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Players and Avatars:

The Connections between Player Personality, Avatar Personality, and Behavior in Video Games

By

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A thesis
submitted in partial fulfillment
of the requirements for the degree
Doctor of Philosophy

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BROCK UNIVERSITTY
St. Catharines, Ontario

June 2015

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Abstract

The increasing variety and complexity of video games allows players to choose how to behave and represent themselves within these virtual environments. The focus of this dissertation was to examine the connections between the personality traits (specifically, HEXACO traits and psychopathic traits) of video game players and player-created and controlled game-characters (i.e., avatars), and the link between traits and behavior in video games. In Study 1 (n = 198), the connections between player personality traits and behavior in a Massively Multiplayer Online Roleplaying Game (World of Warcraft) were examined. Six behavior components were found (i.e., Player-versus-Player, Social Player-versus-Environment, Working, Helping, Immersion, and Core Content), and each was related to relevant personality traits. For example, Player-versus-Player behaviors were negatively related to Honesty-Humility and positively related to psychopathic traits, and Immersion behaviors (i.e., exploring, role-playing) were positively related to Openness to Experience. In Study 2 (n = 219), the connections between player personality traits and in-game behavior in video games were examined in university students. Four behavior components were found (i.e., Aggressing, Winning, Creating, and Helping), and each was related to at least one personality trait. For example, Aggressing was negatively related to Honesty-Humility and positively related to psychopathic traits. In Study 3 (n = 90), the connections between player personality traits and avatar personality traits were examined in World of Warcraft. Positive player-avatar correlations were observed for all personality traits except Extraversion. Significant mean differences between players and avatars were observed for all traits except Conscientiousness; avatars had higher mean scores on Extraversion and psychopathic traits, but lower mean scores on the remaining traits. In Study 4, the connections between

player personality traits, avatar traits, and observed behaviors in a life-simulation video game (The Sims 3) were examined in university students (*n* = 93). Participants created two avatars and used these avatars to play The Sims 3. Results showed that the selection of certain avatar traits was related to relevant player personality traits (e.g., participants who chose the *Friendly* avatar trait were higher in Honesty-Humility, Emotionality, and Agreeableness, and lower in psychopathic traits). Selection of certain character-interaction behaviors was related to relevant player personality traits (e.g., participants with higher levels of psychopathic traits used more *Mean* and fewer *Friendly* interactions). Together, the results of the four studies suggest that individuals generally behave and represent themselves in video games in ways that are consistent with their real-world tendencies.

Keywords: personality, video games, avatars, psychopathy, aggression.

Acknowledgements

I am grateful to many people for their support throughout my PhD. First, I would like to thank my supervisor, Dr. Angela Book, for her patience and support. I am very grateful to her for letting me run with the topic of my choosing and for having confidence in my abilities. I would also like to thank my committee members, Dr. Carolyn Hafer, Dr. Teena Willoughby, and Dr. Nancy DeCourville, who have been very helpful in providing expertise, feedback, and advice. I also thank Dr. Gordon Hodson, Dr. Kathy Belicki, Dr. Tanya Martini, and Dr. Stan Sadava, for their encouragement.

I would especially like to thank my friends and family for supporting and encouraging me throughout my graduate career. I am so thankful to my extended family, my parents-in-law, my sister-in-law and her family, and most particularly, to my dear parents and my brother and his family. You have all been so helpful and understanding, and I appreciate your interest in my work.

Last, and most importantly, I would like to thank Mike and Nathan. Nathan, thank you for being a sweetheart and an inspiration. Mike, thank you for being interested in my correlation matrices and for listening to me talk about video games. Your unfailing patience, consideration, advice, and support have meant so much to me. Thanks for surviving this with me!

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General Introduction

Overview

For many individuals, time that was formerly devoted to activities in the real world (i.e., outside of video games or virtual worlds) is now being devoted to playing video games. Video games can be played on computers, dedicated consoles (e.g., Xbox, PlayStation), or hand-held devices, and they offer an increasingly wide variety of content ranging from simple puzzle games to complex multi-player action games. In many complex video games, players have a high level of autonomy and can control a game-character, or *avatar*, that is used to represent them within the game world. If the current trend towards increasing variety and complexity in video games continues, as it seems likely to do, both the number of individuals who play video games and the amount of time these individuals spend playing will increase in the years ahead (Castronova, 2007).

Although video games are relatively new forms of media entertainment, they are quickly becoming one of the most popular forms of entertainment currently available. In 2013, the action-adventure video game *Grand Theft Auto V* took just three days to generate $1billion (US) in sales, earning the game the title of "fastest entertainment property to gross $1billion" (Lynch, 2013). In comparison, top-selling movies like *Avatar* and *The Avengers* took 19 days to reach the same total (Kain, 2013).

Given the increasing popularity of video games, it is not surprising that general interest in understanding video games and their consequences has also increased. As a result, the field of video game research has been expanding at a rapid pace. To date, much of the research focus has been on the negative consequences associated with video games, such as the possible link between violent content in video games and subsequent

aggression (e.g., Anderson et al., 2010) as well as problematic usage and video game addiction (e.g., Sim, Gentile, Bricolo, Serpelloni, & Gulamoydeen, 2012). However, some research has also been devoted to the positive consequences of video games, including the use of video games for learning (e.g., Girard, Ecalle, & Magnant, 2013) and the possibility of encouraging prosocial or cooperative behavior through video game play (e.g., Gentile et al., 2009).

However, some important areas of video game research remain underdeveloped. As video games become more immersive and more appealing to more people, individual differences between players must also be examined with respect to fundamental elements of video games. The characteristics of individuals who play video games, the ways in which they represent themselves in video games, and the activities they choose while in-game are areas of video game research that have yet to be fully examined. More specifically, the connections between player personality and behavior in video games, and between player personality and avatar personality, have not received much research attention.

Further, relatively few studies have examined the extent to which individuals behave similarly in video games as they do in the real world. It has frequently been proposed that when individuals enter virtual settings (like video games), they are free to throw off the constraints of their real-world selves and develop the “alternate selves” of their own choosing (e.g., Ducheneaut, 2010; Turkle, 1995). However, personality describes individuals’ general tendencies across a variety of situations (Ashton, 2013), and it seems improbable that personality should cease to be important when an individual begins playing a video game. The question of the degree of real-world/virtual-world

similarity remains, however, because the virtual worlds within video games might be sufficiently different from the real world that the expression of personality is changed. Personality might be related to player self-representation and behavior in video games to a different extent or in a different manner than is generally observed in the real world.

Therefore, the focus of this dissertation was to examine how player personality relates to behavior in video games, to the perceived personality characteristics of avatars, and to the connections between players and avatars. In general, the aim of the current dissertation was to evaluate the extent to which in-game behavior and self-representation in video games is consistent with real-world tendencies (as measured by player personality traits). In four studies, I examined the connections between personality traits and in-game behaviors in a) a Massively Multiplayer Online Role-playing Game (MMORPG; *World of Warcraft*; Study 1), b) a stand-alone life-simulation video game (*The Sims 3*; Study 4), and c) video games generally (Study 2). In addition, I examined how different individuals represent themselves in complex video games via avatars; specifically, I examined the connections between player personality traits and avatar characteristics in World of Warcraft (Study 3) and The Sims 3 (Study 4).

Personality

Personality traits describe the differences between individuals in terms of their tendencies for behavior, emotion, and thought (Ashton, 2013). Because personality traits describe individuals' general tendencies across situations (Ashton, 2013), it seems likely that they would be relevant to individuals' behavior in video games as well. Therefore, this dissertation examined player personality in terms of a comprehensive set of broad

personality traits (i.e., the HEXACO model of personality; Ashton & Lee, 2007; Lee & Ashton, 2004;) as well as a more specific set of traits (i.e., psychopathic traits).

HEXACO Model of Personality.

Perhaps the most popular model for describing personality traits at a comprehensive level has been the Five Factor Model or Big Five (see, e.g., Digman, 1990; Goldberg, 1990). The Five Factor/Big Five traits are generally named Agreeableness, Extraversion, Neuroticism, Conscientiousness, and Openness to Experience (John, Naumann, & Soto, 2008). Many studies have used these five traits with much success, including several studies that have focused on the relationships between Big Five traits and video game outcomes (e.g., Ducheneaut, Wen, Yee, & Wadley, 2009; Fong & Mar, 2015; McLeod, Liu, & Axline, 2014; Sung, Moon, Kang, & Lin, 2011).

However, recent research has focused on determining the number and nature of broad personality traits that can be reliably identified from personality-descriptive terms in many different languages (e.g., Ashton et al., 2004; Lee & Ashton, 2008; De Raad et al., 2014). Lexical studies of personality-descriptive terms in many languages have demonstrated that six factors (instead of five) best describe the variation in personality (Ashton & Lee, 2010; Lee & Ashton, 2008). These factors have been named **H**onesty-Humility, **E**motionality, E**x**traversion, **A**greeableness, **C**onscientiousness, and **O**penness to Experience (prompting the acronym HEXACO).

The HEXACO model of personality was developed as a direct result of these lexical studies of personality terms, and does not represent an extension or modification of the Big Five (Ashton & Lee, 2007). The HEXACO model covers some important

elements of personality variation that are not well captured by the Big Five (Ashton & Lee, 2007; Ashton, Lee, & De Vries, 2014). However, not surprisingly, it does share some similarities with the older model of personality (Ashton & Lee, 2007). The content of the Extraversion, Conscientiousness, and Openness to Experience factors, in particular, is reasonably similar across models. In the HEXACO model, however, the Agreeableness and Emotionality factors represent variations on the Big Five Agreeableness and Neuroticism factors, and are not directly equivalent. The Honesty-Humility factor contains personality content that is poorly represented by the Big Five model, although some of its content can be found in the Big Five Agreeableness factor (Ashton et al., 2014).

The three factors that share most similarity with Big Five traits, namely Extraversion, Conscientiousness, and Openness to Experience, are theoretically related to each other in that they focus on different kinds of endeavor (Ashton & Lee, 2007). More specifically, Extraversion is conceptualized as reflecting differences in individuals' tendencies to put effort into social interactions. Those who are high on this trait tend to be sociable and gregarious, whereas those who are low on this trait tend to be shy and reserved. Conscientiousness is conceptualized as reflecting differences in individuals' tendencies to put forth effort in task-related activities. Those who are high on this trait tend to be diligent and organized, whereas those who are low on this trait tend to be irresponsible and careless. Finally, Openness to Experience is conceptualized as reflecting differences in individuals' tendencies to put forth effort in idea-related domains. Those who are high on this trait tend to be inquisitive and creative, whereas

those who are low in this trait tend to be unimaginative and conventional (Ashton & Lee, 2007).

The three remaining factors of the HEXACO model, Honesty-Humility, Agreeableness, and Emotionality, are all theoretically related to different kinds of altruistic tendency (Ashton & Lee, 2007; Ashton et al., 2014). Emotionality is theoretically related to kin altruism, in particular the tendency to feel emotional attachment and empathic concern for individuals with whom one is close (e.g., family members), as well as the tendency to avoid harm. Honesty-Humility and Agreeableness are primarily related to reciprocal altruism. More specifically, Honesty-Humility reflects the degree to which individuals tend to avoid exploiting others even when the opportunity to do so is present, whereas Agreeableness reflects the degree to which individuals tend to cooperate with others when there is a risk that those others might be exploitative (Ashton & Lee, 2007; Ashton et al., 2014).

In terms of trait content, those who are high in Honesty-Humility tend to be fair and honest, whereas those who are low on this trait tend to be manipulative and entitled (Ashton & Lee, 2007; Ashton et al., 2014). Those who are high in Agreeableness tend to be patient and tolerant of others, whereas those who are low on this trait tend to be unforgiving and impatient. Those who are high in Emotionality tend to be sentimental and anxious, whereas those who are low on this trait tend to be independent and tough (Ashton & Lee, 2007; Ashton et al., 2014).

Psychopathy.

Although the HEXACO model describes personality variation in a comprehensive manner, certain specific traits can also be useful for describing how different individuals

behave, think, and feel. In particular, psychopathic traits are important for describing individual differences in tendencies to be manipulative, callous, deceitful, impulsive, irresponsible, and prone to antisocial behavior (Hare, 2003; Hare & Neumann, 2008). It has been proposed that the theoretical explanation for psychopathic tendencies is that they reflect an evolved strategy marked by a tendency to cheat rather than to cooperate (Book & Quinsey, 2004; Mealey, 1995).

Psychopathy is frequently measured using the Psychopathy Checklist-Revised in clinical populations (Hare, 2003). However, many other measures of psychopathy exist (including self-report measures; Lilienfeld & Fowler, 2007), and the PCL-R itself cannot be considered as the definitive equivalent of the construct of psychopathy (Cooke & Michie, 2001). Nonetheless, factor analyses of the PCL-R are frequently used to describe the main elements of the construct more generally. Therefore, psychopathy is often conceptualized as being comprised of two main factors, with each factor including two facets (Hare, 2003).

The first factor of psychopathy (labelled simply Factor 1) includes both the Interpersonal Manipulation facet (which includes characteristics such as manipulativeness and deceitfulness) and the Callous Affect facet (which includes characteristics such as lack of empathy, shallow affect, and lack of remorse; Hare, 2003; Neal & Sellbom, 2012). The second factor (Factor 2) includes both the Erratic Lifestyle facet (which includes characteristics like impulsivity and irresponsibility) and the Antisocial Behavior or Criminal Tendencies facet (which includes a variety of antisocial behaviors; Hare, 2003; Neal & Sellbom, 2012).

Although psychopathy is frequently discussed in terms of those who exhibit the most extreme characteristics of the construct (i.e., those who are clinically diagnosed as "psychopaths"), it is generally considered to be a dimensional construct (Edens, Marcus, Lilienfeld, & Poythress, 2006), and as such, can be measured in "normal" (i.e., subclinical) populations (Neal & Sellbom, 2012; Williams, Paulhus, & Hare, 2007). Several studies suggest that psychopathic traits, as assessed by a variety of different measures, are consistently related to broad personality traits in normal populations. The HEXACO model of personality has been observed to account for more of the variance in psychopathic traits than measures of the Big Five traits (e.g., Lee & Ashton, 2014). Psychopathic traits are most strongly related to low levels of Honesty-Humility and Emotionality, but are also related to low levels of Agreeableness and Conscientiousness (Book, Visser, & Volk, 2015; de Vries, Lee, & Ashton, 2008; Gaughan, Miller, & Lynam, 2012; Lee & Ashton, 2014; Romero, Villar, & López-Romero, 2015).

Psychopathic traits are associated with a number of problematic behaviors, including violent behavior (Neumann & Hare, 2008). Even in student samples, psychopathic traits are positively related to bullying, cheating, and criminal activity (Williams, Paulhus, & Hare, 2007). Psychopathic traits are also positively related to enjoyment of harassing and disrupting others in internet discussions (i.e., *trolling* behavior; Buckels, Trapnell, & Paulhus, 2014). Because of the antisocial nature of psychopathic traits and the behaviors that frequently are perpetrated by individuals with these traits, it is important to study psychopathic traits with regards to video game behavior.

Video Games

With the first video games appearing in the 1960s, video games have a very short history and have developed quickly from simple beginnings. *Spacewar!*, released in 1962, was one of the earliest video games (Egenfeldt-Nielsen, Smith, & Tosca, 2013). [1] It was a simple two-player game in which each player controlled a spaceship and attempted to destroy the other (Egenfeldt-Nielsen et al., 2013). Graphics were simple white objects on a black screen, and movement was in two dimensions. In spite of its simplicity, Spacewar! represented an impressive innovation in computing at the time (Egenfeldt-Nielsen et al., 2013).

Since these simple beginnings, video games have developed rapidly in terms of complexity and variety. One of the most notable advances is simply in the degree of choice that now exists; players can now choose not only which video games to play and what kind of platform on which to play them, but also, often, what to do while playing a video game. Current video games vary from quite simple to highly complex, with many games offering detailed story-lines, complex mechanics, and a variety of different actions, among other elements.

Current video games vary widely in terms of the kinds of game-play they offer. Some video games offer only one action or move (e.g., puzzle games like *Bejeweled* and *Angry Birds*), and given that all players must use the same move, personality is likely to have relatively little impact on individuals' behavior in these kinds of games.[2] In

[1] It is difficult to precisely state which game was the first video game, as it is debatable whether some early attempts to create digital games might fall short of being true video games in the general sense of the term (Egenfeldt-Nielsen et al., 2013).

