficulty of directly manipulating immersion in the context of video games. Moreover, it should be noted that the indirect manipulation of self-immersion in Study 3 involved an individual difference variable – players' chronic fantasy engagement.

To explain the success of analogous manipulations of self-immersion in previous research (e.g., Kross, et al., 2005) compared to the difficulty of manipulating immersion in the present research, it may be worth noting an important difference between the current research and prior research: the source of the activity's content. Immersion may be more straightforward to experimentally induce in activities where the content is self-generated (e.g., recalled events, hypothetical future events) than in activities where the

75

content was generated by someone else (e.g., video games, movies). For example, in an activity where a participant has more control over the content, such as recalling a past event, manipulations of mental imagery may be more salient to participants, given that they have to actively interpret and apply the researcher's instructions as they mentally construct a representation of the event. In contrast, for participants in which the manipulation is built into a previously-constructed fantasy activity (e.g., perspective in a video game), the manipulation may be a far less salient element of the situation, given that participants did not themselves have to acknowledge and incorporate the manipulation into the content of the activity.

Whatever the reason for the difference in the effectiveness of immersion manipulations across these contexts, it would be worthwhile, in future research, to more systematically test different manipulations of immersion in fantasy activities to determine whether feasible domain-general manipulations exist or whether effective manipulations of immersion need to be specifically tailored to particular activities or for the background and interests of particular players, as in Study 3. A possible domain-general manipulation of inducing greater distancing that may work in the context of fantasy would involve participants experiencing an irritating physical sensation, such as holding a hand in cool water or sitting in an uncomfortable position, as they engage in the activity. The physical sensation may be sufficient to keep participants "grounded in reality", keeping reality salient and preventing them from fully immersing in the activity. A possible way of inducing greater immersion, in contrast, may be to have participants experience the activity in the absence of distracting stimuli, for example by dimming the room lights or engaging in the activity in a sound-insulated room. By removing potential reminders of the "real world", it may be easier for participants to become immersed into an activity.

Carryover effects. While the present studies attempted to experimentally manipulate player immersion into a violent video game to determine its effects on post-game aggression, they did not include a no-play or non-violent video game control group for comparison. In an exploratory study not presented in this manuscript, participants completed the "fantasy-themed" version of the video game from

Study 3. Rather than manipulating participant immersion into the game, the only manipulation was the order in which participants completed the different parts of the study: in one condition, participants played the game first and then completed measures of aggression and immersion into the game. In the other condition, participants completed the aggression measures first, and then played the game and reported their immersion into the game. Unexpectedly, there were no significant differences between participants in the two conditions: participants who played the violent video game first ($M = -.10$, $SD = .97$) were no more aggressive than participants who played the videogame second ($M = .14$, $SD = .93$), and, in fact, there was even a trend in the opposite direction ($F(1,166) = 2.61$, $p = .11$). Additionally, the data suggested a positive relationship between participant immersion into the game and aggression even when participants played the game *after* completing the measures of aggression ($\beta = .21$, $t(162) = 1.93$, $p = .06$). While it is difficult to draw conclusions based on a single laboratory study, especially when the pattern of results runs opposite to the well-documented finding that playing violent video game increases aggression (e.g., Anderson et al., 2010) – it nevertheless raises questions about whether immersion into violent video games plays a role in causing, as opposed to merely predicting, post-game aggression.

One possibility is that immersion into a violent video game *does* increase post-game aggression, and the lack of a significant difference between the play and no-play condition on post-game aggression was the product of trying to detect a small effect with a limited study design. Given the relatively small effect size of violent video game effects, estimated to be about .20 (Anderson et al., 2010), it is entirely possible that any one study may fail to show a significant effect of playing violent video games on aggression simply due to random chance. Alternatively, a variable confounded with the manipulation may have inflated participants' aggression scores for those who completed the aggression measure first. For example, participants who completed the measure of aggression first may have been more alert and attentive during the competitive reaction time task in which aggression was measured, as it was the first measure in the study, than participants who completed this aggression measure 15 minutes into the session, after playing the game. As a result of this increased attentiveness, participants who completed the

aggression measure first may have detected and been more reactive to the initial provocation by their simulated opponent, increasing their aggression relative to what it might have been if the same participants had instead completed this aggression measure much later in the course of the study, when their attention may have been lagging. This suggests that participant boredom may be working against me in this study, making it difficult to determine whether playing the violent video game increased aggression over not playing at all. Taken together, it may be the case that while immersion does increase post-game aggression, this particular study was ill-suited to test immersion effects against a control condition.

A second explanation for the study's unexpected findings is that immersion into a violent video game does not cause post-game aggression but, instead, individual differences in the tendency to become immersed predict unique variance in specific instances of behavioural aggression beyond what is predicted by trait aggression. This alternative explains the association between immersion and aggressive behaviour in both the "play first" and "play second" conditions. The measure of immersion into the violent video game may capture individual differences in the general tendency to get caught up in, or become emotionally and motivationally engaged in, aggressive activities both in the game itself and in tasks that measure aggressive behaviour, such as the competitive reaction time task. To the extent that traditional self-report measures of dispositional aggressive tendencies fail to capture these experiential aspects of aggression, measures of immersion may contribute to better prediction of aggressive behaviour than measures of trait aggression alone.

Study 3 provides some evidence to support the first explanation, that immersion *does* play a causal role in post-game aggression. The manipulation of fantasy content in Study 3 affected post-game aggression for participants who chronically engaged in fantasy activities, a simple effect marginally mediated by the extent to which participants who chronically engaged in fantasy activities experienced immersion into the game. There is thus reason to believe that immersion into a violent video game plays a causal role in post-game aggression. Moreover, were it the case that immersion is not causally implicated

in producing post-game aggression, my findings would still suggest that there is value in measuring immersion in the context of video game violence. If immersion turns out not to be a mechanism leading to post-game aggression, it may nevertheless prove useful as a more sensitive measure of a person's propensity to get caught up in aggressive activities, which could not only improve researchers' ability to predict dispositional aggressivity, but may also provide new theoretical insights into the psychology of aggression. For example, the Buss-Perry Aggression Questionnaire assesses four subscales: physical aggression, verbal aggression, anger, and hostility (Buss & Perry, 1992). While these subscales capture a significant portion of variance in real world aggressive behaviour (Buss & Perry, 1992), none assess the phenomenological experience of participation in aggression, such as experiencing immersion versus distancing while participating in aggressive acts. Given the important role of self-immersion in the regulation of negative affect, undesirable thoughts (Ayduk & Kross, 2010a), and aggressive behaviour (Mischkowski et al., 2012), incorporating items that assess an individual's propensity to become immersed in aggressive acts into measures of dispositional aggressivity may enhance the content validity of those individual difference measures.

In light of the unexpected findings from the study discussed in this section, I plan to conduct a series of studies to more rigorously test my hypothesis that immersion into violent video games increases post-game aggression. One such study would involve following the guidelines for best practices in violent video game research put forward by Anderson and his colleagues (Anderson et al., 2010) by testing the play first versus play second study in a within-subjects design that tests whether participant immersion into a violent video game predicts an increase in participants' aggressive behaviour above a baseline measure of aggressive behaviour. The results of this study would allow me to make more definitive claims about whether immersion plays a causal role in participants' post-game aggression.

Immersion in self-selected fantasy activities. A final limitation of the present research involves its focus on participant immersion into researcher-assigned fantasy activities to the exclusion of participant-chosen fantasy activities. The present studies found that participants significantly differed in

the extent to which they became immersed in the violent video game and that this immersion was significantly predicted by their prior experience with violent video games and predicted their post-game aggressive behaviour. It is possible, however, that these significant associations may be an artefact of the study's design. For example, in the real world, there may be far less variability in people's immersion into fantasy activities because people likely preferentially seek out fantasy activities they can readily immerse into and likely abandon fantasy activities they do not become immersed into. Were it the case that far less variability in immersion scores exists in the real world, the associations between prior experience and immersion and between immersion and post-activity thoughts and behaviour observed in the present studies may be weaker or non-existent. That said, it is worth noting that anecdotal evidence and the literature reviewed have both suggested that there is at least some naturally-occurring variation in the extent to which people experience immersing and distancing in self-selected fantasy activities. Moreover, contextual factors may affect the extent to which a person immerses or distances over time in the same activity, which would provide some naturally-occurring variation. At very least, this issue suggests the importance of conducting further research on immersing and distancing to test whether the processes and properties of self-selected fantasy activities found presently generalize to participant-selected fantasy activities.

Future Directions

The present research has raised several important questions about the potential role of immersion as a process underlying the spillover of fantasy activities into real-world thoughts and behaviour. The first such question involves the specificity of the present effects to video games. Fantasy engagement encompasses a broad range of different media, including movies, television, novels, live-action roleplaying, and interaction in vast online worlds. While the present research studied immersion into video games specifically, future research should test the generalizability of these effects to other media. For example, fantasy activities where participants are able to respond as naturally as possible should lead to the most immersion, given that they minimize the number of instances where a player is reminded that

he or she is, in fact, engaging in a fantasy. This would suggest that more actively involving fantasy activities such as daydreaming, video games, and role-playing should be particularly immersing and should thus lead to greater post-activity cognitive and behavioural effects. In contrast, more passively involving media such as books, television, and movies, where the content is fixed, may make salient the fantasy's non-real status by preventing audiences from responding as they would naturally, leading to fewer post-activity spillover effects. Future research systematically testing differences between fantasy domains and their underlying processes would enrich our understanding of the processes underlying immersion and fantasy spillover into reality.

It would also be interesting to examine immersion in the domain of collective fantasies, where more than one person collectively contributes to the content of a fantasy activity. One can imagine, in line with Festinger's prior work on cults for example (Festinger, Riecken, & Schachter, 1956), that having others involved in a fantasy activity may validate the pretense, facilitating the suspension of disbelief and thereby enhancing immersion. Alternatively, one could imagine that the presence of others may lead to disagreements about the content or parameters of the fantasy space, as in the case of children experiencing conflict during pretend play (e.g., Howe, Rinaldi, Jennings, & Petrakos, 2002). In this case, collective fantasies may hinder immersion, as such conflicts or the actions of others may make salient the game's non-real status, breaking the suspension of disbelief. Future research should aim to examine whether immersion effects are enhanced or hindered by the presence of co-participants by adapting paradigms such as those in the current research to involve multiple participants in a given fantasy activity.

Another line of research worth pursuing in the future involves testing the effects of immersion into fantasy activities in other cultures. The present research tested the mediating role of immersion into fantasy activities solely on North American participants – in undergraduate students at a North American university in Study 1 and 3 and in an online sample of American adults in Study 2. While these findings support some generalization to North American communities, what remains unaddressed is whether these findings generalize to other cultures. For example, prior research has found that members of

81

interdependent or "face" cultures (e.g., East Asians) are more likely than members of independent or "dignity" cultures (e.g., North Americans) to experience the self from an outsider or third-person perspective (e.g., Cohen & Gunz, 2002; Cohen, Hoshino-Browne, & Leung, 2007; Kim & Cohen, 2010). For example, research has found that Asian-Amerians are more likely to have memories, mental imagery, and models of the self that are all third-person - based on a gestalt of how others perceive them - relative to Anglo-Americans, for whom phenomenological experience is far more egocentric and first-person (Cohen, Hoshino-Browne, & Leung, 2007). Given the tendency for East Asians to spontaneously adopt the perspective of a distanced observer, it is possible that, relative to North Americans, East Asians may be less likely to experience fantasy activities from an egocentric, immersed perspective, instead experiencing them from a distanced observer's perspective. Were this the case, it may suggest that, all else being equal, East Asian participants may be less likely to experience aggression after playing a violent video game than North American participants due to becoming less immersed in the game. More broadly, it may be the case that East Asians are less likely than North Americans to experience thought and behavioural spillover effects after engaging in fantasy activities. It is worth noting, however, that past research has also shown that Asian American participants' behaviour, relative to North American participants, is more influenced by information processed from a third-person perspective (Kim & Cohen, 2010). As such, this may lead to a different prediction for East Asian participants, one that is opposite from the pattern observed in North American participants: For East Asian participants, experiencing self-distancing from a fantasy might increase fantasy spillover effects, as fantasies experienced from a self-distanced perspective may be more impactful on real-world attitudes and behaviour than those experienced from an immersed, egocentric perspective. Were this the case, it would suggest that fantasy spillover effects are not solely determined by the absolute amount of immersion one experiences into a fantasy activity and but, instead, they may be a product of a person's experienced immersion into the fantasy and his or her cultural background. It remains for future research to test these different possibilities through cross-cultural studies.

Finally, I believe it would be worth studying the potential long-term effects of fantasy engagement for self and identity processes. In the present research, I have provided preliminary evidence that immersion into a fantasy activity can have immediate effects on thoughts and behaviour. Many fantasy activities are recurring, however. Books are typically not read in one sitting, and may often span several volumes. Similarly, role-playing games often take place in regularly-occurring sessions, with many campaigns lasting months or even years. Fantasy-themed communities, such as Second Life or fan communities often involve assuming the identity of a fictional character and interacting with others as that character for hours at a time on a daily basis for years. Social-cognitive models of aggression suggest that over time, recurring exposure to violent video games leads to long-term cognitive, behavioural, and personality changes (Anderson, Gentile, & Buckley, 2007). Analogously, it may be the case that prolonged, recurring immersion into fantasy activities may have long-term effects on a person's personality or their sense of self. Future research would benefit from longitudinal studies of individuals who routinely engage in fantasy activities to test the long-term implications of immersion into fantasy activities. To this end, I am presently conducting a longitudinal study on members of a fantasy-themed fan community. Members of this community adopt the identity of fantasy-themed avatars through which they interact with other members of the community. I am testing whether the identity and personality of participants who interact with others as their avatar become more like the personality and identity of their avatar over time, especially for those who spend the most time as their avatar and for those who become the most immersed into their avatar. In the future, I hope to test whether personality traits and even more fundamental aspects of a person's identity, including his or her political beliefs, religious beliefs, and even gender identification, may be influenced by regular immersion into fantasy-themed activities.

Conclusion

Across three studies I found evidence to support the hypothesis that immersion into a fantasy activity – playing a violent video game – had a significant impact on subsequent behaviour, and mediated the relationship between prior experience with that fantasy activity and post-fantasy behaviour. This

research has a number of theoretical implications, including implications for research on fantasy, research on self-immersion and transportation, and research on video game violence effects. This research also has a number of practical implications for video game design and the use of immersion into fantasy activities to foster desirable attitudes and behaviour. While there were notable limitations of the present research, it also suggested a number of potentially fruitful lines of research which may help us to better understand how the fantasy activities we invest so much time and resources in can have real-world effects on us, despite our tendency to trivialize such activities as frivolous recreation.