[2] Personality might still have some impact on behavior in games like these. While playing *Angry Birds*, for example, some players might prefer to simply complete one level and move on to the next, while other players might choose to aim for a high-score or a complete clear of each level. Thus, although all players

contrast, many video games allow different individuals to make significant and meaningful choices between activities with different content and goals. The current dissertation is focused primarily on these "complex" games that permit the player to choose from different available actions, as it is these kinds of games that allow players greater freedom to make choices that are relevant to their personality traits.

There are several important reasons for studying players' behavior within complex video games. First, the increasing popularity of video games means that more people are playing more often and spending more of their total time experiencing events that take place in video games rather than in the real world. In the past, video games have been viewed as primarily the pastime of male adolescents (Griffiths, Davies, & Chappell, 2004; Williams, Yee, & Caplan, 2008). However, in 2014, 59% of Americans and 54% of Canadians played video games, and 48% of these players were female (Entertainment Software Association, 2014; Entertainment Software Association of Canada, 2014). Playing video games has remained popular among adolescents in general and male adolescents in particular (Greenburg, Sherry, Lachlan, Lucas, & Holmstrom, 2010), but the average (North American) video game player in 2014 was over 30 years old (31 years in the USA; 33 years in Canada; Entertainment Software Association, 2014; Entertainment Software Association of Canada, 2014).

Second, as mentioned above, playing video games can have effects on players' attitudes and behaviors after the game has ended. Many studies suggest that violent content in video games is associated with subsequent aggressive thoughts and behaviors (Anderson et al., 2011), although there is still controversy within that field regarding the

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use the same move (i.e., fling birds at pigs in structures) within the game, it is possible that players could behave differently as a result of personal preferences.

magnitude of the effects, among other issues (Elson & Ferguson, 2014). In fact, the competitive content of video games, rather than the violent content, appears to be more important for influencing subsequent aggressive behavior (Adachi & Willoughby, 2011a, 2011b, 2013). In addition, cooperative gaming is associated with subsequent helping behavior (Dolgov, Graves, Nearents, Schwark, & Volkman, 2014) and may lead to reduced prejudice between groups (Adachi, Hodson, Willoughby, & Zanette, 2014). Thus, it is clear that many different kinds of video games, as well as different elements of video games, have the potential to influence individuals' behaviors and attitudes in the real-world.

Third, it is becoming increasingly evident that video games and the events that take place within these games can feel important to many individuals. Although video games are commonly considered to be "only games" or even "toys" (e.g., Castronova, 2007), research suggests that the impact of video games on many individuals can be stronger than these attitudes would seem to imply (e.g., Hartmann, Toz, & Brandon, 2010; McLeod et al., 2014; Yee, 2006a). Complex video games are becoming, in many ways, places that people "inhabit" for varying lengths of time, and the events they experience within these games are often important to them. For example, although violent actions against video game characters do not cause any actual harm, many players feel some guilt when engaging in unjustified violence against video game characters (Hartmann et al., 2010). In addition, many MMORPG players report that they have experienced events in-game that are more rewarding than events experienced in the real world (Yee, 2006a), and some players report experiencing changes to their real-lives as a result of events experienced in-game (McLeod et al., 2014). Many individuals form

friendships with other players they meet through online video games and often have contact with these individuals outside of the game (Axelsson & Regan, 2006; Schiano, Nardi, Debeauvais, Ducheneaut, & Yee, 2011; Yee, 2006a). Some individuals develop lasting serious relationships with individuals they meet within video games (Axelsson & Regan, 2006). It appears that many individuals care about the events they experience, whether those events occur in the real world or in the virtual worlds of video games.

Avatars.

Many video games allow players to select or create game characters that serve as virtual representations of the players within the video game world. These player-controlled game characters are usually called *avatars*. Avatars are contrasted with computer- or game-controlled characters, which behave according to the rules encoded in their programs, rather than being controlled by a person. Avatars are used in first person shooter games (e.g., *Call of Duty*), racing games (e.g., *Mario Kart*), online virtual worlds (e.g., *Second Life*), life-simulation games (e.g., *The Sims*) and MMORPGs (e.g., World of Warcraft; *Eve Online*).

The degree of player input regarding the characteristics of the avatar varies for different types of video games. Many video games only allow players to select a pre-made avatar from a menu of a few options (e.g., Mario Kart), whereas other video games allow the player to create an avatar by specifying aspects of the avatar's appearance, role, or affiliation (e.g., World of Warcraft). Many players choose to create avatars of the same sex as themselves (Ducheneaut et al., 2009; Koles & Nagy, 2012; McLeod et al., 2014; Yee, Ducheneaut, Yao, & Nelson, 2011), whereas some players choose to create opposite sex avatars (Ducheneaut et al., 2009). However, although research on avatar

characteristics has recently been increasing, the degree of similarity between avatars and the players who use them is still not entirely clear. It has frequently been proposed that the use of avatars in virtual environments allows individuals to “try on” different identities (e.g., Gilbert et al., 2014; Koles & Nagy, 2012; Turkle, 1995). This seems to imply that players can take on any identity, and choose any behaviors, from within the framework of available behaviors in video games that use avatars. However, the degree to which different avatars reflect truly different identities or versions of the player’s actual self has not yet been established.

Although players control the actions of their avatars, characteristics of avatars can also have an influence on players’ behaviors. Physical characteristics of the avatar, such as height, attractiveness, and sex can influence subsequent player behavior (Yang, Gibson, Lueke, Huesmann, & Bushman, 2014; Yang, Huesmann, & Bushman, 2014; Yee & Bailenson, 2007; Yee, Bailenson, & Ducheneaut, 2009). For example, playing as a male avatar rather than as a female avatar is associated with increased aggression after game-play (Yang, Huesmann, et al., 2014). Likewise, the role that the avatar takes on within game-play may have an influence on subsequent behavior; for example, playing as a villain rather than as a hero is associated with higher aggression after game play (Yoon & Vargas, 2014).

The presence of other avatars (controlled by other players) as compared to game-characters (controlled by the game) is also an important element of many video games. Perceiving an opponent as an avatar (controlled by a player) as opposed to a computer-controlled character has a greater impact on players’ physiological responses to game-play (Lim & Reeves, 2010) and increases feelings of being present within the game-

world (Lim & Reeves, 2010; Weibel, Wissmath, Habegger, Steiner, & Groner; 2008). Therefore, players' experiences with their own avatars as well as their experiences with other players' avatars have important effects on various outcomes.

Massively Multiplayer Online Role-Playing Games.

One important and relatively new kind of video game, offering both a high level of behavioral choice and the opportunity to create and control avatars, is the Massively Multiplayer Online Roleplaying Game (MMORPG). There are several key elements that define MMORPGs (Chan & Vorderer, 2006). First, they are played exclusively online (i.e., over the Internet). Second, they are massively multiplayer, meaning that thousands of players can be in the game-world at one time (Chan & Vorderer, 2006). Third, the game-worlds within MMORPGs are persistent, meaning that the game continues to run and develop even when a player logs off. Fourth, these games normally have an element of role-playing, reflecting the fact that MMORPGs developed in part from table-top role-playing games (Egenfeldt-Nielsen et al., 2013).

The development of MMOPRGs was also heavily influenced by *Multi-User Domains*, or *Dungeons* (*MUDs*; Chan & Vorderer, 2006). MUDs were exclusively text-based virtual worlds accessed via computer that allowed players to interact with other players. Some MUDs focused primarily on social activities, whereas others focused on more game-like activities, including player combat against other players (Bartle, 1996). Players in one of the social-type MUDs, *LamdaMOO*, spent much of their time in the MUD interacting with others, but could also explore the virtual world (Schiano & White, 1998). Both the social and combat aspects of MUDs have been incorporated into present-day MMORPGs.

One of the most popular MMORPGs currently available is *World of Warcraft*. World of Warcraft is a fantasy-type MMORPG that is playable on PC or Mac computers. In this game, players can create and customize avatars, and take complete control over these avatars (one at a time) within the game world (What is World of Warcraft?, n.d.). World of Warcraft features elaborate story-lines, epic quests, multi-player battles, and a wide range of possible activities. Players can play alone, choosing activities that focus on game-controlled opponents (e.g., defeating monsters, completing quests) or other activities like working on professions (e.g., blacksmithing). However, many aspects of the game require players to play with or against other players. Players can cooperate with other players to complete difficult content (e.g., in multi-player battles featuring game-controlled opponents within *dungeons* or *raids*), and players can engage in player-versus-player combat (e.g., attacking other players' avatars either solo or as part of a multi-player battle). Avatars have a starting level of one, and then gain experience and increase in level (i.e., *level up*) by engaging in many of these activities. When an avatar has reached the maximum level, players can participate in end-game content, which features a high level of difficulty. To a large extent, players can choose their own paths through the game, which means that they can focus on those aspects of the game that are particularly appealing to them. It is important to note that new content is added to this video game on a regular basis, which means that players can regularly level up their avatars to a higher level, with new lands to explore and new quests to complete. As with other MMORPGs (but unlike most other video games), there is no "end" to World of Warcraft.

World of Warcraft is an appropriate video game for the study of player personality, avatar personality, and in-game behavior for several reasons. First, a great deal of previous research has focused on World of Warcraft, which provides some important foundations on which to base the current research. Second, it has been and continues to be quite popular, reporting over 7 million subscribers just prior to its 10th anniversary (Makuch, 2014). Third, it offers a high degree of behavioral choice that makes it relevant to a study of in-game behavior. Therefore, World of Warcraft will be the focus of Studies 1 and 3.

Online Virtual Worlds and Life Simulation Games.

Online virtual worlds share many similarities with MMORPGs, although they are not video games in the strict sense (Crawford, Gosling, & Light, 2011; Ducheneaut, 2010). Much like MMORPGs, online virtual worlds are persistent online environments that allow players to create avatars and use their avatars in-world to interact with other players (Ducheneaut, 2010). In contrast with most MMORPGs, however, virtual worlds lack the focus on game objectives (like completing quests or engaging in combat) that are the focus of most MMORPGs, and instead allow players a large degree of freedom to choose their own activities (Ducheneaut, 2010). One popular and frequently-studied online virtual world is *Second Life*, in which players can use an avatar to engage in many activities that have real-world equivalents, such as building in-world items and structures, shopping, and socializing with friends (Bayraktar & Amca, 2012; Guadagno, Muscanell, Okdie, Burk, & Ward, 2011). Online virtual worlds like Second Life have formed the focus of several studies that are relevant to the study of avatars (e.g., McLeod et al., 2014). Because of the similarities between online virtual worlds and MMORPGs,

research on these virtual worlds provides relevant background for the subject of this dissertation.

Several elements of MMORPGs and online virtual worlds are also present in the life simulation game called *The Sims 3* (the third edition of the popular game franchise *The Sims)*. Much like World of Warcraft and Second Life, The Sims 3 features customizable avatars that the player can control in-game and a high degree of choice of action. Unlike MMORPGs and online virtual worlds, however, The Sims 3 is not played online, and the game-world is not persistent (i.e., it does not progress or change in the absence of the player). In addition, players are able to create and control several characters at one time, as compared to World of Warcraft and Second Life, which permit the player to control just one character at a time.

However, several elements of The Sims 3 make it ideal for the study of the connection between personality, avatar characteristics, and in-game behaviors. First, it allows players to specify their avatars' personality traits, an option that is not provided in games like World of Warcraft. Second, because it is not played online, game-play is not susceptible to interference by other players. Third, the game is relatively simple to understand and features a point-and-click interface that is likely to be easier to master than the interface used in World of Warcraft. Therefore, The Sims 3 was selected as the focus of Study 4.

Previous Research

Although video games differ from the real world, often to a large extent, there is evidence that players do not make strong distinctions between real-world and virtual-world environments. Social norms operate much the same in Second Life as they do in

the real world (Eastwick & Gardner, 2009), and more generally, individuals often apply social rules for human interaction to their interactions with computers (Nass & Moon, 2000). In addition, gender is related to behavior in Second Life much as it would be expected to be related based on the way social roles influence behavior in the real world (Guadagno et al., 2011).

However, the primary question that remains is whether individuals behave in video games much as they do in the real world. It has been argued that individuals who play video games are not simply passive consumers of video game content, but rather that they are quite capable of selecting both which games to play and how to behave while in those games (Egenfeldt-Nielsen et al., 2013). Because personality traits reflect individuals' general tendencies for (real-world) behavior, they reflect a useful measure of real-world behavioral tendencies.

Player Personality and Behavior in Video Games.

Since the development of MUDs, there has been interest in understanding the kinds of behaviors shown by different players. Bartle (1996, 2004) offered a description of the different kinds of behaviors that can occur in MUDs (1996, 2004). Based on an online discussion between experienced members of a popular MUD in 1989-1990, Bartle (1996) suggested that players in MUDS could be summarized by four types: *Killers*, *Explorers*, *Achievers*, and *Socializers*. Bartle (1996, 2004) argued that each type of player was associated with a preference for a particular kind of behavior, and that the prevalence of each type of player would have an impact on the other types and the overall nature of the MUD (and later, on video games more generally).

Although player types offer a simple method of conceptualizing the differences between players in terms of their in-game behaviors, it is unlikely that such a simple system can adequately explain different players' behaviors. Bartle (1996, 2004) has acknowledged that many players suit each of his proposed types to a certain extent, although he argued that many will have a primary preference for just one type. At a broader level, some information is lost when attempting to group individuals rather than measuring individuals on continuous dimensions (as demonstrated by comparisons of personality types versus personality dimensions; Ashton & Lee, 2009). Nonetheless, ideas regarding the different types of players observed in MUDs and video games are useful in that they describe the different general behavioral tendencies of many players that have been observed by game players and game designers, and may provide a starting point for more systematic analyses of player behavior.

Research on motivations for playing video games has focused primarily on MMORPGs, and results of these studies have suggested that the main reasons why individuals play these games bear some similarities to Bartle's (1996, 2004) player types. Working in part from Bartle's player types, Yee (2006a) found that motivations for playing MMPORPGs could be summarized into the following five categories: relationship, immersion, escapism, manipulation, and achievement. Later work suggested just three categories: social, immersion, and achievement (Yee, 2006b). Subsequently, studies have found variants on these motivation categories in different samples (e.g., Graham & Gosling, 2013; Jeng & Teng, 2008).

Several studies have found that motivations for playing online video games are correlated with player personality traits (e.g., Graham & Gosling, 2013; Jeng & Teng,

2008; Park, Song, & Teng, 2011). Some of these correlations appear to show consistency between personality trait definitions and motivations, whereas others do not. For example, Extraversion was positively related to motivations that involve interacting with other players (e.g., teamwork, socialization, and leadership; Graham & Gosling, 2013; Jeng & Teng, 2008), but Conscientiousness was negatively related to achievement motivations (Graham & Gosling, 2013).

Motivations for playing video games do not directly indicate how players will behave in within video games, yet motivations and in-game behaviors are related in consistent ways (Billieux et al., 2013). For example, discovery motivations are related to exploration behaviors (Billieux et al., 2013). Thus, examining personality-motivation correlations can provide a starting point for investigating personality-behavior correlations. Nonetheless, studies of in-game behavior more specifically are needed.

Previous studies of the connections between player personality and in-game behavior have differed in the extent to which their results suggest there is consistency between real-world and in-game behavior. McCreery, Krach, Schrader, and Boone (2012) found no significant relationships between player personality and in-game behavior in World of Warcraft (however, it is possible that methodological problems with that study affected the results). In contrast, Yee, Harris, Jabon, and Bailenson (2011) reported significant correlations between personality and behaviors in Second Life, but these do not seem to be relevant to personality trait content. For example, they found that Conscientiousness was related to walking more often and visiting more zones within the virtual world, whereas Agreeableness was related to total distance covered (Yee, Harris,

et al., 2011), and these correlations cannot be readily explained with respect to personality trait definitions.

However, some studies on the connections between player personality and in-game behavior have found results suggesting that certain in-game behaviors are somewhat consistent with real-world tendencies (e.g., Peng, Liu, & Mou, 2008; Yee, Ducheneaut, Nelson, & Likarish, 2011). Peng et al. (2008) found that, in comparison with individuals with less aggressive personalities, individuals with more aggressive personalities tend to engage in more aggressive behaviors in violent video games.