Figure 1. Structural equation model of game experience predicting game phenomenology variables, enjoyment, and difficulty, allowing all of them to predict post-game aggressive behaviour while controlling for trait aggression (not shown) in Study 1.
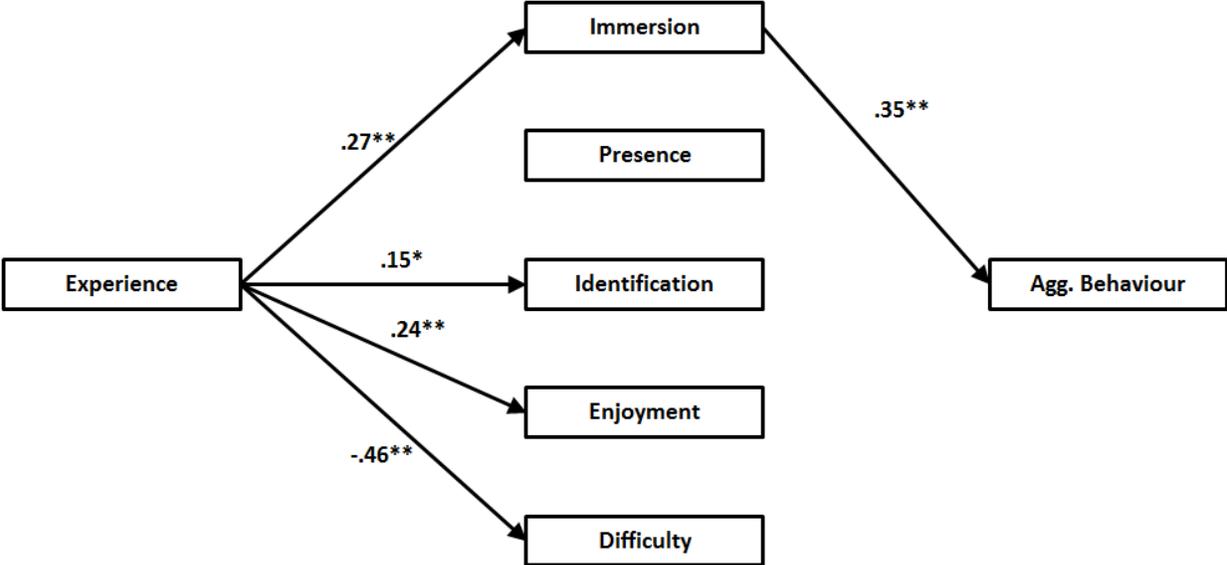
Note. * $p < .05$, ** $p < .01$. Standardized regression coefficients are presented, and non-significant pathways not shown.

Figure 2. Structural equation model of the game experience scale predicting game phenomenology variables, enjoyment, and difficulty, and allowing those variables to predict post-game aggressive scenario completions while controlling for trait aggression (not shown) in Study 2.
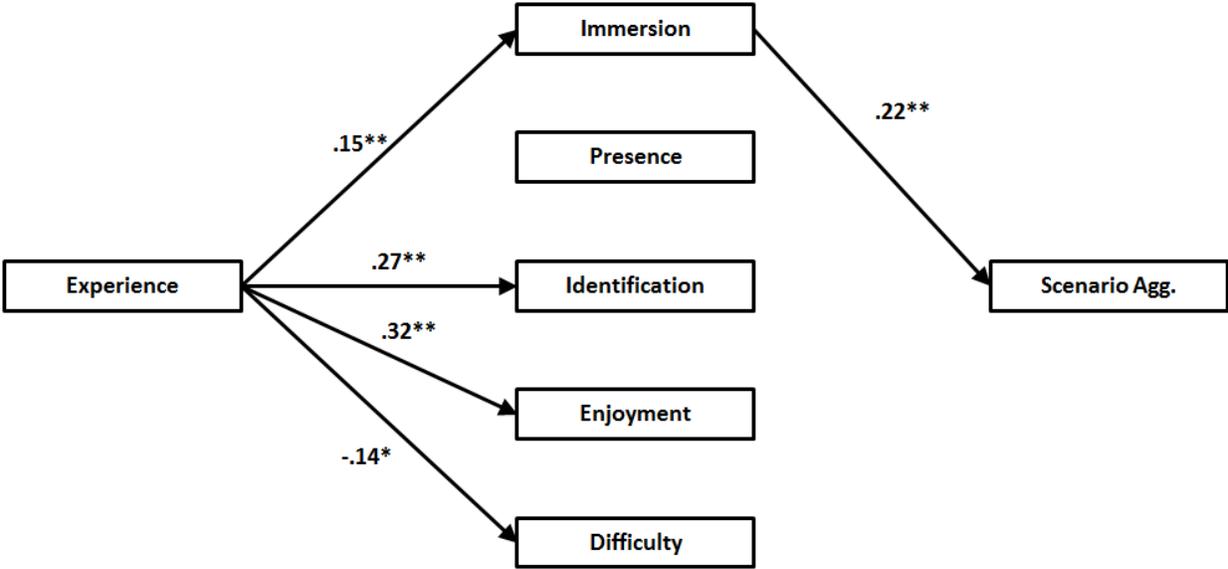
Note: * $p < .05$, ** $p < .01$. Standardized regression coefficients are displayed, and non-significant pathways not shown.

Figure 3. Regression analysis showing the interaction of condition and chronic fantasy engagement predicting immersion scores in Study 3.
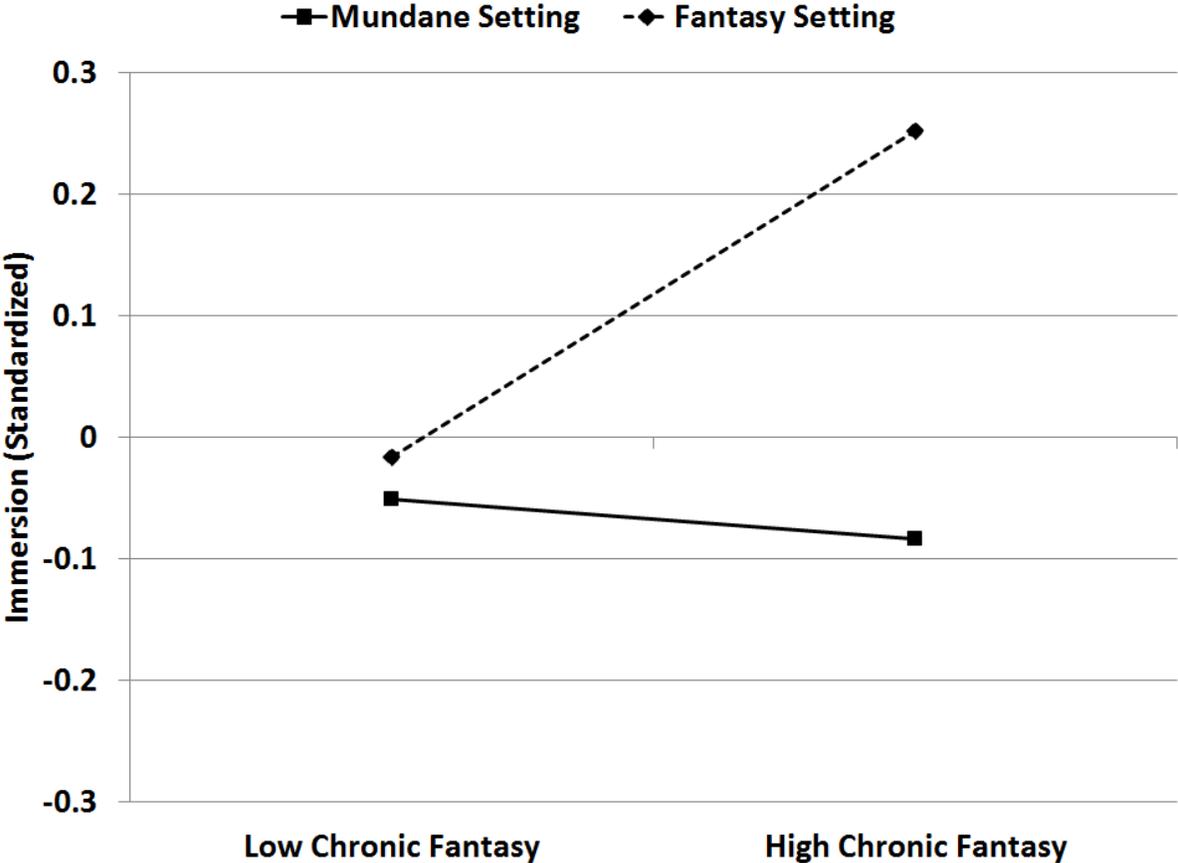
Figure 4. Regression analysis showing the interaction of condition and chronic fantasy engagement predicting behavioural aggression in Study 3.
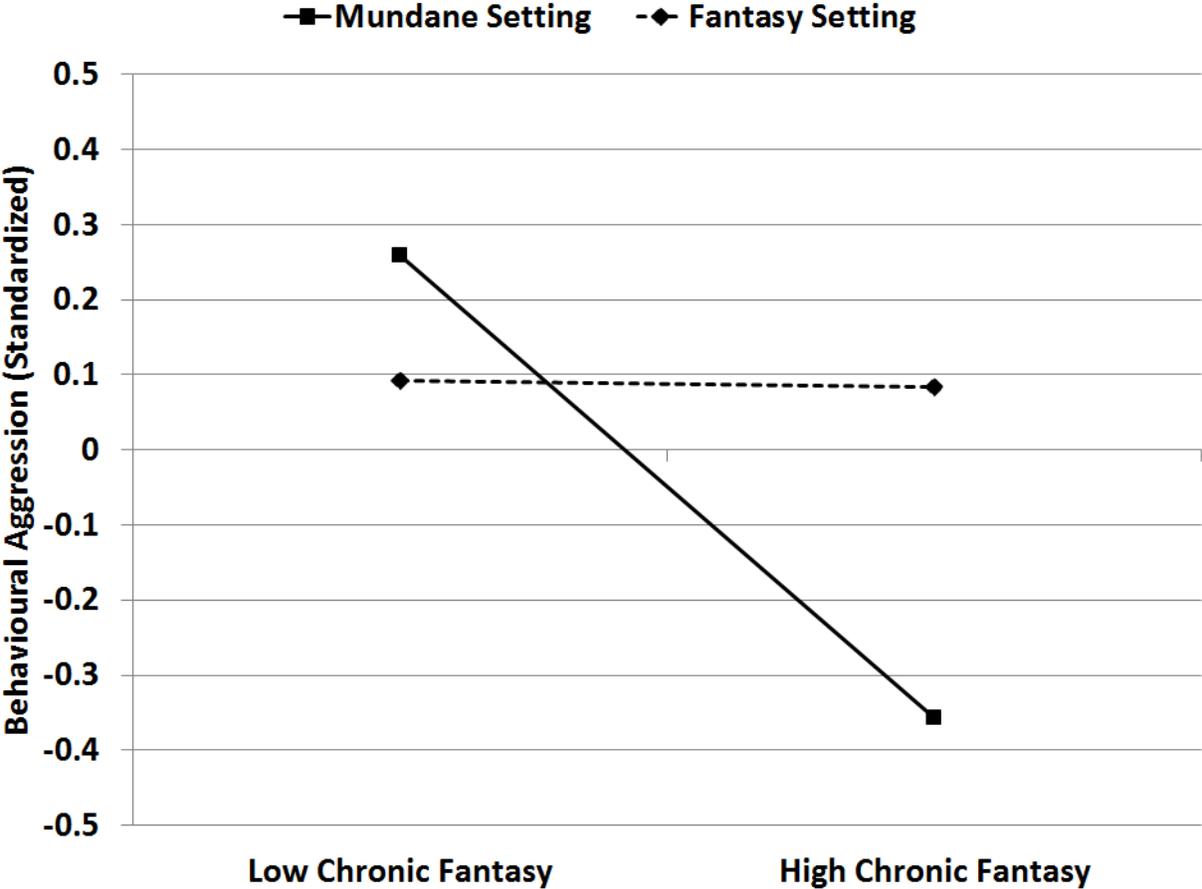
Figure 5. Structural equation model of game experience predicting game phenomenology variables, enjoyment, and difficulty, all predicting post-game aggressive behaviour while controlling for trait aggression (not shown) in Study 3.
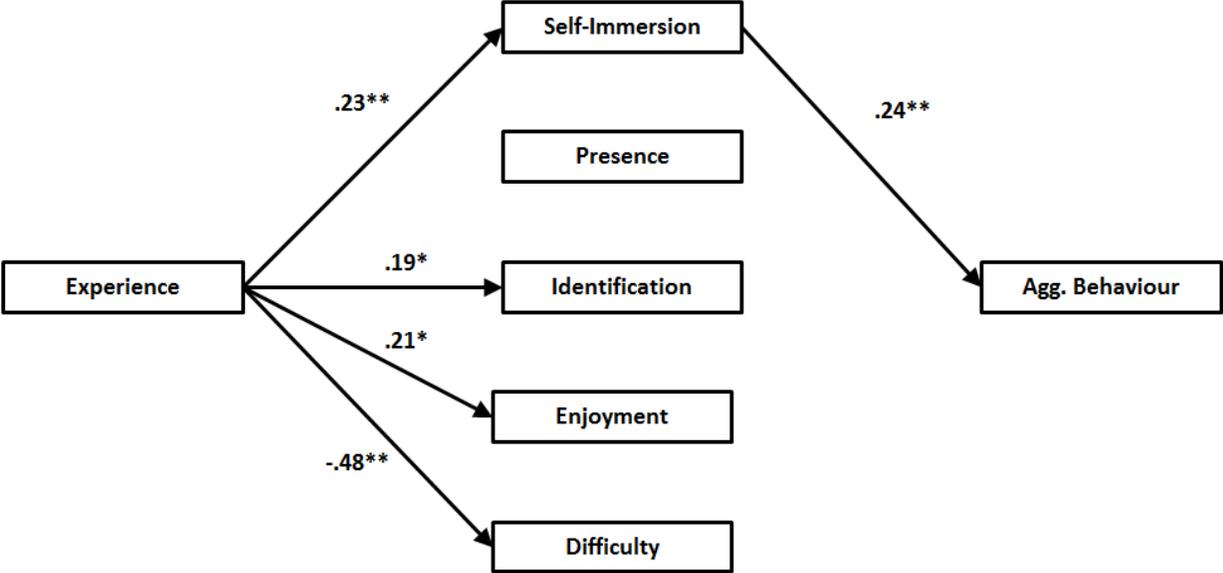
Note. * $p < .05$, ** $p < .01$. Standardized betas are displayed and non-significant pathways not shown.

Table 1.

Summary statistics for variables of interest in Study 1.

	Mean (SD)
1. Buss-Perry Aggression Questionnaire (1-5)	2.93 (0.97)
2. Aggressive word ratio (0-1)	0.22 (0.07)
3. Noise blast intensity (1-10)	4.61 (2.24)
4. Noise blast duration (1-10)	4.20 (2.22)
5. Immersion 3-Item (1-7)	3.35 (1.32)
6. Presence 3-Item (1-7)	2.64 (1.45)
7. Identification 4-Item (1-7)	1.97 (1.00)
8. Video Game Experience (1-10)	4.86 (2.71)

Table 2.

Correlations between variables of interest in Study 1.

	1	2	3	4	5	6	7	8	9
1. BPAQ	1.0	--	--	--	--	--	--	--	--
2. Word Completion	.06	1.0	--	--	--	--	--	--	--
3. Aggressive Behaviour	.13	.20*	1.0	--	--	--	--	--	--
4. Immersion	.00	.10	.34**	1.0	--	--	--	--	--
5. Presence	.03	.20**	.16*	.59**	1.0	--	--	--	--
6. Identification	.13	.06	.25**	.45**	.44**	1.0	--	--	--
7. Enjoyment	.09	.05	.34**	.64**	.42**	.47**	1.0	--	--
8. Difficulty	-.04	-.02	.08	-.01	.08	.04	-.04	1.0	--
9. Video Game Experience	.09	.11	.18*	.27**	.05	.16*	.24**	-.46**	1.0

Note. $* p < .05$, $** p < .01$. BPAQ = Buss-Perry Aggression Questionnaire.

Table 3.

Confidence intervals (95%) of the estimated direct and indirect effects of game phenomenology subscales, enjoyment, and difficulty mediating the relationship between violent video game experience and post-game aggressive behaviour in Study 1.

Model 1	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.057*	.028		
2. Experience (Direct)	.022	.028		
3. Immersion	.035	.013	.014	.068
Model 2	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.057*	.028		
2. Experience (Direct)	.016	.028		
3. Immersion	.035	.015	.012	.072
4. Identification	.009	.008	-.001	.032
5. Presence	-.002	.005	-.020	.003
Model 3	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.057*	.028		
2. Experience (Direct)	.046	.031		
3. Immersion	.032	.015	.010	.068
4. Identification	.008	.008	-.002	.031
5. Presence	-.002	.005	-.020	.003
6. Enjoyment	.003	.010	-.015	.026
7. Difficulty	-.030	.015	-.061	-.003

Note. $* p < .05$, $** p < .01$.

Table 4.