Similarly, one previous study examining the connections between players' Big-Five personality traits and game-generated behavioral statistics for players' main avatars in World of Warcraft found some evidence that the relationships are consistent with real-world tendencies (Yee, Ducheneaut, Nelson, et al., 2011). For example, number of friendly interactions (like "/hug" and "/cheer") were positively related to player Agreeableness, and number of areas explored on the game-world map was positively related to Openness to Experience. Although many of the correlations observed by Yee, Ducheneaut, Nelson, et al. (2011) suggest consistency between real-world tendencies and in-game behaviors, some other correlations were not as clearly consistent. In addition, although reported correlations were significant, they were small in size in a large (>1000) sample. Further research is clearly needed to determine whether these correlations are replicable.

Player Personality and Avatar Characteristics.

In video games, avatars are the intermediaries through which players' actions are performed. In some ways, avatars can be quite different from the players that create and

control them. Many games allow players to create avatars with non-human features, like trolls (in World of Warcraft), and vampires (in Second Life). Avatars may have roles or professions that are quite different from players' real-world roles (e.g., warlocks and rogues in World of Warcraft), and players can choose to create avatars of the opposite gender, as discussed above.

In terms of personality, players may view their avatars as similar to or different from themselves. One possibility is that some players might view their avatars as being more similar to their vision of themselves as they would like to be (i.e., their ideal selves; Bessière, Seay, & Kiesler, 2007; Przybylski, Weinstein, Murayama, Lynch, & Ryan, 2012) rather than similar to themselves as they actually are. Several studies have suggested that there are mean differences between players and avatars in MMORPGs in terms of personality traits. Specifically, two studies showed that players rate their avatars as having higher Extraversion and Conscientiousness scores, and lower Openness to Experience scores as compared to themselves (Ducheneaut et al., 2009; Jónsson & Snorrason, 2012). Likewise, means scores for avatars were lower on Neuroticism (Ducheneaut et al., 2009; Sung et al., 2011) and Emotionality (Jónsson & Snorrason; 2012) compared to than players' scores. In one study, avatars were rated as lower on Honesty-Humility and (HEXACO) Agreeableness than players (Jónsson & Snorrason; 2012), while in another, there was no difference between players and avatars on (Big Five) Agreeableness (Ducheneaut et al., 2009).

There is also evidence for personality similarity between avatars and players. For example, significant positive correlations were observed between players and avatars on each Big Five personality trait (Sung et al., 2011), suggesting that players view their

avatars as much the same as themselves (at least in terms of rank order within the sample). Other studies have not reported the correlations between player and avatar personality traits, however, which suggests that further research is needed.

Players' perceptions of their similarity to their avatars may be related to the degree of connection they feel with their avatars. It has been proposed that the degree of connection between players and avatars can range from distant (i.e., the player views the avatar as an object to be controlled) to close (i.e., the player does not perceive any separation between player and avatar; Bartle, 2004). Connections between players and avatars may reflect both the degree to which players feel attached to (and liking for) their avatars (Lewis, Webber, & Bowman, 2008) as well as identification. Identification with an avatar is said to occur when the player does not perceive any separation between player and avatar; that is, the player experiences the game as though the player "is" the avatar (Cohen, 2001; Klimmt, Hefner, & Vorderer, 2009). The extent to which players identify with and feel attached to their avatars are important elements of the study of player-avatar similarity, in part because personality similarity between players and avatars is positively related to the degree to which players identify with their avatars (Trepte & Reineke, 2010).

Content of this Dissertation

The primary goal of this dissertation was to examine the relationships between personality traits, specifically the HEXACO traits and psychopathic traits, and behavior and self-representation via avatars in video games. The focus of this dissertation was primarily on video games that feature customizable avatars as an integral part of game-play, although one study (Study 2) focuses on video games more generally. Previous

research suggests that there are connections between player personality and conceptually relevant in-game behaviors (e.g., Yee, Ducheneaut, Nelson, et al., 2011), although the research on this topic is quite limited. In addition, research suggests that player personality traits may be related to corresponding avatar traits (e.g., Sung et al., 2011), and that there are significant mean differences between players and avatars on most personality traits (e.g., Jónsson & Snorrason; 2012). In this dissertation, I sought to build upon this previous research and to identify whether correlations between player personality and in-game behaviors and self-representation are similar in different video games. Throughout this dissertation, I examined results with respect to developing a better understanding of the extent to which players behave and represent themselves in video games in a manner that is consistent with their real-world tendencies.

In Study 1, I examined the correlations between self-reported player personality traits (i.e., HEXACO traits and psychopathic traits) and self-reported in-game behaviors in World of Warcraft. Participants in this study were current or recent players of World of Warcraft, who completed an online survey. The survey was in two parts; all measures for Study 1 were taken from part one of this survey.

In Study 2, I examined the relationship between player personality traits and self-reported behaviors in video games more generally. Participants were students at Brock University who had played at least one video game, who completed an online self-report survey.

In Study 3, I first examined the relationships between player personality and player-reported avatar personality traits for World of Warcraft avatars. Second, I examined the relationships between player and avatar personality traits and elements of

players' connections to their avatars (i.e., identification and attachment). Third, I examined the connections between avatar personality traits and in-game behaviors. Participants in this study were a subset of the World of Warcraft player sample used in Study 1; these participants completed part two in addition to part one of the two-part survey used in Study 1.

Finally, in Study 4, I examined the relationships between player personality and player-selected avatar traits, as well as between player personality and observed in-game behaviors, in The Sims 3. In addition, I examined the relationships between player personality and connection to avatars (i.e., identification and attachment). Participants were students at Brock University, who completed all parts of the study in person in a lab. This study involved creating avatars in The Sims 3, using these avatars to play the game, and completing self-report measures.

References

Adachi, P.J.C., Hodson, G., Willoughby, T., & Zanette, S. (2014). Brothers and sisters in arms: Intergroup cooperation in a violent shooter game can reduce intergroup bias. *Psychology of Violence*. Advance Online Publication. doi: 10.1037/a0037407

Adachi, P.J.C., & Willoughby, T. (2011a). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1,* 259-274. doi: 10.1037/a0024908

Adachi, P.J.C., & Willoughby, T. (2011b). The effect of violent video games on aggression: Is it more than just the violence? *Aggression and Violent Behavior, 16*, 55-62. doi: 10.1016/j.avb.2010.12.002

Adachi, P.J.C., & Willoughby, T. (2013). Demolishing the competition: The longitudinal link between competitive video games, competitive gambling, and aggression. *Journal of Youth and Adolescence, 42,* 1090-1104. doi: 10.1007/s10964-013-9952-2

Anderson, C.A., Shibuya, A., Ihori, N., Swing, E.L., Bushman, B.J., Sakamoto, A., Rothstein, H.R., & Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin, 136,* 151-173. doi: 10.1037/a0018251

Ashton, M.C. (2013). *Individual differences and personality*. (2nd ed.). London: Elsevier.

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). An investigation of personality types within the HEXACO personality framework. *Journal of Individual Differences, 30,* 181-187. doi: 10.1027/1614-0001.30.4.181

Ashton, M.C., & Lee, K. (2010). On the cross-language replicability of personality factors. *Journal of Research in Personality, 44,* 436-441. doi: 10.1016/j.jrp.2010.05.006

Ashton, M.C., Lee, K., & de Vries, R.E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality factors: A review of research and theory. *Personality and Social Psychology Review, 18,* 139-152. doi: 10.1177/1088868314523838

Ashton, M.C., Lee, K., Perugini, M., Szarota, P., de Vries, R.E., Di Blas, L., Boies, K., & De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives:

Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology, 86,* 356-366. doi: 10.1037/0022-3514.86.2.356

Axelsson, A.-S., & Regan, T. (2006). Playing Online. In P. Vorderer & B. Jennings (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 77-88). New York: Routledge.

Bartle, R.A. (1996). *Hearts, Clubs, Diamonds, Spades: Players who suit MUDs*. Retrieved from http://www.mud.co.uk/richard/hcds.htm

Bartle, R.A. (2004). *Designing Virtual Worlds*. New Riders: Berkeley, CA.

Bayraktar, F., & Amca, H. (2012). Interrelations between virtual-world and real-world activities: Comparisons of genders, age groups, and pathological and nonpathological internet users. *Cyberpsychology, Behavior, and Social Networking, 15,* 263-269. doi: 10.1089/cyber.2011.0337

Bessière, K, Seay, A.F., & Kiesler, S. (2007). The ideal elf: Identity exploration in World of Warcraft. *Cyberpsychology and Behavior, 10,* 530-535. doi: 10.1089/cpb.2007.9994

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, & D., Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29,* 103-109. doi: 10.1016/j.chb.2012.07.021

Book, A., Visser, B.A., & Volk, A.A. (2015). Unpacking "evil": Claiming the core of the Dark Triad. *Personality and Individual Differences, 73,* 29-38. doi: 10.1016/j.paid.2014.09.016

Book, A. S., & Quinsey, V.L. (2004). Psychopaths: Cheaters or warrior-hawks? *Personality and Individual Differences, 36,* 33-45. doi: 10.1016/S0191-8869(03)00049-7

Buckels, E.E., Trapnell, P.D., & Paulhus, D.L. (2014). Trolls just want to have fun. *Personality and Individual Differences, 67,* 97-102. doi: 10.1016/j.paid.2014.01.016

Castronova, E. (2007). *Exodus to the virtual world*. New York: Palgrave MacMillan.

Chan, E., & Vorderer, P. (2006). Massively Multiplayer Online Games. In In P. Vorderer & B. Jennings (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 77-88). New York: Routledge.

Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication and Society, 4,* 245-264. doi: 10.1207/S15327825MCS0403_01

Cooke, D.J., & Michie, C. (2001). Refining the construct of psychopathy: Towards a hierarchical model. *Psychological Assessment, 13,* 171-188. Doi: 10.1037/1040-3590.13.2.171

Crawford, G., Gosling, V.K., & Light, B. (2011). *Online gaming in context: The social and cultural significance of online games*. New York: Routledge.

De Raad, B., Barelds, D.P.H., Timmerman, M.E., De Roover, K., Mlačić, B., & Church, A.T. (2014). Towards a pan-cultural personality structure: Input from 11 psycholexical studies. *European Journal of Personality, 28,* 497-510. doi: 10.1002/per.1953

De Vries, R.E., Lee, K., & Ashton, M.C. (2008). The Dutch HEXACO personality inventory: Psychometric properties, self-other agreement, and relations with psychopathy among low and high acquaintanceship dyads. *Journal of Personality Assessment, 90,* 142-151. doi: 10.1080/00223890701845195

Digman, J.M. (1990). Personality structure: Emergence of the Five-Factor Model. *Annual Review of Psychology, 41,* 417-440. doi: 10.1146/annurev.ps.41.020190.002221

Dolgov, I., Graves, W.J., Nearents, M.R., Schwakr, J.D., & Volkman, C.B. (2014). Effects of cooperative gaming and avatar customization on subsequent spontaneous helping behavior. *Computers in Human Behavior, 33,* 49-55. doi: 10.1016/j.chb.2013.12.028

Ducheneaut, N. (2010). Massively multiplayer online games as living laboratories: Opportunities and pitfalls. In W.S. Bainbridge (Ed.). *Online Worlds: Convergence of the Real and the Virtual.* London: Springer-Verlag. doi: 10.1007/978-1-84882-825-4_11

Ducheneaut, N., Wen, M.-H.D., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. *Proceedings of the 2009 SIGCHI conference on Human Factors in Computing Systems,* 1151- 1160. doi: 10.1145/1518701.1518877

Eastwick, P.W., & Gardner, W.L. (2009). Is it a game? Evidence for social influence in the virtual world. *Social Influence, 4,* 18-32. doi: 10.1080/15534510802254087

Edens, J.F., Marcus, D.K., Lilienfeld, S.O., & Poythress, N.G. (2006). Psychopathic, not psychopath: Taxometric evidence for the dimensional structure of psychopathy. *Journal of Abnormal Psychology, 115,* 131-144. doi: 1037/0021-843x.115.1.131

Egenfeldt-Nielsen, S., Smith, J.H., & Tosca, S.P. (2013). *Understanding video games: The essential introduction.* (2nd ed.). New York: Routledge.

Elson, M., & Ferguson, C.J. (2013). Twenty-five years of research on violence in digital games and aggression: Empirical evidence, perspectives, and a debate gone astray. *European Psychologist, 19,* 33-46. doi: 10.1027/1016-9040/a000147

Entertainment Software Association (2014). *Essential facts about the computer and video game industry: 2014 Sales, demographic, and usage data.* [PDF]. Retrieved from: http://www.theesa.com/about-esa/industry-facts/

Entertainment Software Association of Canada (2014). *2014 Essential facts about the Canadian video game industry.* [PDF]. Retrieved from: http://theesa.ca/facts-research/

Fong, K., & Mar, R.A. (2015). What does my avatar say about me? Inferring personality from avatars. *Personality and Social Psychology Bulletin, 41,* 237-249. doi: 10.1177/0146167214562761

Gaughan, E.T., Miller, J.D., & Lynam, D.R. (2012). Examining the utility of general models of personality in the study of psychopathy: A comparison of the HEXACO-PI-R and NEO-PI-R. *Journal of Personality Disorders, 26,* 513-523. doi: 10.1521/pedi.2012.26.4.513

Gentile, D.A., Anderson, C.A., Yukawa, S., Ihori, N., Saleem, M., Ming, L.K.,… Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin, 35,* 752-763. doi: 10.1177/0146167209333045

Gilbert, R., Thadani, V., Handy, C., Andrews, H., Sguigna, T., Sasso, A., & Payne, S. (2014). The psychological functions of avatars and alt(s): A qualitative study. *Computers in Human Behavior, 32,* 1-8. doi: 10.1016/j.chb.2013.11.007

Girard, C., Ecalle, J., & Magnant, A. (2013). Serious games as new educational tools: how effective are they? A meta-analysis of recent studies. *Journal of Computer Assisted Learning, 29,* 207-219. doi: 10.1111/j.1365-2729.2012.00489.x

Goldberg, L.R. (1990). An alternative "description of personality": The Big-Five Factor structure. *Journal of Personality and Social Psychology, 59,* 1216-1229. doi: 1037/0022-3514.59.6.1216

Graham, L.T., & Gosling, S.D. (2013). Personality profiles associated with different motivations for playing World of Warcraft. *Cyberpsychology, Behavior, and Social Networking, 16,* 189-193. doi: 10.1089/cyber.2012.0090

Griffiths, M.D., Davies, M.N.O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology and Behavior, 7,* 479-487. doi: 10.1089/1094931041774631

Greenberg, B.S., Sherry, J., Lachlan, K., Lucas, K., & Holmstrom, A. (2010). Orientations to video games among gender and age groups. *Simulation and Gaming, 41,* 238-259. doi: 10.1177/1046878108319930

Guadagno, R.E., Muscanell, N.L., Okdie, B.M., Burk, N.M., & Ward, T.B. (2011). Even in virtual environments women shop and men build: A social role perspective on Second Life. *Computers in Human Behavior, 27,* 304-308. doi: 10.1016/j.chb.2010.08.008

Hare, R.D. (2003). *The Hare Psychopathy Checklist - Revised.* (2nd Ed.). Toronto, ON, Canada: Multi-Health Systems.

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

Hartmann, T., Toz, E., & Brandon, M. (2010). Just a game? Unjustified virtual violence produces guilt in empathetic players. *Media Psychology, 13,* 339-363. doi: 10.1080/15213269.2010.524912

Jeng, S.-P., & Teng, C.-I. (2008). Personality and motivations for playing online games. *Social Behavior and Personality, 36,* 1053-1060. doi: 10.2224/sbp.2008.36.8.1053

John, O.P., Naumann, L.P., & Soto, C.J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, Measurement, and conceptual issues. In Oliver P. John, Richard W. Robins, Lawrence A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3rd Ed., pp. 114-158). New York, NY: Guilford Press.