Descriptive statistics for 18-item experience scale in Study 2.

	Mean (SD)	Range
1. Hours per week playing video games	9.68 (11.37)	0-80
2. % of video games played that are violent	26.51 (35.29)	0-100
3. Hours per week watching television	15.31 (16.32)	0-100
4. % of television watched that is violent	18.62 (24.75)	0-100
5. Hours per week watching movies	7.76 (12.13)	0-100
6. % of movies watched that are violent	23.48 (27.88)	0-100
7. Average hours of video games / week in high school	23.48 (27.88)	0-80
8. Average hours of video games / week in elementary	11.06 (13.38)	0-80
9. Average number of days playing video games per week	3.67 (2.38)	0-7
10. Average number of hours playing video games per week	8.96 (9.55)	0-60
11. Do you own a video game console? (1=yes, 0 = no)	.68 (.47)	0-1
12. Number of video games owned	46.95 (74.43)	0-500
13. Percent of owned violent video games that are violent	42.12 (33.55)	0-100
14. Experience with first-person shooter video games	6.08 (3.12)	1-10
15. Experience with third-person shooter video games	5.22 (3.09)	1-10
16. Experience with violent video games	6.27 (3.14)	1-10
17. Experience with non-violent video games	7.57 (2.53)	1-10
18. Violent content in your favourite 3 video games	3.44 (1.68)	1-7

Table 5.

Summary statistics for variables of interest in Study 2.

	Mean (SD)
1. Buss-Perry Aggression Questionnaire (1-5)	2.13 (0.73)
2. Aggressive word ratio (0-1)	0.21 (0.08)
3. Aggressive story completions (1-7)	3.13 (1.88)
4. Immersion 3-Item (1-7)	5.28 (1.34)
5. Presence 2-Item (1-7)	4.11 (1.68)
6. Identification 4-Item (1-7)	3.24 (1.46)

Table 6.

Correlations between variables of interest in Study 2.

	1	2	3	4	5	6	7	8	9
1. BPAQ	1.0	--	--	--	--	--	--	--	--
2. Word Completion	.11	1.0	--	--	--	--	--	--	--
3. Story Aggression	.13	-.03	1.0	--	--	--	--	--	--
4. Immersion	-.04	-.07	.22**	1.0	--	--	--	--	--
5. Presence	.09	-.06	.17*	.60**	1.0	--	--	--	--
6. Identification	.19**	.01	.11	.46**	.68**	1.0	--	--	--
7. Difficult	-.00	-.07	.00	.02	.10	.06	1.0	--	--
8. Enjoyable	.18**	.06	.08	.47**	.41**	.43**	.02	1.0	--
9. Video Game Experience	.31**	.23**	.13*	.13*	.08	.30**	-.12**	.33**	1.0

Note. $* p < .05$, $** p < .01$. BPAQ = Buss-Perry Aggression Questionnaire

Table 7.

Confidence intervals (95%) of the estimated direct and indirect effects of violent video game experience on ratings of aggressiveness of post-game scenario completions.

Model 1	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.117	.080		
2. Experience (Direct)	.071	.080		
3. Immersion	.046	.023	.011	.099

Model 2	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.117	.080		
2. Experience (Direct)	.105	.085		
3. Immersion	.041	.024	.007	.101
4. Identification	-.035	.035	-.119	.024
5. Presence	.006	.014	-.009	.054

Model 3	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.109	.080		
2. Experience (Direct)	.134	.089		
3. Immersion	.043	.025	.007	.108
4. Identification	-.033	.036	-.115	.029
5. Presence	.006	.014	-.010	.057
6. Enjoyment	-.038	.034	-.118	.018
7. Difficulty	-.002	.013	-.031	.023

Note. $* p < .05, ** p < .01.$

Table 8.

Summary statistics for variables of interest in Study 3.

	Mean (SD)
1. Buss-Perry Aggression Questionnaire (1-5)	2.89 (1.09)
2. Aggressive word ratio (0-1)	0.19 (0.07)
3. Noise blast intensity (1-10)	4.42 (2.06)
4. Noise blast duration (1-10)	4.20 (1.95)
5. Immersion 3-Item (1-7)	3.49 (0.95)
6. Presence 3-Item (1-7)	2.38 (1.25)
7. Identification 4-Item (1-7)	2.06 (0.83)
8. Video Game Experience (1-10)	4.44 (2.71)
9. Fantasy: Frequency (1-7)	5.15 (1.47)
10. Fantasy: Time (1-7)	4.19 (1.29)
11. Fantasy: Important (1-6)	3.57 (1.11)

Table 9.

Correlations between variables of interest in Study 3.

	1	2	3	4	5	6	7	8	9	10
1. BPAQ	1.0	--	--	--	--	--	--	--	--	--
2. Word Completion	.08	1.0	--	--	--	--	--	--	--	--
3. Behavioural Agg.	.29**	.09	1.0	--	--	--	--	--	--	--
4. Immersion	.13	.07	.34**	1.0	--	--	--	--	--	--
5. Presence	.13	.17*	.19*	.49**	1.0	--	--	--	--	--
6. Identification	.21*	-.00	.12	.41**	.32**	1.0	--	--	--	--
7. Enjoyment	.08	-.02	.25**	.55**	.31**	.30**	1.0	--	--	--
8. Difficulty	-.12	-.06	-.23**	-.25**	.04	-.16	-.11	1.0	--	--
9. VG Experience	.23**	-.05	.17**	.25**	-.03	.22**	.22**	-.48**	1.0	--
10. Chronic Fantasy	-.04	-.03	-.10	.05	.04	.03	-.15	-.06	.26**	1.0

Note. * $p < .05$, ** $p < .01$. BPAQ – Buss-Perry Aggression Questionnaire.

Table 10.

Confidence intervals of the estimated direct and indirect effects of game phenomenology subscales mediating the simple effect of condition on post-game aggressive behaviour among high fantasy engagers in Study 3. Note: high fantasy engagers are defined as scoring at least one standard deviation above the mean on the chronic fantasy engagement measure.

Model 1	Effect	SE	94% CI (Lower)	94% CI (Upper)
1. Interaction (Direct)	.422*	.217		
2. Immersion	.136	.095	.001	.335

Model 2	Effect	SE	94% CI (Lower)	94% CI (Upper)
1. Interaction (Direct)	.427*	.219		
2. Immersion	.136	.095	.005	.374
3. Identification	-.011	.029	-.110	.017
4. Presence	.003	.023	-.024	.076

Model 3	Effect	SE	93% CI (Lower)	93% CI (Upper)
1. Interaction (Direct)	.447*	.218		
2. Immersion	.105	.089	.001	.347
3. Identification	-.011	.029	-.106	.016
4. Presence	.005	.027	-.026	.084
5. Enjoyment	.009	.041	-.049	.107
6. Difficulty	.014	.044	-.050	.120

Note. * $p < .05$, ** $p < .01$.

Table 11.

Confidence intervals (95%) of the estimated direct and indirect effects of game phenomenology subscales, enjoyment, and difficulty mediating the relationship between violent video game experience and post-game aggressive behaviour in Study 3.

Model 1	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.038	.031		
2. Experience (Direct)	.010	.030		
3. Immersion	.028	.012	.008	.058

Model 2	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.038	.031		
2. Experience (Direct)	.016	.031		
3. Immersion	.029	.014	.008	.064
4. Identification	-.005	.007	-.027	.003
5. Presence	-.001	.004	-.014	.003

Model 3	Effect	SE	95% CI (Lower)	95% CI (Upper)
1. Experience (Total)	.038	.031		
2. Experience (Direct)	-.016	.035		
3. Immersion	.023	.014	.003	.062
4. Identification	-.006	.007	-.027	.003
5. Presence	-.001	.004	-.015	.003
6. Enjoyment	.005	.009	-.008	.028
7. Difficulty	.032	.019	-.002	.072

*Note. * $p < .05$, ** $p < .01$.*

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Appendix A: Screenshots of Modified Half-Life 2 Game (Study 1)

Appendix B: Screenshots of Modified Half-Life 2 Game in 1st Person Perspective (Top) and 3rd Person Perspective (Bottom) (Study 1)

Appendix C: Buss-Perry Aggression Questionnaire (Studies 1-3)

(Anderson & Dill, 2000; Buss & Perry, 1992)

How characteristic of you is each of the following descriptions?