Jónsson, S.A., & Snorrason, S.K. (2012). *Differences in the self between real life and MMORPGs measured through the HEXACO personality model: A case of EVE online.* (Undergraduate thesis, University of Iceland, Iceland). Retrieved from http://hdl.handle.net/1946/11867

Kain, E. (Sept 9, 2013). *'Grand Theft Auto V' Crosses $1B in sales, biggest entertainment launch in history.* Forbes. Retrieved from: http://www.forbes.com/sites/erikkain/2013/09/20/grand-theft-auto-v-crosses-1b-in-sales-biggest-entertainment-launch-in-history/

Klimmt, C., Hefner, D., & Vorderer, P. (2009). The video game experience as "true" identification: A theory of enjoyable alterations of players' self-perception. *Communication Theory, 19,* 351-373. doi: 10.1111/j.1468-2885.2009.01347.x

Koles, B., & Nagy, P. (2012). Who is portrayed in Second Life: Dr. Jekyll or Mr. Hyde? The extent of congruence between real life and virtual identity. *Journal of Virtual Worlds Research, 5(1),* 1-17. doi: 10.4101/jvwr.v5i1.2150

Lee, K., & Ashton, M.C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39,* 329-358, doi: 10.1207/s15327906mbr3902_8

Lee, K., & Ashton, M.C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality, 76,* 1001-1053. doi: 10.1111/j.1467-6494.2008.00512.x

Lee, K., & Ashton, M.C. (2014). The Dark Triad, the Big Five, and the HEXACO model. *Personality and Individual Differences, 67,* 2-5. doi: 10.1016/j.paid.2014.01.048

Lewis, M.L., Weber, R., & Bowman, N.D. (2008). "They may be pixels, but they're MY pixels:" Developing a metric of character attachment in role-playing video games. *Cyberpsychology and Behavior, 11,* 515-517. doi: 10.1089/cpb.2007.0137

Lilienfeld, S.O., & Fowler, K.A. (2007). The self-report assessment of psychopathy: Problems, pitfalls, & promises. In C.J. Patrick (Ed.). *Handbook of Psychopathy.* New York: Guilford Press.

Lim, S., & Reeves, B. (2010). Computer agents versus avatars: Responses to interactive game characters controlled by a computer or other player. *International Journal of Human-Computer Studies, 68,* 57-68. doi: 10.1016/j.ijhcs.2009.09.008

Lynch, K. (Oct. 8, 2013). *Confirmed: Grand Theft Auto 5 breaks 6 sales world records.* Retrieved from: http://www.guinnessworldrecords.com/news/2013/10/confirmed-grand-theft-auto-breaks-six-sales-world-records-51900/

Makuch, E. (2014, October 15). *World of Warcraft gains 600,000 subscribers since June: MMO now has 7.4 million subscribers; milestone achieved ahead of the November launch of the Warlords of Draenor expansion*. Retrieved from http://www.gamespot.com/articles/world-of-warcraft-gains-600-000-subscribers-since-/1100-6422961/

McLeod, P.L., Liu, Y.-C., & Axline, J.E. (2014). When your Second Life comes knocking: Effects of personality on changes to real life from virtual world experiences. *Computers in Human Behavior, 39,* 59.70. doi: 10.1016/j.chb.2014.06.025

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

Mealey, L. (1995). The socio-biology of sociopathy: An integrated evolutionary model. *Behavioral and brain sciences, 18,* 523-599.

Nass, C. & Moon, Y. (2000). Machines and Mindlessness: Social responses to computers. *Journal of Social Issues, 56,* 81-103. doi:10.1111/0022-4537.00153

Neal, T.M.S., & Sellbom, M. (2012). Examining the factor structure of the Hare Self-Report Psychopathy scale. *Journal of Personality Assessment, 94,* 244-253. doi: 10.1080/00223891.2011.648294

Neumann, C.S., & Hare, R.D. (2008). Psychopathic traits in a large community sample: Links to violence, alcohol use, and intelligence. *Journal of Consulting and Clinical Psychology, 76,* 893-899. doi: 10.1037/0022-006x.76.5.893

Park, J., Song, Y., & Teng, C-I. (2011). Exploring the links between personality traits and motivations to play online games. *Cyberpsychology, Behavior, and Social Networking, 14,* 747-751. doi: 10.1089/cyber.2010.0502

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology and Behavior, 11,* 157-161. doi: 10.1089/cpb.2007.0026

Przybylski, A.K., Weinstein, N., Murayama, K., Lynch, M.F., & Ryan, R.M. (2012). The ideal self at play: The appeal of video games that let you be all you can be. *Psychological Science, 23,* 69-76. doi: 10.1177/0956797611418676

Romero, E., Villar, P., & López-Romero, L. (2015). Assessing six factors in Spain: Validation of the HEXACO-100 in relation to the Five Factor Model and other conceptually relevant criteria. *Personality and Individual Differences, 76,* 75-81. doi: 10.1016/j.paid.2014.11.056

Schiano, D.J., Nardi, B., Debeauvais, T., Ducheneaut, N., & Yee, N. (2011). A new look at World of Warcraft's social landscape. *Proceedings of the International Conference on the Foundations of Digital Games,* 174-179. doi: 10.1145/2159365.2159389

Schiano, D.J., & White, S. (1998). The first noble truth of cyberspace: People are people (even when they MOO). *Proceedings of the 1998 SIGCHI conference on Human Factors in Computing Systems,* 352-359. doi: 10.1145/274644.274693

Sim, T., Gentile, D.A., Bricolo, F., Serpelloni, G., & Gulamoydeen, F. (2012). A conceptual review of research on the pathological use of computers, video games, and the Internet. *International Journal of Mental Health Addiction, 10,* 748-769. doi: 10.1007/s11469-011-9369-7

Sung, Y., Moon, J.H., Kang, M., & Lin, J.-S. (2011). Actual self vs. avatar self: The effect of online social situation on self-expression. *Journal of Virtual Worlds Research, 4,* 4-21. doi: 10.4101/jvwr.v4i1.1927

Trepte, S., & Reinecke, L. (2010). Avatar creation and video game enjoyment: Effects of life-satisfaction, game competitiveness, and identification with the avatar. *Journal of Media Psychology, 22,* 171-184. doi: 10.1027/1864-1105/a000022

Turkle, S. (1995). *Life on the screen: Identity in the age of the internet.* New York: Simon & Schuster.

Weibel, D., Wissmath, B., Habegger, S., Steiner, Y., & Groner, R. (2008). Playing online games against computer- vs. human-controlled opponents: Effects on presence, flow, and enjoyment. *Computers in Human Behavior, 24,* 2274-2291. doi: 10.1016/j.chb.2007.11.002

What is World of Warcraft? (n.d.) In *World of Warcraft: Beginner's Guide*. Retrieved from http://us.battle.net/wow/en/game/guide/

Williams, K.M., Paulhus, D.L., & Hare, R.D. (2007). Capturing the four-factor structure of psychopathy in college students via self-report. *Journal of Personality Assessment, 88,* 205-219. doi: 10.1080/00223890701268074

Williams, D., Yee, N., & Caplan, S.E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication, 13,* 993-1018. doi: 10.1111/j.1083-6101.2008.00428.x

Yang, G.S., Gibson, B., Lueke, A.K., Huesmann, L.R., & Bushman, B.J. (2014). Effects of avatar race in violent video games on racial attitudes and aggression. *Social Psychological and Personality Science, 5,* 698-704. doi: 10.1177/1948550614528008

Yang, G.S., Huesmann, L.R., & Bushman, B.J. (2014). Effects of playing a violent video game as male versus female avatar on subsequent aggression in male and female players. *Aggressive Behavior, 40,* 537-541. doi: 10.1002/1b.21551

Yee, N. (2006a). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments, 15,* 309-329.

Yee, N. (2006b). Motivations for play in online games. *CyberPsychology and Behavior, 9,* 772-775. doi:10.1089/cpb.2006.9.772

Yee, N., & Bailenson, J. (2007). The Proteus effect: The effect of transformed self-representation on behavior. *Human Communication Research, 33,* 271-290. doi: 10.1111/j.1468-2958.2007.00299.x

Yee, N., Bailenson, J.N., & Ducheneaut, N. (2009). The Proteus effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research, 36,* 285-312. doi: 10.1177/0093650208330254

Yee, N., Ducheneaut, N., Yao, M., & Nelson, L. (2011). Do men heal more when in drag? Conflicting identity cues between user and avatar. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 773-776. doi: 10.1145/1978942.1979054

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

Yee, N., Harris, H., Jabon, M., & Bailenson, J.N. (2011). The expression of personality in virtual worlds. *Social Psychological and Personality Science, 2,* 5-12. doi: 10.1177/1948550610379056

Yoon, G., & Vargas, P.T. (2014). Know thy avatar: The unintended effect of virtual-self representation on behavior. *Psychological Science, 25,* 1043-1045. doi: 10.1177/0956797613519271

CHAPTER 2: Study 1

Note: This chapter is based on the following article:

Worth, N.C., & Book, A.S. (2014). Personality and behavior in a Massively Multiplayer Online Role-Playing Game. *Computers in Human Behavior, 38,* 322-330. doi: 10.1016/j.chb.2014.06.009

Introduction

Online video games are continually increasing in popularity and attract an increasingly diverse player-base (e.g., Williams, Yee, & Caplan, 2008). They are also increasing in complexity, so that individuals face fewer limits on their actions within many of these games (Yee, 2006a). Massively multiplayer online role-playing games (MMORPGs), in particular, offer players many game-play options, as they allow players to interact with other players in open-world virtual landscapes filled with a variety of possible activities. These games attract millions of players of all ages, nationalities, and occupations, and average playing time for these games is usually in excess of 20 hours per week (Griffiths, Davies, & Chappell, 2004; Williams et al., 2008; Yee, 2006a). The popularity of these games and the diversity of behaviors available within them make these games an important topic for research.

One of the most popular MMORPGs currently available is *World of Warcraft*, which was launched in 2004 and still retains well over 7 million subscribers as of December, 2013 (Makuch, 2014). In this game, players create a character or avatar (a virtual representation of themselves) belonging to one of two factions (Alliance or Horde) and use this character to combat adversaries in a vast fantasy-type world. Players are

distributed across hundreds of different realms (or servers), each of which contains an identical copy of the game. Realms differ according to the type of play that is supported: in Player-versus-Environment (PvE) realms, the emphasis is on combat with game-generated monsters (and player-versus-player combat is optional); in Player-versus-Player (PvP) realms, both player-versus-player and player-versus-environment combat are available (and player-versus-player combat is harder to avoid); in Role-playing (RP) and Role-playing – PvP (RP-PvP) realms, the emphasis is on role-playing (or behaving in a way that is consistent with the fantasy-world of the game; for example, players speak and act "in character" as elves, trolls, etc.).

Thus, players of World of Warcraft are able to choose whether to primarily battle game-generated opponents or to combat other players. Players are also able to choose whether to focus on optimizing their characters by progressing through the most difficult content in the game (i.e., multi-player *raids*) or to focus on other activities, such as completing quests, exploring the virtual world of the game, working on professions (i.e., gathering materials and creating goods), or battling other players. Throughout this game, players can choose whether to adventure primarily alone, or whether to join other players (either temporarily or on a long-term basis in a *guild*) to defeat enemies. With so many options to choose from, it seems likely that different players will choose different activities and opponents. The aim of the current study, therefore, is to analyze the connections between self-reported behaviors in World of Warcraft and important personality traits.

Personality and Behavior in Online Games

When a variety of choices is available, different players can choose different ways to play and things to do in online games. One of the earlier theories regarding these differences was proposed by Bartle (1996), who postulated that there are four major types of players of MUDs (multi-user dungeons, a pre-cursor to MMORPGs), each of which is defined by preferences for different activities in-game. According to Bartle (1996), *Killers* prefer harassing or imposing on other players, *Socializers* prefer interacting and socializing with other players, *Achievers* prefer completing game content, and *Explorers* prefer investigating the virtual world of the game.

Subsequently, research has supported the idea that players differ in their in-game behaviors and preferences; previous studies have shown that players have different motivations for playing, preferences for avatars, and engage in different in-game behaviors. For example, in World of Warcraft, men prefer participating in player-versus-player activities and raids, while women tend to prefer exploring and working on professions (Yee, Ducheneaut, Shiao, & Nelson, 2012). In addition, older players prefer doing quests while younger players prefer player-versus-player activities and raids (Yee et al., 2012).

Although these demographic variables provide some clues as to the ways that players differ in their behaviors in online games, personality traits are perhaps even more important to consider as predictors of in-game behavior. Personality traits have a strong influence on how people think, feel, and behave in the real world, and should, therefore, influence virtual (i.e., in-game) behavior as well. Although individuals generally report behaving much the same in online games as they do in the real world (Bayraktar &

Amca, 2012), there is a number of characteristics of online environments (such as anonymity and invisibility) that may lead players to engage in different behaviors online from those they would commit in the real world (Suler, 2004). It is, therefore, worth studying the connections between personality and in-game behavior to determine exactly what influence personality traits may have.

There has been relatively little research conducted on the specific connections between personality and in-game behavior. However, some research has focused on the related topic of the connections between personality and motivations for playing online games. The focus of the previous research has been on the Big Five or Five Factor Model of personality, which consists of the traits of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience (John, Naumann, & Soto, 2008).

Some of the research on personality and motivations for play suggests that the correlations are reasonably consistent with what one might expect based on connections between personality traits and real-world behaviors. For example, Openness to Experience has been found to be related to immersion, independence (Graham & Gosling, 2013), discovery, and role-playing motivations (Jeng & Teng, 2008). Extraversion is related to socialization, leadership (Graham & Gosling, 2013), and teamwork motivations (Jeng & Teng, 2008). Agreeableness is positively related to socialization (Graham & Gosling, 2013) and relationship motivations (Park, Song, & Teng, 2011), while Neuroticism is negatively related to teamwork (Jeng & Teng, 2008) and leadership (Graham & Gosling, 2013) motivations.

Certain other correlations are less obviously consistent with personality-behavior correlations in the real world. In particular, Park et al. (2011) reported that both Extraversion and Agreeableness were correlated with both achievement and adventure motivations. Further, Conscientiousness has been found to be negatively related to an achievement motivation (Graham & Gosling, 2013), which is unexpected given that Conscientiousness is positively related to achievement in the real world (John et al., 2008). However, inconsistencies with real-world relationships may be due at least in part to the nature and number of items used to measure the motivations in these studies, and the possibility remains that personality traits can be reliable predictors of motivations to play online games.

Motivations for play are related to actual in-game behaviors in predictable ways (Billieux et al., 2013). Exploration behaviors, as measured by the number of exploration achievements earned by players' primary avatars, are related to discovery motivations. Likewise, player-versus-player behaviors are related to competition motivations, and achievements for completing raids and dungeons (which require the coordinated efforts of several players) are related to motivations like advancement and teamwork (Billieux et al., 2013).

Thus, research on the connections between personality and motivations provide some potential clues regarding the expected connections between personality and behavior. Additional information is provided by some research on preferences for avatars; for example, Agreeableness is positively related to preferences for avatars with helping-related occupations like monk and cleric, and negatively related to preferences for avatars with killing-related occupations like assassin (Park & Henley, 2007).

Therefore, the connections between personality and motivations for play, as well as personality and avatar preference, are often (but not always) consistent with the content of the personality traits involved.

Some research also suggests that the relationships between personality and in-game behavior are consistent with personality-behavior correlations in the real world. For example, when playing a violent (but not online) video game, individuals with more aggressive personalities engaged in a greater number of aggressive behaviors than those who were less aggressive (Peng, Liu, & Mou, 2008).

Likewise, Yee, Ducheneaut, Nelson, and Likarish (2011) found several meaningful correlations between Five Factor Model personality traits and in-game behaviors (as measured by achievements and character statistics) in World of Warcraft. Extraversion was associated with completing more high-level challenges that require interaction and cooperation with groups of players (i.e., dungeons and raids), while those lower in Extraversion had more achievements relating to solo activities like questing and fishing. Agreeableness was associated with performing more friendly visual interactions (e.g., the "/hug" emote), and low Agreeableness was associated with having killed more players in player-versus-player combat. Conscientiousness was associated with having high profession levels and having collected many pets, tasks which require diligence to complete. Openness to Experience was associated with having completed more exploration achievements. Thus, many of the correlations observed by Yee et al. (2011) seem largely consistent with personality and behavior patterns observed in the real world.

In contrast, one previous study has found no connections between Five Factor personality traits and in-game behavior. In a study of World of Warcraft, McCreery,

Krach, Schrader, and Boone (2012) examined the correlations between each Five Factor personality trait and a corresponding set of behaviors (e.g., between Agreeableness and a set of pre-defined "agreeable" in-game behaviors), and found no significant relationships. However, this study may underestimate the possible relationships between player personality and in-game behavior due to potential issues with the behavioral measures used. Neither internal consistency reliability estimates of the behavior sets, nor a factor analysis of the behavior items, are reported. Thus, it is not clear whether the items in each set form appropriate and reliable scales. Further, McCreery et al. (2012) acknowledge that the validity of the behavior sets was not analyzed, and the sample size (n = 39) may have been too small.

Overall, previous research has not yet clarified the nature of the connections between personality traits and in-game behavior. The current study aims to address this problem, first by creating and analyzing a questionnaire measuring self-reported in-game behavior in World of Warcraft, and second by investigating the relationships between the components of this questionnaire and personality traits. Although previous research on motivations for play in online games (e.g., Yee, 2006a, 2006b) provides hints as to the major dimensions of activity in games like World of Warcraft, to our knowledge no specific questionnaire of this type has yet been studied. Thus, our first research question relates to the structure of an in-game behavior questionnaire for World of Warcraft created for the purposes of the current study:

RQ1: What is the component-structure of the In-Game Behavior Questionnaire for World of Warcraft?

Personality Traits

The current study aimed to examine the connections between several important personality traits – the HEXACO personality traits (Ashton & Lee, 2007) and psychopathic traits – and behavior in World of Warcraft. The HEXACO model of personality has been shown to be particularly useful in summarizing differences between individuals (Ashton & Lee, 2007). This model of personality was developed based on lexical studies of personality-descriptive terms in many different languages (Ashton et al., 2004; Lee & Ashton, 2008), which have shown that a comprehensive description of personality can best be achieved with six major factors: Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience (thus, the acronym HEXACO).

The HEXACO model of personality is, in part, similar to the Five Factor Model of personality (Ashton & Lee, 2007). In particular, the factors of Extraversion (i.e., outgoing and lively versus shy and withdrawn), Conscientiousness (i.e., organized and diligent versus disorganized and reckless), and Openness to Experience (i.e., unconventional and creative versus conventional and unimaginative) are much the same in both models (Ashton & Lee, 2007).

However, there are also some important differences between the HEXACO and Five Factor models (Ashton & Lee, 2007). The Honesty-Humility factor appears as perhaps the most obvious of those differences. This factor covers the tendency to be sincere and fair (at the high end) versus deceitful and manipulative (at the low end), and these important tendencies are only partly covered in the Five Factor Model of personality (Ashton & Lee, 2005).

Other important distinctions between the HEXACO model and the Five Factor model involve the Agreeableness and Emotionality factors (Ashton & Lee, 2007). In the HEXACO model, the Agreeableness factor reflects individuals' tendencies to be patient and tolerant (at the high end) versus angry and impatient, while the Emotionality factor reflects tendencies to be sentimental and anxious (at the high end) versus tough and insensitive. Content related to anger is located at the low end of HEXACO Agreeableness but at the high end of Five Factor Neuroticism, and sentimentality is found at the high end of HEXACO Emotionality but at the high end of Five Factor Agreeableness (Ashton & Lee, 2007).

Previous research on personality and online behavior has focused mainly on the Five Factor model of personality (e.g., McCreery et al., 2012; Yee et al., 2011). The results of these past studies do not form a clear picture of the connections that should be expected between personality and behavior in MMORPGs. In addition, to our knowledge no previous research has focused on the connections between the HEXACO personality traits and in-game behavior. Because of the important differences between the Five Factor model and the HEXACO model, the inconsistencies in previous results, and the fact that the structure of the In-Game Behavior Questionnaire was not yet known, no specific hypotheses were proposed regarding the correlations between HEXACO traits and in-game behaviors. Instead, we proposed a second research question:

RQ2: What are the relationships between HEXACO personality traits and in-game behavior components?

Although the HEXACO model of personality covers personality variation in a comprehensive manner, it is also worthwhile to examine the connections between in-

game behavior and important specific traits. Psychopathy is a personality construct that involves tendencies to be manipulative, callous, irresponsible, impulsive, and antisocial (Hare, 2003; Hare & Neumann, 2008). When it is measured among "normal" (i.e., subclinical) populations, it is frequently conceptualized as being comprised of four factors: Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Criminal Tendencies (Neal & Sellbom, 2012; Williams, Paulhus, & Hare, 2007). Psychopathic traits are strongly negatively related to Honesty-Humility and Emotionality, in particular, and also to low Conscientiousness and Agreeableness (de Vries, Lee, & Ashton, 2008; Gaughan, Miller, & Lynam, 2012). Psychopathic traits have important and serious consequences, as higher levels of this trait are associated with greater frequency of bullying and criminal activity even in student samples (Williams, et al., 2007). Because the behavior of those with high levels of psychopathic traits has a serious and negative impact on others, it is important to examine these traits in connection with behavior in online video games. Thus, we proposed a third research question:

RQ3: What are the relationships between psychopathic traits and in-game behavior components?

Methods

Participants

Participants for the current study were 205 players of the video game *World of Warcraft*. Seven participants were eliminated from analyses due to non-response or providing nonsense answers. Of the 198 participants who provided usable data, 156 (78.78%) were male. Participants ranged in age from 16 to 51, with a mean age of 20.71

(*SD* = 6.40). Two participants did not report their ages. The majority of participants (119, 60.71%) were under the age of 20.

Participants were mainly located in the USA (154, 77.78%), with 28 (14.14%) in Canada, and the remainder (16, 8.08%) in Europe, Australia, New Zealand, Mexico, and Asia. Participants completed the survey in July and August, 2010, at which time World of Warcraft was in the *Wrath of the Lich King* expansion.

Measures

HEXACO-60 (Ashton & Lee, 2009).

This 60-item version of the full-length HEXACO-PI-R (Lee & Ashton, 2004, 2006) contains 10 items for each of the 6 HEXACO factors. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Lee and Ashton (n.d.) report internal consistency reliabilities in a large college student sample (*n* = 1126) as follows: Honesty-Humility, .76; Emotionality, .80; Extraversion, .80; Agreeableness, .77; Conscientiousness, .76; Openness to Experience, .78. The HEXACO-60 has demonstrated high levels of self-observer agreement and appropriate correlations between the HEXACO factors and the factors of the Five Factor model (Ashton & Lee, 2009).

Self-Report Psychopathy Scale – III (SRP-III; Paulhus, Neumann, & Hare, in press).

This 64-item measure was designed to reflect the 4-factor structure of the Psychopathy Checklist – Revised (Hare, 2003; Williams et al., 2007). The factors are named Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Criminal Tendencies. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Neal and Sellbom (2012) report internal consistency reliabilities for the scales as

follows: total score, .92; Interpersonal Manipulation, .82; Callous Affect, .78; Erratic Lifestyle, .79; Criminal Tendencies, .75. The total score and the four factors have demonstrated appropriately strong correlations with other measures of psychopathy and with relevant external measures, demonstrating good convergent and criterion-related validity (Neal & Sellbom, 2012).

In-Game Behavior Questionnaire.

For the purposes of this study, 41 items were written reflecting typical activities in World of Warcraft (please see Appendix A). These items were intended to reflect the majority of activities engaged in by most players within the game. The first three items reflected the three roles that players can take on in group settings within the game: tank role (taking damage from enemies so as to prevent other players from taking damage), healer role (healing other players who have taken damage from enemies), and damage role (inflicting damage on enemies). The remaining 38 items were written to reflect the primary activities engaged in by most players within the game. Items were generated based on descriptions of activities from the World of Warcraft website (http://us.battle.net/wow/en/), discussions regarding in-game behaviors between players on the World of Warcraft discussion forums (http://us.battle.net/wow/en/forum/), and the first author's own experience playing the game. Items were included in the scale so as to loosely reflect previous research regarding motivations for game play (Yee, 2006a; 2006b) and Bartle's (1996) proposed four types of players – Explorers, Achievers, Killers, and Socializers. Participants were asked to rate how often they engaged in each activity on a scale ranging from 1 (*Never*) to 7 (*Almost all of the time*).

Procedure

Messages announcing the study were posted to a forum frequented by World of Warcraft players. Current or recent players of World of Warcraft were invited to go to a website that hosted the survey. At the website, participants viewed a Welcome message explaining the purpose of the study and the requirements to participate, followed by an informed consent form. Players who agreed to participate then completed demographic questions, basic items related to World of Warcraft play (e.g., "How long have you been playing World of Warcraft?"), the In-Game Behavior Questionnaire, the HEXACO-60, the SRP-III, and items regarding general video game preferences (not reported in the current study). A subset of the participants also completed questionnaires about their primary World of Warcraft avatars; these data are not reported in the current study.

Results

Principal Components Analysis of the In-Game Behavior Questionnaire

We conducted an initial principal components analysis of the In-Game Behavior Questionnaire, extracting all components with eigenvalues in excess of one. Next, a parallel analysis (with n = 198; 38 variables) was performed in order to determine the appropriate number of components to extract. The first six eigenvalues from the actual data exceeded the 95th percentile eigenvalues from the parallel analysis, suggesting that six components should be retained.

Next, a principal components analysis with promax rotation was conducted, extracting six factors. Items loading above .40 on a component were retained. Table 2-1 shows the proposed component names and item lists for each of the six components.

Table 2-1
In-Game Behavior Questionnaire Component Names and Items

Component Name	Item List
Player-versus-Player	5. Fight players of the opposite faction (PvP combat) 18. Compete in battlegrounds 10. Kill players of the opposite faction who are much lower level than you (gank) 39. Engage in corpse camping 34. Duel with players from the same faction as you 32. Steal kills from another player 40. Compete in arenas 14. Fight Non Player Characters (NPCs, like guards) of the opposite faction
Social Player-versus-Environment	13. Participate in raids 41. Work on progressing through raid content 28. Work with guild members 20. Chat with other players 27. Act as a leader in dungeons or raids 15. Work on quests alone [reversed]
Working	4. Work on earning or acquiring gold 35. Work on improving your character's reputation 11. Work on completing achievements 6. Make, build, or enchant things (such as potions, weapons, or armor) 33. Gather resources from the environment (such as herbs or ore) 23. Sell high-value items (such as high-level armor) or provide high-level services (such as high-level enchantments) 8. Work on acquiring mounts or pets
Helping	22. Help other players 25. Give gold, armor, resources, etc., to other players 16. Heal or cast buffs on other players 12. Give advice to other players
Immersion	38. Develop or act out a history or a personality for your character 19. Roleplay 9. Make, acquire, or use unusual items (such as clothing with no armor value or items with funny or unexpected effects) 21. Look for locations that few players know about 17. Explore 26. Discuss or learn about game lore
Core Content	24. Work on leveling up 37. Fight monsters (mobs) 7. Work with others on a quest or in a dungeon

Note: Items are listed in order of highest to lowest loading for each component.

Four items did not load above .40 on any component and were dropped from further analyses. These items were “Try to complete quests or dungeons as quickly as possible” (item 36), “Work on improving your playing skills or technique” (item 29), “Make friends or develop relationships with other players” (item 31), and “Work on acquiring better or rare weapons or armor” (item 30). Only one item loaded above .40 on two components: “Chat with other players” (item 20) loaded at .540 on Social Player-versus-Environment and also had a secondary loading of .415 on Helping.

For each component, scales were computed as the mean of the items loading on the components. Means, standard deviations, and Cronbach’s alpha reliabilities for each scale are provided in Table 2-2. Reliabilities ranged from .62 for the Core Content scale to .86 for the Player-versus-Player Scale.

The first component was labeled Player-versus-Player, as the items describe activities involving combat against other players (as opposed to game-generated opponents). The second component was labeled Social Player-versus-Environment, as the items involve socializing and completing tasks directed at game-generated opponents (i.e., “player-versus-environment”) that require communication among group members to complete. The third component was labeled Working, with items relating to working on tasks that can be completed, including the accumulation of items and in-game achievements. The fourth was labeled Helping, with items relating to assisting other players. The fifth component was labeled Immersion, as the items involve immersing oneself in the game world. The sixth and final component was labeled Core Content as the items reflect the basic elements of the game.

Table 2-2
Means, Standard Deviations, and Cronbach's Alpha Reliabilities for In-Game Behavior and Personality Scales

	M	*SD*	alpha
Behavior Scales			
Player vs. Player	3.16	1.18	.86
Social Player vs. Environment	4.27	1.06	.77
Working	3.94	1.07	.80
Helping	4.27	1.05	.74
Immersion	3.14	1.09	.77
Core Content	5.08	1.06	.62
Personality Scales			
Honesty-Humility	3.22	.72	.79
Emotionality	2.86	.67	.80
Extraversion	3.05	.65	.79
Agreeableness	3.09	.64	.77
Conscientiousness	3.39	.63	.80
Openness	3.57	.66	.77
IPM	2.78	.65	.87
CA	2.73	.56	.82
ELS	2.74	.58	.81
CT	1.59	.53	.85
SRP Total	2.46	.45	.92

Note: IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies, SRP Total: Self-Report Psychopathy Total Score.

Descriptive Statistics

Two outliers were identified on the Criminal Tendencies factor of the SRP-III (no other scales showed significant univariate outliers). In order to reduce the impact these outliers would have on the analyses, their scores were moved to just above the next highest scores while maintaining their rank-order within the data set, as recommended by Tabachnick & Fidell (2007). All variables were reasonably normally distributed, with the exception of the Criminal Tendencies factor, which was significantly positively skewed (z_{skew} = 7.466). However, since the behaviors measured in the Criminal Tendencies factor are likely to be skewed in the normal population, no transformation was used.

Means, standard deviations, and Cronbach's alpha reliabilities of the variables are presented in Table 2-2. Reliabilities for the HEXACO ranged from .77 for Agreeableness and Openness to Experience to .80 for Emotionality and Conscientiousness. For the SRP-III, reliabilities ranged from .81 for the Erratic Lifestyle factor to .92 for the total score.

Correlational Analyses

Table 2-3 shows the correlations between the six in-game behavior scales and the personality scales. Several significant correlations were observed between the in-game behavior scales. The Player-versus-Player scale was only moderately correlated with two other scales, while the other scales were more strongly and positively correlated with each other.

Each in-game behavior scale was significantly correlated with two or more HEXACO personality scales. Correlations were generally small to medium-sized, with correlations >|.30| observed between Helping and Openness to Experience (.345),

Table 2-3
Correlations between HEXACO Personality Scales, SRP-III Scales, and In-Game Behavior Scales

	PvP	PvE	Working	Helping	Immersion	Core
PvP						
PvE	.153*					
Working	-.100	.213**				
Helping	.085	.378***	.272***			
Immersion	.046	.040	.416***	.441***		
Core	-.206**	.103	.275***	.252***	.210**	
H	-.453***	.049	.096	.212**	.163*	.194**
E	-.084	.044	.223**	.138	.134	.239**
X	.015	.232**	.122	.276***	-.013	.154*
A	-.171*	.158*	.044	.219**	.029	-.065
C	-.212**	.033	.239**	.095	.072	.112
O	-.102	.072	.219**	.345***	.372***	.205**
IPM	.444***	-.023	-.187**	-.089	-.079	-.118
CA	.317***	-.173*	-.246**	-.285***	-.142*	-.245**
ELS	.358***	.055	-.100	.040	-.035	-.059
CT	.223**	.164*	.022	.026	-.084	-.009
SRP	.441***	.009	-.171*	-.098	-.115	-.135

Note: PvP: Player-versus-Player, PvE: Social Player-versus-Environment, Core: Core Content, H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience, IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies, SRP: Self-Report Psychopathy Total Score.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Immersion and Openness to Experience (.372), and Player-versus-Player and Honesty-Humility (-.453). The Player-versus-Player scale was the only in-game behavior scale that was significantly negatively correlated with HEXACO traits (all other significant correlations between the in-game behavior scales and HEXACO traits were positive).

Correlations between psychopathic traits (SRP-III) and in-game behavior scales were somewhat larger. The Player-versus-Player scale and the Working scale were significantly correlated with SRP-III total scores (positively and negatively, respectively). All behavior scales were significantly correlated with at least one of the psychopathy factors. The Player-versus-Player scale was positively correlated with all four of the factors, indicating that those who frequently engage in player-versus-player activities tend to be more manipulative, callous, irresponsible, and antisocial. All five of the other in-game behavior scales were negatively correlated with the Callous Affect factor.