1--------------------------2--------------------------3--------------------------4--------------------------5

Extremely
Uncharacteristic
of Me

Extremely
Characteristic
of Me

1. Once in a while I can't control the urge to strike another person. _____
2. Given enough provocation, I may hit another person. _____
3. If somebody hits me, I hit back. _____
4. I get into fights a little more than the average person. _____
5. If I have to resort to violence to protect my rights, I will. _____
6. There are people who pushed me so far that we came to blows. _____
7. I can think of no good reason for ever hitting a person. (R) _____
8. I have threatened people I know. _____
9. I have become so mad that I have broken things. _____
10. I tell my friends openly when I disagree with them. _____
11. I often find myself disagreeing with people. _____
12. When people annoy me, I may tell them what I think of them. _____
13. I can't help getting into arguments when people disagree with me. _____
14. My friends say that I'm somewhat argumentative. _____
15. I flare up quickly but get over it quickly. _____
16. When frustrated I let my irritation show. _____
17. I sometimes feel like a powder keg ready to explode. _____
18. I am an even-tempered person. (R) _____
19. Some of my friends think I'm a hothead. _____
20. Sometimes I fly off the handle for no good reason. _____
21. I have trouble controlling my temper. _____
22. I am sometimes eaten up with jealousy. _____
23. At times I feel I have gotten a raw deal out of life. _____
24. Other people always seem to get the breaks. _____
25. I wonder why sometimes I feel so bitter about things. _____
26. I know that "friends" talk about me behind my back. _____
27. I am suspicious of overly friendly strangers. _____
28. I sometimes feel that people are laughing at me behind my back. _____
29. When people are especially nice, I wonder what they want. _____

Appendix D: Aggressive Word Completion Task (Studies 1-3)

(Anderson et al., 2003; 2004)

On the following page is a list of 98 partially-completed words. Your task is to fill in the blanks to make complete words as fast as possible. You will be given 3 minutes to complete this task. You are allowed to skip over words and return to them later, and they do not need to be completed in any particular order. Remember that the goal is to complete as many words as possible in the 3 minute time limit. If you have any questions about this task, please ask the researcher now.

1 b _ h _ _ _	34 s m _ c k	67 w _ _ d _ w
2 in _ _ re	35 s m _ _ e	68 w _ _ k e d
3 ex _ e _ _	36 k n _ _ _	69 v i s _ _ n
4 mu _ _ er	37 t _ n e	70 e n _ a g e
5 pr _ _ e	38 s _ _ b	71 s c r _ _ n
6 spea _	39 s h _ r _	72 h _ t r _ d
7 fli _ _ er	40 d r _ _ n	73 t _ l _ p h _ _ _
8 expl _ _ e	41 p _ _ n e	74 d i s _ _ s _ e d
9 w _ _ m	42 a n g _ _	75 c _ n t _ _ l
10 ki _ _	43 f l _ _ t	76 p r o v _ _ e
11 t _ p _	44 f i _ _ t	77 p _ n b _ l l
12 h _ r _	45 p _ c k	78 o u t _ _ _ e
13 a _ t _ r	46 h a _ e	79 c _ l l
14 cho _ e	47 a _ t	80 r _ d e
15 s _ m p _ _	48 c _ t	81 m _ n _ g e
16 att _ c _	49 w _ n	82 i n s _ _ _
17 c _ m p _ _ t	50 a _ e	83 s _ d _
18 des _ _ _ _	51 _ r y	84 b _ _ t
19 sh _ l _	52 w a _	85 b r _ _ z e
20 sho _ t	53 f _ m _	86 r e v _ _ t
21 r _ p _ _ t	54 s l _ p	87 c o o _
22 str _ _ e	55 b _ _ k	88 s _ _ y
23 l _ _ e	56 r _ p e	89 d _ _ r
24 b _ rn	57 f o _ e _ t	90 s m _ c k
25 st _ r _ o	58 o f f _ _ _	91 f r _ _ t
26 p _ _ son	59 l _ _ o n	92 _ u n c h
27 p _ st _ r	60 c r _ _ l	93 s h _ r e
28 m _ _ gle	61 c _ e _ t e	94 a _ u s e
29 bl _ nd	62 s t _ r _ y	95 c l _ _ r
30 sn _ re	63 m _ t c _	96 h _ n t
31 b _ e	64 f _ r _ _	97 w _ t _ r
32 h _ t	65 t _ _ t e	98 s _ a s h
33 g _ _ p e	66 n _ _ t _	

Appendix E: Competitive Reaction Time Interface (Studies 1 & 3)

(Anderson & Bushman, 1997; Bushman & Baumeister, 1998)

Appendix F: Game Phenomenology Scales (Studies 1-3)

Answer each of the following with regard to the **<u>shooter computer game</u>** that you played.

I could identify with the game character. (Identification)[1]						
0 Not at all	1	2	3 Average	4	5	6 Very much

How similar are you and the character? (Identification)[1]						
1 Not at all	2	3	4 Average	5	6	7 A great deal

To what extent would you use the term "*we*" to describe your relationship with the character in the game? (Identification)[1]						
1 Not at all	2	3	4 Average	5	6	7 A great deal

How much do you like the character in the game? (Identification)[1]						
1 Not at all	2	3	4 Average	5	6	7 A great deal

How much did you feel as if you were walking when your character walked? (Presence)[2]						
1 Not at all	2	3	4 Average	5	6	7 Very Much

How much did you feel as if you were in the room that your character was in? (Presence)[2]						
1 Not at all	2	3	4 Average	5	6	7 Very Much

How much did you feel as if you were moving when your character moved? (Presence)[2]						
1 Not at all	2	3	4 Average	5	6	7 Very Much

I really got into the game. (Immersion)[3]						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

Please indicate, using the scale below, the extent to which you experienced the gameplay... (R; Immersion)[4]						
1 Predominantly as an immersed participant	2	3	4	5	6	7 Predominantly as a distanced observer

Please indicate, using the scale below, how far away from the gameplay you felt. (R; Immersion)[4]						
1 Very close, as if through my own eyes	2	3	4	5	6	7 Very far, as if an observer

1. Fischer et al., 2010
2. Jin & Park, 2009
3. Brockmyer et al., 2009
4. Ayduk & Kross, 2010, Mischkowski et al., 2012

Appendix G: Game Enjoyment Scale (Studies 1 & 3)

(Tauer & Harackiewicz, 1999)

To what extent would you agree that playing the computer game was…

Very interesting	Totally Disagree	1	2	3	4	5	Totally Agree
A boring activity (R)	Totally Disagree	1	2	3	4	5	Totally Agree
Enjoyable	Totally Disagree	1	2	3	4	5	Totally Agree
A waste of time (R)	Totally Disagree	1	2	3	4	5	Totally Agree
Fun	Totally Disagree	1	2	3	4	5	Totally Agree

Appendix H: Post-Game Evaluations (Studies 1-3)

Please rate how well each of the following words describes the computer game you have just played using the following scale:

Definitely Not   Somewhat   Extremely

  1-----------------2-----------------3-----------------4-----------------5-----------------6-----------------7

Difficult: _____

Enjoyable: _____

Frustrating: _____

Exciting: _____

Fast: _____

Action-filled: _____

Violent: _____

Gory: _____

(Watson et al., 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
very slightly extremely or not at all	a little	moderately	quite a bit	

_____ interested (+)   _____ irritable (-)

_____ distressed (-)   _____ alert (+)

_____ excited (+)   _____ ashamed (-)

_____ upset (-)   _____ inspired (+)

_____ strong (+)   _____ nervous (-)

_____ guilty (-)   _____ determined (+)

_____ scared (-)   _____ attentive (+)

_____ hostile (-)   _____ jittery (-)

_____ enthusiastic (+)   _____ active (+)

_____ proud (+)   _____ afraid (-)

The 10 positively-valenced items and the 10 negatively-valenced items were formed into composite measures of positive (Study 1 α = .89, Study 3 α = .88) and negative (Study 1 α = .87, Study 3 α = .75) affective state.