Multiple Regression Analysis

In order to further examine the unique contributions of the HEXACO personality factors to the prediction of in-game behaviors, six standard multiple regression analyses were conducted, with the six behavior scales as the dependent variables and HEXACO traits as predictors. Results of the multiple regression analyses (R^2, F, standardized regression coefficients (β) and semipartial correlations (sr^2)) are presented in Table 2-4. Evaluation of the assumptions of multiple regression analysis indicated no problems with multivariate normality, linearity, or homoscedasticity of residuals. All of the regression equations were significant, $p < .05$.

Three of the behavior scales were uniquely predicted by just one of the HEXACO scales: the Player-versus-Player scale was uniquely predicted by Honesty-Humility

Table 2-4

Standard Multiple Regression Analyses Predicting In-Game Behavior Scales from HEXACO Personality Traits

	In-Game Behavior Scales											
	PvP		PvE		Working		Helping		Immersion		Core	
Personality	ß	sr^2	ß	sr^2	ß	sr^2	ß	sr^2	ß	sr^2	ß	sr^2
H	-.410***	.141	.016	.000	.002	.000	.121	.012	.082	.006	.191*	.031
E	-.066	.004	.067	.004	.190**	.034	.136*	.018	.091	.008	.217**	.045
X	.027	.001	.213**	.043	.093	.008	.233***	.052	-.046	.002	.175*	.029
A	-.095	.008	.126	.014	.043	.002	.151*	.020	.003	.000	-.120	.013
C	-.108	.010	-.008	.000	.164*	.023	-.054	.002	-.058	.003	-.027	.001
O	.044	.002	.026	.001	.134	.016	.272***	.065	.360***	.113	.122	.013
F	9.269***		2.568*		4.527***		9.564***		5.887***		5.426***	
R^2	.226		.075		.124		.231		.156		.146	

Note: PvP: Player-versus-Player, PvE: Social Player-versus-Environment, Core: Core Content, H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(accounting for 14.1% of the variance in player-versus-player activities), the Social Player-versus-Environment scale was uniquely predicted by Extraversion (accounting for 4.3% of the variance), and the Immersion scale was uniquely predicted by Openness to Experience (accounting for 11.3% of the variance). The Working scale had two unique predictors (Emotionality (3.4% of the variance) and Conscientiousness (2.3% of the variance)), while the Core Content scale had three unique predictors (Honesty-Humility (3.1% of the variance), Emotionality (4.5% of the variance), and Extraversion (2.9% of the variance)). Finally, the Helping scale was uniquely predicted by four of the six HEXACO factors: Emotionality (1.8%), Extraversion (5.2%), Agreeableness (2.0%), and Openness (6.5%).

Discussion

The current study sought to determine the structure of a self-report measure of in-game behavior for World of Warcraft and to examine the correlations between the components of this measure and personality traits. The six components of the In-Game Behavior Questionnaire were found to be related to HEXACO personality traits and to psychopathy in a manner generally consistent with personality definitions.

Player-versus-Player

The first component of the In-Game Behavior Scale, Player-versus-Player, included eight items, seven of which describe activities where players combat against other players (either directly or indirectly). The remaining item (item 14, “Fight Non Player Characters (NPCs, like guards) of the opposite faction”) is an activity that is usually performed as part of world player-versus-player combat (i.e., attacking an enemy

player near an enemy city may draw out game-controlled guards, thus forcing the attacking player to fight the guards as well as the player).

The observed correlations involving this component suggest that those who frequently engage in player-versus-player combat tend to be dishonest, reckless, and impatient. They also tend to be high in all factors of psychopathy, indicating manipulative, callous, irresponsible, and even criminal tendencies.

The relatively strong correlations with these undesirable traits may be partly explained by the presence of some activities within the Player-versus-Player scale which could be described as “unfair”. Activities such as “ganking” and “corpse-camping” are generally carried out by high-level players on low-level players, such that the low-level player does not have a chance of survival or even useful defense. In the case of corpse-camping, a high-level player can repeatedly kill a low-level player, thus effectively disrupting the low-level player’s attempts to do anything. Players who enjoy taking advantage of the weakness of others by ganking or corpse-camping are, perhaps not surprisingly, likely to be low in Honesty-Humility and high on psychopathic traits. These players share some resemblance with the *Killer* player type described by Bartle (1996).

However, this scale also contains several activities (for example, competing in battlegrounds and arenas) that could be described as “fair” player-versus-player activities; that is, players mutually agree to compete in these activities and all players are of approximately the same level. Thus, the outcome of these player-versus-player activities are more likely to be decided based on skill, and it is less likely that one player will be able to completely dominate others.

Players who engage in corpse-camping and ganking are likely to also participate in the “fair” player-versus-player activities like battlegrounds, as these contain the same element of player-versus-player unpredictability and challenge. The reverse is not necessarily true, however. Mean scores for corpse-camping (M = 2.10) and ganking (M = 2.74) were lower than for battlegrounds (M = 4.56) or for player-versus-player combat generally (M = 4.60). This likely suggests that many players engage in “fair” but not “unfair” player-versus-player combat.

Social Player-versus-Environment

The second component of the In-Game Behavior Questionnaire contained content relating to multi-player activities (i.e., raids) and working or chatting with other players. Raiding is an activity that requires cooperation between large groups of players in order to defeat game-controlled opponents. In order to progress through raids, which are arguably the most difficult and time-consuming activities in the game, players must spend a good deal of in-game time working together. It is, therefore, not surprising that this scale was related to high levels of Extraversion (and Agreeableness in the zero-order correlations). Individuals who are more outgoing and friendly are likely to feel more comfortable working closely with others for long periods of time.

The relatively small size of the correlations might be explained by the fact that raids offer what are usually considered to be the best in-game rewards, and are therefore popular activities with many World of Warcraft players. This makes it likely that some individuals who are less extraverted will also be interested in taking part, which could reduce the potential size of the relationships.

Working

The third component of the In-Game Behavior Questionnaire consisted of items relating to working on in-game tasks and professions (i.e., making things, gathering resources, and selling items are activities that are related to in-game professions like alchemy and mining). Together, these items reflect an interest in completing different game objectives in an orderly fashion, which is consistent with the observed correlation with high levels of Conscientiousness (i.e., traits like diligence and organization).

Players who are more anxious and dependent (i.e., high in Emotionality) also tend to engage in these activities, perhaps because these activities involve relatively little risk of failure or criticism from others. In many other activities in World of Warcraft (e.g., in battlegrounds or raids), players frequently criticize other players based on their playing skills or armor. In contrast, there is a smaller risk of negative feedback from other players when performing the tasks included in the Working scale (and many of these activities can be performed alone). Players who are more conventional (i.e., low in Openness to Experience) may also be less likely to engage in these activities as they may be more focused on traditional game objectives (like raids), which may help to explain why this scale also showed a positive zero-order correlation with Openness to Experience.

Helping

The fourth component, Helping, contains items that involve assisting other players. Giving gold to another player is an obvious example of helping behavior, as gold is necessary for the purchase of many items that promote progression through the

game. However, healing others is also very helpful, as many characters are limited in their ability to quickly regenerate their own health.

Perhaps not surprising, Helping was predicted by high Agreeableness and Emotionality. These connections suggest that those who help also tend to be patient and sentimental. Players who help also tended to low in the Callous Affect factor of the SRP-III, and low scores on this factor are consistent with a concern for the well-being of others.

However, Helping was most strongly related to Openness to Experience and Extraversion. These connections may be partly explained by the fact that in order to help others in World of Warcraft, it is not sufficient to be kind and willing to help. Rather, one must also be willing and able to seek out other players and situations in which help may be required. Tendencies to enjoy socializing with others and also to seek out unusual or novel experiences are, therefore, likely to promote helping behaviors in World of Warcraft.

Immersion

The fifth component, Immersion, contained two items that relate to role-playing and developing one's character's personality, three relating to exploration of game features and locations, and one relating to the stories behind the game (i.e., game lore). Together, these items reflect an interest in connecting with the fantasy-world of the game. It is not surprising, then, that Immersion was uniquely predicted by the Openness to Experience trait. Individuals who are high in Openness are creative and inquisitive, traits that are consistent with a desire to fully engage in the fantasy game-world by role-playing or exploring the game world. They also tend to be unconventional, which is consistent

with an interest in doing some activities that are outside of “mainstream” tasks of the game, like looking for little-known locations or using unusual items. Players who engage in these activities resemble somewhat the *Explorers* of Bartle’s (1996) typology.

Core Content

The three items that comprised the sixth and final component, Core Content, reflect activities that are central to the game and are more frequently performed by those with higher levels of Emotionality, Honesty-Humility, and Extraversion. Players’ characters begin the game at level 1 and then proceed through levels (i.e., *level up*) as they progress through game content. *Leveling* is, therefore, an activity that all players must engage in when they start playing World of Warcraft, but some players may choose to spend more time doing so or to level multiple characters. Leveling may be preferred by those who are higher in Emotionality as it involves little risk of negative feedback from others, and questing with other players is likely to appeal to those who are high in Extraversion. The correlation with Honesty-Humility is not readily interpretable.

Conclusions and Directions for Future Research

Overall, the current study provides some important information regarding the connections between personality and in-game behavior. Although the virtual world within World of Warcraft is very different from the real world, the results of the current study suggest that in-game behavior is related to personality traits in ways that are consistent with trait descriptions and real-world personality-behavior relationships, much as Peng et al. (2008) and Yee et al. (2011) have found.

Future studies on the connections between personality and in-game behavior should continue to refine the In-Game Behavior Questionnaire. This questionnaire was

developed for the purposes of the current study in 2010, and all of the behaviors included in the questionnaire remain relevant to the game in 2014. Although World of Warcraft has received several content updates since the administration of this questionnaire, the fundamentals of the game have remained essentially unchanged. The items listed in the In-Game Behavior Questionnaire refer to general behaviors rather than specific locations, challenges, or enemies which might change over time. However, the questionnaire would likely benefit from additional analysis and improvement. For the purposes of the current study, the In-Game Behavior Questionnaire was created to reflect as many behaviors as possible without redundancy or excessive length. The content of the items could be reviewed to determine if more items would improve the ability of the questionnaire to reflect the breadth and depth of World of Warcraft behaviors. Nonetheless, the current version of the questionnaire provides an important starting place for examining different in-game activities.

It is important note certain limitations of the current study. The current study was perhaps somewhat limited by its use of self-report data. There are other methods for examining in-game behavior, including recording and coding actual in-game behavior (e.g., McCreery et al., 2012) or analyzing in-game data provided by the game itself (e.g., Yee et al., 2011). Both of these alternate methods present both benefits and drawbacks. Coding actual behavior allows the researcher to observe behavior as it actually happens, but this method is limited by the length of game-play time that can feasibly be coded. In addition, players who know that their game-play is being recorded might behave differently than they would normally. Using behavior data provided by the game ensures that accurate statistics on game achievements are used, but this method is limited by the

types of information provided by the game (i.e., statistics are not available on a number of interesting behaviors, such as corpse-camping). Nevertheless, future research could incorporate these methods in addition to self-reports in order to determine whether the connections between personality and in-game behavior generalize across methods.

Future research should also study the connections between personality and in-game behavior across a wider sample of games. This would help to determine whether the results of the current study can be replicated when games with differing content are studied. In addition, future research might focus on samples that include individuals who are not dedicated gamers. The current study included only participants who were current or recent players of World of Warcraft, and it remains to be seen whether these individuals represent a particular subset of the general population or whether the personality-behavior connections observed here are more broadly applicable.

Finally, the current study suggests some important ideas for video game designers. A successful MMORPG like World of Warcraft may, in part, owe its success to the wide array of available options for game-play. Different activities clearly appeal to different individuals, and, therefore, making certain elements of the game mandatory for all players could deter some individuals from playing. Player-versus-player activities, in particular, may be enjoyable primarily to a subset of the player population. Providing many options for game play is likely to help to attract and retain a more diverse and numerous player-base.

References

Ashton, M.C., & Lee, K. (2005). Honesty-Humility, the Big Five, and the five-factor model. *Journal of Personality, 73,* 1321-1353. doi: 10.1111/j.1467-6494.2005.00351.x

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91,* 340-345. doi: 10.1080/00223890902935878

Ashton, M.C., Lee, K., Perugini, M., Szarota, P., de Vries, R.E., Di Blas, L., Boies, K., & De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology, 86,* 356-366. doi: 10.1037/0022-3514.86.2.356

Bartle, R (1996). *Hearts, Clubs, Diamonds, Spades: Players who suit MUDs*. Retrieved from http://www.mud.co.uk/richard/hcds.htm

Bayraktar, F., & Amca, H. (2012). Interrelations between virtual-world and real-world activities: Comparisons of genders, age groups, and pathological and nonpathological internet users. *Cyberpsychology, Behavior, and Social Networking, 15,* 263-269. doi: 10.1089/cyber.2011.0337

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29,* 103-109. doi: 10.1016/j.chb.2012.07.021

De Vries, R.E., Lee, K., & Ashton, M.C. (2008). The Dutch HEXACO personality inventory: Psychometric properties, self-other agreement, and relations with psychopathy among low and high acquaintanceship dyads. *Journal of Personality Assessment, 90,* 142-151. doi: 10.1080/00223890701845195

Gaughan, E.T., Miller, J.D., & Lynam, D.R. (2012). Examining the utility of general models of personality in the study of psychopathy: A comparison of the HEXACO-PI-R and NEO-PI-R. *Journal of Personality Disorders, 26,* 513-523. doi: 10.1521/pedi.2012.26.4.513

Graham, L.T., & Gosling, S.D. (2013). Personality profiles associated with different motivations for playing World of Warcraft. *Cyberpsychology, Behavior, and Social Networking, 16,* 189-193. doi: 10.1089/cyber.2012.0090

Griffiths, M.D., Davies, M.N.O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology and Behavior, 7,* 479-487. doi: 10.1089/1094931041774631

Hare, R.D. (2003). *The Hare Psychopathy Checklist - Revised.* (2nd Ed.). Toronto, ON, Canada: Multi-Health Systems.

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

Jeng, S.-P., & Teng, C.-I. (2008). Personality and motivations for playing online games. *Social Behavior and Personality, 36,* 1053-1060. doi: 10.2224/sbp.2008.36.8.1053

John, O.P., Naumann, L.P., & Soto, C.J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, Measurement, and conceptual issues. In Oliver P. John, Richard W. Robins, Lawrence A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3rd Ed., pp. 114-158). New York, NY: Guilford Press.

Lee, K., & Ashton, M.C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39,* 329-358, doi: 10.1207/s15327906mbr3902_8

Lee, K., & Ashton, M.C. (2006). Further assessment of the HEXACO personality inventory: Two new facet scales and an observer report form. *Psychological Assessment, 18,* 182-191. doi: 10.1037/1040-3590.18.2.182

Lee, K., & Ashton, M.C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality, 76,* 1001-1053. doi: 10.1111/j.1467-6494.2008.00512.x

Lee, K., & Ashton, M.C. (n.d.) *Descriptive statistics and internal consistency reliabilities of the HEXACO-60 scales in a college student sample* [PDF]. Retrieved from http://hexaco.org/downloading.html.

Makuch, E. (2014, February 6). *World of Warcraft subscriptions on the rise, ended 2013 at 7.8 million.* Retrieved from http://www.gamespot.com/articles/world-of-warcraft-subscriptions-on-the-rise-ended-2013-at-7-8-million/1100-6417575/

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

Neal, T.M.S., & Sellbom, M. (2012). Examining the factor structure of the Hare Self-Report Psychopathy scale. *Journal of Personality Assessment, 94,* 244-253. doi: 10.1080/00223891.2011.648294

Park, A.E., & Henley, T.B. (2007). Personality and fantasy game character preferences. *Imagination, Cognition and Personality, 27,* 37-46. doi: 10.2190/IC.27.1.d

Park, J., Song, Y., & Teng, C-I. (2011). Exploring the links between personality traits and motivations to play online games. *Cyberpsychology, Behavior, and Social Networking, 14,* 747-751. doi: 10.1089/cyber.2010.0502

Paulhus, D.L., Neumann, C.S., & Hare, R.D. (in press). *Manual for the Hare Self-Report Psychopathy (SRP) scale.* Toronto, ON, Canada: Multi-Health Systems.