Appendix J: Chronic Fantasy Engagement Scale

(Study 1 α = .82; Study 2 α = .88; Study 3 α = .80)

Instructions: The following items ask about your engagement in fantasy. **Please take a moment to consider the fantasy activity you engage in most frequently**: for example, reading fantasy novels or watching science fiction movies, daydreaming about luxury cars, houses or vacations, or taking on a character in roleplaying games like Second Life or World of Warcraft. Answer the questions below with regard to this fantasy activity. There are no "right" or "wrong" answers, and we are not trying to "trick" you into giving any sort of response. We are simply interested in what "fantasy" (and "fantasy activity") means for people!

How frequently would you say you engage in this activity?

a) Almost never
b) Once a year or less
c) A few times a year
d) Monthly
e) Once a week
f) Several times a week
g) Daily

Compared to the average person, how much time would you say you devote to this activity?

Much less   About the Same Amount   Much More

1-----------------2--------------------3-----------------4-------------------5------------------6------------------7

How important is it to you that you be able to engage in this activity?

a) Extremely unimportant
b) Very unimportant
c) Somewhat unimportant
d) Somewhat important
e) Very important
f) Extremely important

(adapted from Aron et al., 1992)

Circle the picture that best describes how close you ("Self") feel to the character in the game ("Other"):
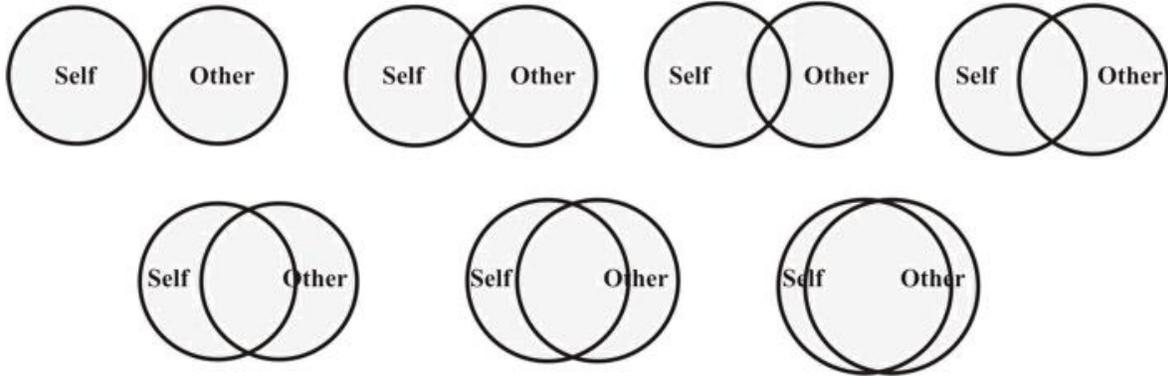
Appendix L: Guilt Scale (Study 1 *α* = .91; Study 3 *α* = .91)

(Hartmann & Vorderer, 2010)

While playing the game, how often did you feel regret, sorry about something you did?

        1 Rarely   2 Hardly Ever   3 Sometimes   4 Often   5 Very Often

While playing the game, how often did you feel like you did something wrong?

        1 Rarely   2 Hardly Ever   3 Sometimes   4 Often   5 Very Often

While playing the game, how often did you feel like you ought to be blamed for something?

        1 Rarely   2 Hardly Ever   3 Sometimes   4 Often   5 Very Often

Appendix M: Dehumanization Scale (Studies 1 & 3)

(Bastian et al., 2012)

Please think about your experience of playing the computer game and then answer each of the following questions with regard to whether you saw **your character** as possessing each of the characteristics:

I felt like my character was open minded, like they could think clearly about things.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt that my character was emotional, like they were responsive and warm.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

My character felt superficial like they had no depth. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like my character was mechanical and cold, like a robot. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like my character was refined and cultured.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like my character was rational and logical, like they were intelligent.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like my character lacked self-restraint, like an animal. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like my character was unsophisticated. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

Study 1 α = .77, Study 3 α = .68

Now, answer each of the following questions with regard to whether you saw **<u>the enemy characters</u>** as possessing each of the characteristics:

I felt like the enemy characters were open minded, like they could think clearly about things.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt that the enemy characters were emotional, like they were responsive and warm.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

The enemy characters felt superficial like they had no depth. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like the enemy characters were mechanical and cold, like robots. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like the enemy characters were refined and cultured.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like the enemy characters were rational and logical, like they were intelligent.						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like the enemy characters lacked self-restraint, like animals. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

I felt like the enemy characters were unsophisticated. (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

Study 1 $\alpha = .78$, Study 3 $\alpha = .68$

Appendix N: Appropriateness of Aggression Scale (Studies 1 & 3)

(Study 1 α = .54; Study 2 α = .91; Study 3 α = .91)

Note: When the following questions ask about your in-game behaviour this refers to the actions you performed within the context of the video game.

How aggressive was your in-game behaviour?						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

How appropriate was your in-game behaviour?						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

How moral was your in-game behaviour?						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

How justified was your in-game behaviour?						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

To what extent would you say that your in-game behaviour reflects who you are?						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

To what extent was your in-game behaviour "just part of the game"? (R)						
1 Not at all	2	3	4 Somewhat	5	6	7 Very Much

Appendix O: Realism Items (Studies 1-3)

To what extent did you feel that you were responsible for your character?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

To what extent did you feel that you controlled your character?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

To what extent did you feel that your character was responsive to you?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

To what extent did you feel that you had a close relationship with your character?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

To what extent did the game feel real to you?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

To what extent did you feel as though you were actually there, not just controlling a character?						
1 Not at all	2	3	4 Average	5	6	7 Very Much

Study 1 α = .77, Study 2 α = .87, Study 3 α = .72

Appendix P: Game Evaluations (Studies 1-3)

	Study 1	Study 2	Study 3
	Mean (SD)	Mean (SD)	Mean (SD)
1. Difficulty	2.65 (1.58)	4.38 (1.63)	3.09 (1.70)
2. Enjoyable	3.34 (1.69)	4.95 (1.63)	2.98 (1.54)
3. Frustrating	2.83 (1.74)	N/A	3.13 (1.79)
4. Exciting	3.05 (1.52)	N/A	2.99 (1.44)
5. Fast-Paced	3.06 (1.62)	N/A	4.02 (1.56)
6. Action-Filled	3.35 (1.63)	N/A	4.02 (1.56)
7. Violent	4.79 (1.55)	5.09 (1.42)	5.17 (1.61)
8. Gory	3.92 (1.68)	3.89 (1.50)	4.39 (1.76)
9. Pleasant	N/A	5.09 (1.42)	N/A
10. Anxiety	N/A	3.89 (1.50)	N/A

Appendix Q: Screenshots from Dead-Zed, Browser-Based Computer Game (Study 2)
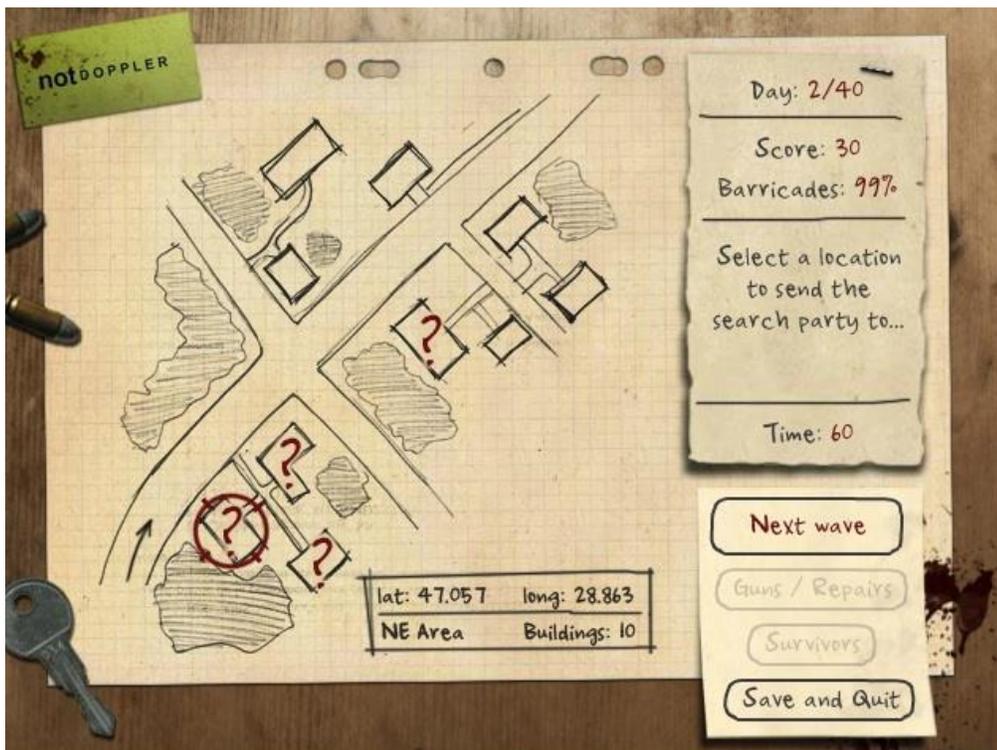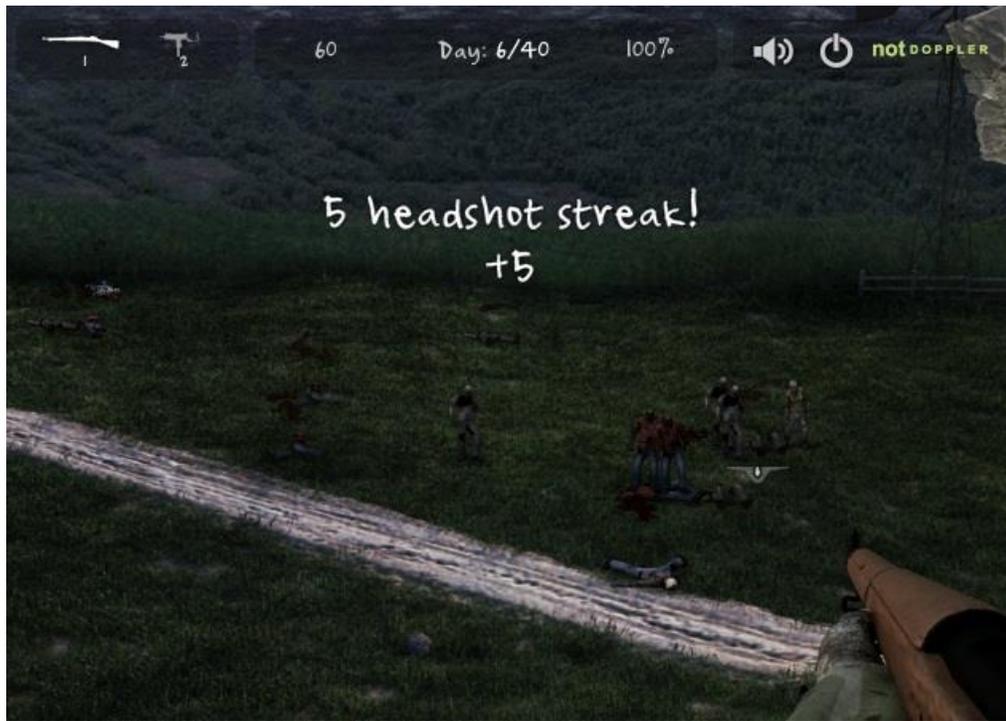
Appendix R: Story Completion (Study 2)

(Adopted from Cohen, Nisbett, Bowdle, & Schwarz, 1996)

Creative Writing Task

In this next part of the study, you will read a scene from a short story. You will then be asked to fill in the next two or three sentences of the story.

It had only been about twenty minutes since they had arrived at the party when Jill pulled Steve aside, obviously bothered about something.

"What's wrong?" asked Steve.

"It's Larry. I mean, he knows that you and I are engaged, but he's already made two passes at me tonight."

Jill walked back into the crowd, and Steve decided to keep his eye on Larry. Sure enough, within five minutes Larry was reaching over and trying to kiss Jill.

_____
_____
_____

Appendix S: Extensive Video game Experience Scale (Study 2)

In recent months, how many hours do you spend per week **playing video/computer games**, on average?

What percentage of this time was spent **playing games with violent content**? %

In recent months, how many hours do you spend per week **watching television**, on average?

What percentage of this time was spent **watching television with violent content**? %

In recent months, how many hours did you spend per week **watching movies**, on average?

What percentage of this time was spent **watching movies with violent content**? %

In high school, how many hours did you spend per week **playing video/computer games**, on average? _____

In elementary school, how many hours did you spend per week **playing video/computer games**, on average? _____

How many days per week do you currently play **video/computer games** on average?

How many hours per week do you currently play **video/computer games** on average?

Do you own a video game console? (Yes / No) If yes, which ones (please list)

Approximately how many video/computer games do you own? _____

What percentage of these games would you estimate are violent? %_____

On a scale of 1 to 10, with 1 meaning "no experience at all" and 10 meaning "extremely experienced", how much experience would you say you have with:

Video games like the game in this study:

1st Person Shooter Games:

3rd Person Shooter Games:

Violent Games:

Non-Violent Games:

Compared to the types of video / computer games you usually play, how would you rate the game that you played in the lab today in terms of violence?						
1 This game was much less violent	2	3	4 This game was about as violent	5	6	7 This game was much more violent

Below, please list up to three of your favorite video or computer games.

#1_____

#2_____

#3_____

Please write the name of the game you put in the #1 slot in the question asking you to list your favorite computer/video games: _____.

Please answer the following questions with regard to this particular game.

How often do you play this game?						
1 Rarely	2	3	4 Occasionally	5	6	7 Often
How violent is this game's content (e.g. storyline, gameplay)?						
1 No violent content	2	3	4 Some violent content	5	6	7 Extremely violent content
How violent are this game's graphics (e.g. photorealistic blood, gore)?						
1 No violent graphics	2	3	4 Some violent graphics	5	6	7 Extremely violent graphics

Please use the checklist below to indicate whether this game contains any of the following:

Aggressive acts (e.g., shooting, hitting) by the player		Body parts torn/severed/exposed	
Aggressive acts directed toward the player		Regularly-occurring acts of aggression	
Human or human-like targets of aggression		Players fighting with other players/characters	
Blood or gore		Player killing other players	
Use of weapons to cause bodily harm		Player killing computer characters	
Photorealistic violence		Threats or verbal aggression	

Please use the checklist below to indicate which of the following genres this game belongs to:

Action adventure (e.g. Legend of Zelda)		Classic adventure (e.g. Myst)	
Military strategy (e.g. Command & Conquer)		Shooter action (e.g. Call of Duty)	
Construction/building strategy (e.g. Sim City)		Sport (e.g. Football)	
Racing (e.g. Gran Turismo)		Simulation (Flight simulator)	
Card / board games (e.g. Solitaire)		Survivor horror (e.g. Resident Evil)	
Beat-em up (e.g. Castle Crashers)		Platform game (e.g. Super Mario Bros.)	
Role-playing (e.g. Skyrim)		Other: _____	

(Watson & Clark, 1991; 1994)

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate <u>to what extent you currently feel this way</u>.

1 Very slightly or not at all	2 A little	3 Moderately	4 Quite a bit	5 Extremely
Afraid	Ashamed	Nervous	Disgusted with self	
Angry	Blue	**Scornful**	Lonely	
Guilty	Frightened	Angry at self	Shaky	
Sad	**Irritable**	Alone	**Loathing**	
Scared	Blameworthy	Jittery	Dissatisfied with self	
Hostile	Downhearted	**Disgusted**		

[Total scale reliability: α = .93. Bolded items indicate the anger subscale: α = .82]

Appendix U: Fantasy (Top) and Mundane (Bottom) Versions of *Half-Life 2* (Study 3)