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology and Behavior, 11,* 157-161. doi: 10.1089/cpb.2007.0026

Suler, J. (2004). The online disinhibition effect. *Cyberpsychology and Behavior, 7,* 321-326. doi: 10.1089/1094931041291295

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* (5th Ed.). Boston, MA: Pearson Education.

Williams, D., Yee, N., & Caplan, S.E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication, 13,* 993-1018. doi: 10.1111/j.1083-6101.2008.00428.x

Williams, K.M., Paulhus, D.L., & Hare, R.D. (2007). Capturing the four-factor structure of psychopathy in college students via self-report. *Journal of Personality Assessment, 88,* 205-219. doi: 10.1080/00223890701268074

Yee, N. (2006a). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments, 15,* 309-329.

Yee, N. (2006b). Motivations for play in online games. *CyberPsychology and Behavior, 9,* 772-775. doi:10.1089/cpb.2006.9.772

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

Yee, N., Ducheneaut, N., Shiao, H., & Nelson, L. (2012). Through the Azerothian looking-glass: Mapping in-game preferences to real world demographics. *Proceedings of the 2012 SIGCHI conference on Human Factors in Computing Systems,* 2811-2814. doi: 10.1145/2207676.2208683

CHAPTER 3: Study 2

Note: This chapter is based on the following article:

Worth, N.C., & Book, A.S. (2015). Dimensions of video game behavior and their relationships with personality. *Computers in Human Behavior, 50,* 132-140. doi: 10.1016/j.chb.2015.03.056

Introduction

Video Games

Video games are becoming increasingly popular forms of entertainment. Because these games can now be played on a variety of platforms, ranging from dedicated consoles to hand-held devices and smart phones, more people can play more often than ever before. Formerly, there were few video games from which to choose, and these games were quite simple, allowing for only one action or a limited array of actions (Nielsen, Smith, & Tosca, 2008). Now, players can choose how to play, both by selecting from a wide range of video games and by deciding what to do in many of these games. Given that there are video games currently available to appeal to all different play-styles, it should be no surprise that millions of people report playing video games (Entertainment Software Association, 2014) and that many devote considerable time to playing them (Billieux et al., 2013; Griffiths, Davies, & Chappell, 2004; Williams, Yee, & Caplan, 2008; Yee, 2006a).

Individuals who play video games can choose not only which game to play but also, often, what to do while playing a particular game. While some simple games allow only one action or a limited number of actions, many complex games provide multiple paths, choices, and other options. Just as behavior in the real world is influenced by

personality characteristics, so too are behaviors in video games likely to be influenced to some degree by personality. If personality and behavior in video games are related much as they are in the real world, one would expect that extraverted individuals would behave more socially, that agreeable individuals would behave more cooperatively, and that conscientious individuals would behave more diligently (in keeping with some of the defining behaviors of these traits; Lee & Ashton, 2008). On the other hand, it may be that the risk-free environment of video games allows to individuals to break free of normal behavioral constraints, thus allowing introverted individuals to be more social and agreeable individuals to express anger.

The primary goal of the current study, therefore, was to examine how personality characteristics are related to different behaviors in video games. More specifically, we addressed the following research problems. First, we investigated the component structure of a questionnaire measuring different behaviors in video games. Second, we investigated the correlations between these components of in-game behavior and broad personality traits (as measured by the HEXACO model of personality; Ashton & Lee, 2007; Ashton et al., 2004; Lee & Ashton, 2008) as well as the correlations between these components of in-game behavior and psychopathic personality traits. Third, we investigated the correlations between frequency of playing video games online, personality traits, and the components of in-game behaviors.

Many video games present unique environments that allow individuals to behave differently than they would in the real world. In many video games, players can perform actions and experience events that are impossible, illegal, or unlikely in the real world. In addition, players' behaviors in video games are generally free of real-world

consequences. Video games that allow the player to control an avatar (i.e., a virtual character representing the player in the game world) to interact with the game also allow individuals to potentially experiment with different identities (Ducheneaut, 2010; Turkle, 1995).

In spite of the differences between video game worlds and the real world, some evidence suggests that individuals' behavior in video games is similar to their real-world behavior (e.g., Eastwick & Gardner, 2009). For example, players of the virtual world *Second Life* report doing many of the same things as they do in the real world (Bayraktar & Amca, 2012). Second Life is an online virtual world in which a variety of activities is available, and Bayraktar and Amca (2012) found that correlations between real-world and in-game behavior were generally positive, ranging from .18 for shopping to .48 for entertaining. One exception was found, however: meeting new people was not significantly related between real-world and game contexts, which may simply reflect the fact that it is easy to encounter new people in virtual worlds and other video games that take place online (Bayraktar & Amca, 2012).

However, because Second Life is an online virtual world, which involves less emphasis on "gaming" than most true video games, it is not clear how this finding might apply to other video games. Further, unlike Second Life, many video games do not allow such direct comparisons between in-game and real-world activities, primarily because many in-game activities have no direct real-world equivalent. An examination of the correlations between personality traits and behaviors in video games is therefore needed, to help determine whether players behave in video games much as they do in real life, or quite differently, as compared to other players.

Personality and Behavior in an Online Video Game

Several studies have examined the connections between personality and behavior in a popular video game, the Massively Multiplayer Online Role-playing Game (MMORPG) *World of Warcraft*. World of Warcraft allows players to create an avatar and use this avatar to perform many different activities in a fantasy-type world (What is World of Warcraft?, n.d.). Because the game is played entirely online, players can interact with other players in a variety of ways. For example, players can cooperate with each other to defeat difficult game-generated opponents in *raids*, or attack and kill each others' avatars in player-versus-player activities like *battlegrounds*. World of Warcraft reported a subscriber-base of over 7 million players in 2014, just prior to its 10th anniversary (Makuch, 2014) and allows a diversity of behaviors that has made it ideal for studies of in-game behavior.

Previous research has shown that personality is related to behavior in World of Warcraft, and that many of the correlations are consistent with real-world personality-behavior relationships (e.g., Worth & Book, 2014). For example, player-versus-player behaviors (activities that involve attacking and killing other players' avatars) have been found to be negatively correlated with Honesty-Humility, Agreeableness, and Conscientiousness, and positively correlated with psychopathic traits (Worth & Book, 2014; Yee, Ducheneaut, Nelson, & Likarish, 2011). In addition, behaviors that require persistence and diligence, like collecting pets and working on in-game professions, are positively correlated with Conscientiousness. Behaviors involving exploration and immersion within the game-world were positively correlated with Openness to Experience. Finally, positive social interactions, specifically helping other players and

using friendly interactive emotes like /hug and /wave, were associated with high levels of both Agreeableness and Openness to Experience (Worth & Book, 2014; Yee, Ducheneaut, et al., 2011).

The results of the studies by Worth and Book (2014) and Yee, Ducheneaut, et al. (2011) provide some support for research on personality and motivations for playing World of Warcraft. For example, social motivations for playing World of Warcraft were related to Agreeableness and Extraversion, and immersive motivations were related to Openness to Experience (Graham & Gosling, 2013). Thus, in-game behaviors and motivations for play are related to personality traits in predictable ways.

However, another study did not find support for these results. McCreery, Krach, Schrader, and Boone (2012) examined the connections between (player and avatar) personality traits and pre-defined sets of behaviors in World of Warcraft, and found no significant correlations between player personality and behavior. However, it is possible that this study underestimates the true correlations between personality and behavior, due either to issues with the behavioral sets used (i.e., the behavioral sets created for the study may not have been properly reliable or representative of the personality traits they were designed to reflect), or to a relatively small sample size. Nevertheless, it points to the need for further research on personality-behavior connections in video games.

Personality and Behavior in Other Video Games

The need for further research is also indicated by the fact that World of Warcraft and other MMORPGs are not representative of video games more generally. Many video games are not played online and do not offer the range of choices offered in World of

Warcraft. It is therefore not clear if the results of the previous studies of behavior in World of Warcraft will generalize to other video games.

Previous research examining the connections between personality and behavior in video games other than World of Warcraft has been rather limited. In a study of behavior in Second Life, Yee, Harris, Jabon, and Bailenson (2011) found that personality traits were correlated with certain exploration behaviors. For example, Conscientiousness was related to walking more often and visiting more zones (Yee, Harris, et al., 2011). However, it is not clear how these particular correlations should be interpreted in terms of correspondence with real-world personality-behavior correlations, or whether these results are likely to be replicated in other video games.

However, some research has suggested that personality and behavior in video games might be related in predictable ways. A study focusing on two violent action video games found that individuals with more aggressive personalities engaged in more aggressive acts in the video games than individuals with less aggressive personalities (Peng, Liu, & Mou, 2008). Similarly, those who are low in Agreeableness play violent video games more often (Chory & Goodboy, 2011), and certainly violent video games permit more aggressive behaviors than less violent video games.

Two studies of the connections between personality and motivations for playing online video games also suggest that personality-behavior correlations may be found in games other than World of Warcraft (Jeng & Teng, 2008; Park, Song, & Teng, 2011). For example, Openness to Experience was positively correlated with discovery motivations (Jeng & Teng, 2008), and Agreeableness was positively related to

relationship motivations (Park et al., 2011). Thus, personality may influence what people prefer to do in video games other than World of Warcraft.

The Current Study

The current study extends upon the previous research discussed in in the introduction by examining the connections between personality and in-game behavior in video games more generally. For the purposes of the current study, we developed a self-report scale of behaviors that are relevant to many different video games. We therefore proposed the following research question:

RQ1: What is the component-structure of the General Video Game Behavior Questionnaire?

Previous research examining the connections between personality and behavior in video games has primarily involved the Big Five or Five Factor Model of personality (e.g., McCreery et al., 2012; Yee, Ducheneaut, et al., 2011). However, the HEXACO model of personality has demonstrated excellent utility for explaining the different behaviors of individuals in World of Warcraft (Worth & Book, 2014). The HEXACO model of personality was developed from lexical studies of personality-descriptive terms, which have shown that six factors, rather than five, are needed to best describe the variation in personality (Ashton & Lee, 2007). These six factors are similar across many different languages (Ashton et al., 2004; Lee & Ashton, 2008), and are named Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience (hence the acronym HEXACO).

Although the HEXACO model of personality is similar in some ways to the Five Factor model of personality, particularly with regards to the Extraversion,

Conscientiousness, and Openness to Experience factors, there are also some important differences (Ashton & Lee, 2007). The HEXACO Emotionality factor describes differences between those who are tough and insensitive (at the low end) and those who are anxious and sentimental (at the high end), and the Agreeableness factor describes differences between those who are angry and inflexible (at the low end) and patient and tolerant (at the high end). The Honesty-Humility factor describes the differences between those who are manipulative and greedy (at the low end) and sincere and fair (at the high end), and individual differences related to Honesty-Humility are not well-represented in the Five Factor Model (e.g., Ashton, Lee, & de Vries, 2014).

It was not practical to develop specific hypotheses for the current study regarding the connections between HEXACO personality traits and behaviors, both because the component-structure of the General Video Game Behavior Questionnaire was not known and because previous studies of the connections between personality and in-game behavior have found conflicting results (e.g., McCreery et al., 2012; Worth & Book, 2014). Accordingly, we proposed instead the following research question:

RQ2: What are the correlations between HEXACO personality traits and dimensions of in-game behavior in video games generally?

In addition to the HEXACO model of personality, the current study included a measure of psychopathic traits. Individuals with high levels of psychopathic traits are callous, manipulative, and impulsive, and they tend to engage in antisocial and criminal behaviors (Hare, 2003; Hare & Neumann, 2008). It is particularly important, therefore, to understand how individuals with high levels of these traits behave in video games, as

their behavior may be particularly aggressive and potentially detrimental to other players. We therefore investigated the following research question:

RQ3: What are the correlations between psychopathic traits and dimensions of in-game behavior in video games generally?

Because most previous research has focused on online video games like World of Warcraft, the current study also included a variable measuring frequency of playing video games online. Online video games offer the additional element of player-to-player contact, and it has been suggested that they may, therefore, appeal more to certain individuals than to others (Axelsson & Regan, 2006). Online video games may involve or elicit different behaviors than stand-alone (offline) video games. For example, player-versus-player behaviors are only possible in online video games, and this kind of behavior may be particularly appealing to certain individuals (e.g., Worth & Book, 2014). Therefore, we proposed a fourth research question:

RQ4: What are the correlations between frequency of playing video games online, video game behaviors, and personality traits?

Methods

Participants

The participants for the current study were 220 university students, of whom one participant was excluded because she had no score on the General Video Game Behavior Questionnaire. Of the 219 participants included in the analyses, 154 (70.3%) were female. Participants ranged in age from 18 to 32, with a mean age of 20.06 (*SD* = 2.45; five participants did not report their age). The majority of participants (142; 66.36%) were under the age of 21. The sample was mainly white (169; 77.17%), with 15 (6.85%)

reporting South Asian ethnicity, and the remainder (35; 15.98%) reporting other ethnicities.

Frequency of playing video games among participants in the current sample ranged from less than once a month to seven days a week. On average, participants played between once a month and once a week (*M* = 1.68, *SD* = 1.99; where 0 = "less than once a month", 1 = between once a month and once a week", and 2 = "about 2 days a week"), with 74 (33.79%) participants reporting that they played less than once a month. Average gaming sessions lasted about 1 to 2 hours (*M* = 1.63, *SD* = 1.04; *Mode* = 2; where 1 = "30 minutes to 1 hour" and 2 = "1 to 2 hours").

Measures

HEXACO-60 (Ashton & Lee, 2009).

The HEXACO-60 (Ashton & Lee, 2009) contains 10 items for each of the 6 HEXACO factors. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Internal consistency reliabilities are generally good; Lee and Ashton (n.d.) report the following values in a college student sample (*n* = 1126): Honesty-Humility, .76; Emotionality, .80; Extraversion, .80; Agreeableness, .77; Conscientiousness, .76; Openness to Experience, .78. The HEXACO-60 has demonstrated descriptive statistics similar to the longer versions of the scale (i.e., HEXACO-PI-R; Lee & Ashton, 2004, 2006), as well as high levels of self-observer agreement and appropriate correlations between the HEXACO factors and the factors of the Five Factor model (Ashton & Lee, 2009).

Self-Report Psychopathy Scale – III (SRP-III; Paulhus, Neumann, & Hare, in press).

The Self-Report Psychopathy Scale – III (Paulhus et al., in press) contains 16 items for each of four factors: Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Criminal Tendencies. The scale was designed to reflect the 4-factor structure of the Psychopathy Checklist – Revised (Hare, 2003; Williams, Paulhus, & Hare, 2007). Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Neal and Sellbom (2012) report internal consistency reliabilities as follows: total score, .92; Interpersonal Manipulation, .82; Callous Affect, .78; Erratic Lifestyle, .79; Criminal Tendencies, .75. The full scale and the four individual factors are appropriately correlated with other measures of psychopathy, indicating good convergent validity (Neal & Sellbom, 2012). This scale is also related to relevant external criteria, including criminal behaviors and various forms of aggression (Neal & Sellbom, 2012).

General Video Game Behavior Questionnaire.

This questionnaire was created for the purposes of the current study (please see Appendix B). The questionnaire includes 34 items that were written so as to reflect many of the various activities that are common in video games. Items were generated so as to reflect a wide range of possible activities in many different video games, and each item was intended to be sufficiently general so as to be relevant to many different video games. Items included in the questionnaire were partly influenced by the kinds of activities that Bartle (1996) suggested would be preferred by different "types" of players (*Explorers*, *Achievers*, *Killers*, and *Socializers*). Inclusion of items in the questionnaire was also partly influenced by previously identified motivations for play in online video

games (e.g., Yee, 2006b) and dimensions of behavior identified in a study of World of Warcraft (Worth & Book, 2014). Participants were asked to respond to the question "In the video games that you play, how often do you…" using a scale ranging from *Never* (coded 1) to *Almost all of the time* (coded 7). Participants were also given the option to answer N/A (Not Applicable) if the behavior was impossible to do in any of the games that they had played; this response was also coded 1.[3]

Additional Variables.

Frequency of online play was measured with the item: "How often do you play video games with or against other players online?" The response scale ranged from 1 (*Never*) to 7 (*Almost all of the time*). Participants were also asked to write-in the name of their favorite video game with the following item: "What is your favorite video game?"

Procedure

Participants were recruited through a posting on the Brock University psychology department participant recruitment site. In order to be eligible for the study, participants were required to have played at least one video game and to be at least 16 years of age. A link to the study webpage was provided in the study posting; individuals who were interested in participating could click the link to enter the study website, where they viewed a consent and information form that explained the purpose and nature of the study. Participants who chose to participate clicked on a link at the bottom of the consent form in order to indicate agreement to participate in the study and to start the study. Participants then completed a demographic information page, several items regarding

[3] Instructions at the top of the questionnaire stated: "If an action is impossible to do in any of the games you play, please select N/A (Not Applicable). If an action is possible, but you never do it, please select Never." As both the "Never" response and the "N/A" response indicate a frequency of 0, it was deemed appropriate to give the two responses the same value in the analyses.

their experience with video games (including frequency of playing video games in the past six months, length of typical video game playing session, favorite video game, and frequency of playing video games online), the General Video Game Behavior Questionnaire, the HEXACO-60 and the SRP-III. All participants completed the questionnaires in the same order.

Results

Principal Components Analysis of the Video Game Behavior Questionnaire

First, we conducted an initial principal components analysis of the General Video Game Behavior Questionnaire, extracting all components with eigenvalues greater than one. Next, a parallel analysis (with n = 219 and 34 variables) was performed in order to determine the appropriate number of components to extract. The first 4 eigenvalues from the actual data exceeded the 95th percentile eigenvalues from the parallel analysis, suggesting that 4 components should be retained.

Next, we conducted a principal components analysis with promax rotation, extracting four components. Items loading above .40 on a component were retained. Table 3-1 shows the proposed component names and item lists for each of the four components. The first component was named *Aggressing*, as top-loading items referred to activities involving aggressive actions. The second component was named *Winning*, as the items referred to efforts to succeed at the game or to beat an opponent. The third component was named *Creating*, as the top-loading items referred to activities involving building or creating things. The fourth component was named *Helping*, as the items referred to activities involving assisting others with aspects of the games.

Table 3-1
General Video Game Behavior Scale Component Names and Items

Component Name	Item No.	Item List
Aggressing	15.	Use a weapon (e.g., a gun, knife, sword, etc.)?
	28.	Damage, injure, kill, or destroy game characters (controlled by the game)?
	3.	Participate in a fight, battle, or war?
	10.	Damage, injure, kill, or destroy other players (controlled by other people)?
	6.	Destroy objects, buildings, cars, or other inanimate (non-living) things?
	32.	Talk to or communicate with other players in the game?
	7.	Work on acquiring new, better, or more items?
Winning	16.	Work on achieving a high score?
	24.	Try to win (the race/the match/the game/etc.)?
	20.	Try to beat an opponent's (player or game character) score or rank?
	1.	Try to improve your own previous score or record?
	29.	Work on improving your playing skills or technique?
	8.	Try to do better than an opponent (player or game character)?
	31.	Work on advancing to the next level/stage/part of the game?
	22.	Try different strategies for playing the game?
	21.	Work on finishing the game or completing all parts of the game?
	14.	Try to prevent an opponent (player or game character) from winning or completing a task)?
Creating	13.	Build objects, items, or structures?
	2.	Create or design something in the game?
	23.	Create a character to represent you in the game?
	30.	Explore?
	19.	Organize, sort, or categorize objects?
	5.	Select a game character to play as?
Helping	27.	Show or tell another (player or game character) how to do something in the game?
	11.	Give advice to another (player or game character) about the game?
	4.	Help another (player or game character) get better at the game?
	25.	Give items/loot/objects to another (player or game character)?
	18	Work with another (player or game character) on a task?

Note. Items are listed in order of highest to lowest loading within each component. Items 9, 12, 17, 26, 33, and 34 did not load above .40 on any component and were discarded.

Only one item had a secondary loading greater than .40. Item 32 – "Talk to or communicate with other players in the game" – loaded at .495 on Aggression and .454 on Helping. Two additional items had secondary loadings greater than .35. Item 7 – "Work on acquiring new, better, or more items" – loaded at .429 on Aggressing and .399 on Creating; item 14 – " Try to prevent an opponent (player or game character) from winning or completing a task" – loaded at .416 on Winning and at .384 on Aggressing. Six items did not load above .40 on any component and were discarded. These items were "Try to finish the game as quickly as possible" (item 34), "Try to make the game more difficult for an opponent (player or game character)" (item 17), "View the game action from the point of view of one character" (item 12), "Try something that is not usually done" (item 9), "Take on a leadership role" (item 33), and "Try a new character, strategy, direction, course, etc." (item 26).

Sample Characteristics and Data Management

The Winning behavior scale was significantly negatively skewed (z_{skew} = -4.74). To correct for moderate negative skew, we therefore reflected and applied a square-root transformation of the variable, as recommended by Tabachnick and Fidell (2007). The variable was then re-reflected in order to preserve the original orientation of the variable. Following transformation, the Winning scale was no longer significantly skewed (z_{skew} = -1.77).

Two outliers were observed on the Criminal Tendencies subscale of the SRP-III (z = 3.48 and z = 4.83, respectively) and the scale was significantly positively skewed (z_{skew} = 9.05). Tabachnick and Fidell (2007) advise reducing the scores of outliers to the next highest values on the scale (while maintaining their rank order) in order to reduce the

potential influence on the results. However, after modifying scores in this way, the two modified scores were still significant outliers and one additional score also became a significant outlier, for a new total of three outlying values. Therefore, the decision was made to retain the scores in their unmodified state. Many of the behaviors listed in the Criminal Tendencies scale are rare and would not be expected to be normally distributed in the general population; therefore, the scale was not transformed.

One outlier was observed on the Honesty-Humility scale (z = -3.36). As this outlier was not far removed from the rest of the data and the variable was normally distributed, no modifications were made.

All other scales were normally distributed and had no outliers. Means, standard deviations, and Cronbach's alpha reliabilities of the primary variables of interest are presented in Table 3-2. Reliabilities ranged from .72 for the Openness to Experience scale to .94 for the SRP-III total score.

Correlational Analyses

Table 3-3 shows the correlations between the four video game behavior scales, the personality scales, and frequency of playing online. The video game behavior scales were all moderately interrelated. The Aggressing and Helping scales were most strongly correlated, indicating that those who frequently fight and kill in video games also tend to help others within the games. Each behavior scale was significantly correlated with at least one HEXACO trait, although correlations were small. Only the Aggressing and Winning scales were significantly correlated with psychopathy (SRP-III) scales; the Aggressing scale in particular was significantly positively correlated with all four of the SRP-III factors and also with the total SRP-III score.

Table 3-2
Means, Standard Deviations, and Cronbach's Alpha Reliabilities for General Video Game Behavior Scales, Online Frequency, and Personality Scales

	M	*SD*	alpha
Aggressing	4.11	1.60	.91
Winning (sqrt)[a]	6.33	0.31	.87
Creating	3.86	1.15	.74
Helping	3.63	1.26	.83
Online Frequency[b]	2.92	2.08	—
Honesty-Humility	3.23	.63	.77
Emotionality	3.24	.66	.78
Extraversion	3.47	.56	.76
Agreeableness	3.09	.59	.78
Conscientiousness	3.48	.59	.78
Openness to Experience	3.31	.61	.72
IPM	2.54	.58	.84
CA	2.34	.54	.81
ELS	2.76	.60	.83
CT	1.55	.51	.83
SRP Total	2.30	.46	.94

Note: IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies, SRP Total: Self-Report Psychopathy Total Score.
[a] Scores on the Winning scale were reflected, transformed by square root to correct for negative skew, and re-reflected to preserve the original orientation of the variable.
[b] Online Frequency was measured with a single item.

Table 3-3
Zero-order Correlations and Partial Correlations (Controlling for Participant Sex) between Video Game Behavior Scales, HEXACO Personality Scales, and SRP-III Scales.

	Sex[a]	Aggress	Winning	Creating	Helping	Online Freq
Aggress	-.473***					
Winning	-.346***	.514*** (.424***)				
Creating	.016	.330*** (.383***)	.276*** (.300***)			
Helping	-.196**	.522*** (.497***)	.390*** (.350***)	.478*** (.490***)		
Online Freq	-.472***	.565*** (.440***)	.390*** (.274***)	.087 (.107)	.339*** (.285***)	
H	.109	-.169* (-.134*)	-.112 (-.079)	-.050 (-.052)	.045 (.068)	-.147* (-.109)
E	.478***	-.299*** (-.095)	-.189** (-.029)	.057 (.057)	-.097 (-.004)	-.349*** (-.160*)
X	.066	.008 (.044)	-.019 (.004)	-0.21 (-.022)	.047 (.061)	-.024 (.008)
A	-.167*	.067 (-.014)	.072 (.016)	-.003 (.000)	.190* (.163*)	.108 (.033)
C	.201**	-.172* (-.089)	-.017 (.057)	-.138* (-.144*)	-.079 (-.041)	-.174* (-.092)
O	-.098	.059 (.015)	-.022 (-.060)	.107 (.109)	.043 (.024)	.013 (-.038)
IPM	-.190**	.225** (.157*)	.131 (.071)	.133* (.139*)	.044 (.007)	.156* (.077)
CA	-.435***	.373*** (.212**)	.198** (.056)	-.025 (-.021)	.043 (-.048)	.390*** (.232**)

Table 3-3 (Continued)
Zero-order Correlations and Partial Correlations (Controlling for Participant Sex) between Video Game Behavior Scales, HEXACO Personality Scales, and SRP-III Scales

	Sex[a]	Aggress	Winning	Creating	Helping	Online Freq
ELS	-.261***	.278*** (.182**)	.243** (.169*)	.106 (.114)	.061 (.011)	.275*** (.178**)
CT	-.049	.176** (.174*)	.076 (.063)	.032 (.033)	.012 (.003)	.180** (.179**)
SRP	-.283***	.317*** (.217**)	.198* (.111)	.078 (.086)	.050 (-.006)	.300*** (.197**)

Note: Partial correlations controlling for participant sex are presented in parentheses below the zero-order correlations. Aggress: Aggressing; Online Freq: Frequency of online video game play; H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience, IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies, SRP: Self-Report Psychopathy Total Score.
[a] Participant Sex was coded as 1 = Male, 2 = Female.
* $p < .05$. ** $p < .01$. *** $p < .001$.

We observed that participant sex was significantly correlated with the Aggressing, Winning, and Helping scales, but not with the Creating scale. The correlations indicated that men were engaging in all of these behaviors more frequently than women. In order to determine how this difference might affect the correlations between personality and behavior, we ran a series of partial correlations, controlling for sex. For the HEXACO traits, three correlations reached significance after controlling for participant sex. Honesty-Humility was negatively correlated with Aggressing, $r = -.134$, $p = .048$, Conscientiousness was negatively correlated with Creating, $r = -.144$, $p = .033$, and Agreeableness was positively correlated with Helping, $r = .163$, $p = .016$.

For psychopathic traits, six of the nine correlations reached significance. After controlling for participant sex, Aggressing was positively correlated with total SRP scores (r = .217, p = .001), Interpersonal Manipulation (r = .157, p = .021), Callous Affect (r = .212, p = .002), Erratic Lifestyle (r = .182, p = .007), and Criminal Tendencies (r = .174, p = .010). In addition, the Winning scale was positively correlated with Erratic Lifestyle (r = .169, p = .013) after controlling for participant sex.

Playing online was negatively correlated with Emotionality, suggesting that those who play online most frequently are more insensitive and less anxious than those who play online less frequently. It was also negatively correlated with Honesty-Humility and Conscientiousness, but these correlations did not reach significance after controlling for participant sex. Those who played online more frequently also tended to have higher psychopathy (SRP-III) scores; the largest correlation was with the Callous Affect scale. Playing online was strongly positively correlated with the Aggressing scale, and was also positively correlated with Winning and Helping, but was not significantly correlated with Creating.

In order to better understand the behavior of those who are frequently playing online, we examined the favorite video games of those who played frequently and infrequently online. Fifty-two participants (32 men; 61.54%) rated their frequency of playing online as 5 (*Often*) or higher. Among these participants, the most frequently mentioned favorite video game was *Call of Duty* (any version; n = 13), a violent first-person shooter game that can be played in either single-player or multi-player modes. The next most frequently mentioned video games were *Diablo* (a violent role-playing game; n = 4) and *Halo* (a violent first-person shooter; n = 4) and *NHL 2K11* (a sports

game; *n* = 4). In comparison, 136 participants (22 men; 16.18%) listed their frequency of playing online as 3 (*Rarely*) or lower. The most frequently listed video game among this portion of the sample was *Mario Kart* (*n* = 20) followed by *Super Mario Brothers* (any version; *n* = 15). The former is a cartoon-style racing game and the latter is a cartoon-style platform game (in which players direct a character to run and jump from platform to platform while collecting items and avoiding enemies). Thus, there seems to be a general tendency for those who play online more frequently to enjoy violent video games as compared to those who play online less frequently.

Discussion

The current study examined the connections between personality traits and behaviors that take place in a variety of video games. The four dimensions of video game behavior were significantly related to both HEXACO personality traits and to psychopathic characteristics. Further analyses indicated that some of the relationships between personality and behavior were partly explained by sex differences. Nonetheless, several correlations remained after controlling for participant sex, indicating that personality is a factor in predicting behavior in video games.

Aggressing

The Aggressing scale contains seven items, five of which describe aggressive in-game behaviors, one that refers to acquiring items, and one that refers to talking to other players in video games. Given that communication is often prosocial, it is interesting that the item describing player-to-player communication loads positively on the scale with aggressive behaviors. This fact might be explained by the strong positive correlation between the Aggressing scale and online frequency. Many online video games allow

players to speak to other players, and many video games that involve frequent aggressive actions are also often played online. Perhaps unsurprisingly, the most frequently mentioned favorite video game among those who often played online was a violent game, Call of Duty. Several recent versions of this video game have multiplayer modes that allow players to play competitively or cooperatively with each other and to communicate with each other online (Watters, 2011).

The Aggressing scale was significantly positively correlated with all of the psychopathic traits, four of which remained significant after controlling for participant sex. The correlation between the Aggressing scale and Honesty-Humility also remained significant after controlling for participant sex, whereas the correlations with Emotionality and Conscientiousness no longer reached significance.

The negative correlation between Aggressing and Honesty-Humility and positive correlations between Aggressing and psychopathic traits suggest that those who engage in more aggressive behaviors in video games tend to display dishonest, manipulative, callous, and irresponsible tendencies in other contexts, as well. It is, perhaps, not surprising to find that individuals who tend to callously take advantage of others more frequently engage in aggressive actions in video games than those who are more honest and sympathetic. This finding provides support for previous research showing that low levels of Honesty-Humility are related to attacking and killing other players in World of Warcraft (Worth & Book, 2014) and also that those with more aggressive personalities commit more aggressive actions in violent video games (Peng et al., 2008).

However, it is important to note that the Aggressing scale was not significantly correlated with Agreeableness, which indicates that aggressive behavior in video games

is not necessarily associated with tendencies to be angry, inflexible, and impatient. Instead, it appears that these kinds of aggressive in-game behaviors are mainly associated with low levels of Honesty-Humility and higher levels of psychopathic traits.

Winning

The Winning scale contains items relating to winning and progressing through video games, perhaps the most obvious goals in many video games. Although the behaviors in this scale are clearly quite popular among many participants, resulting in a negatively skewed scale, there was still variability in responses. It might seem obvious that all players would try to win while playing a video game, but it is important to note that some video games allow players to focus on other goals or do not have a clear "win" condition (e.g., the virtual-life game *The Sims* and the creative building game *Minecraft*). Even within a particular video game, some players may be more focused on winning or progressing than others. For example, some players in World of Warcraft prefer to spend time exploring the virtual world of the game rather than progressing through game content (Worth & Book, 2014).

The Winning scale, like the Aggressing and Helping scales, was strongly influenced by participant sex. Men, more than women, reported engaging in behavior directed at winning in video games. Although the Winning scale was correlated (at the zero-order level) with Emotionality, Callous Affect, Erratic Lifestyle, and Self-Report Psychopathy total scores, the only correlation that reached significance after controlling for participant sex was with the Erratic Lifestyle factor of psychopathy. It appears that after taking participant sex into account, only psychopathic tendencies to be irresponsible, impulsive, and prone to boredom remain related to win-directed behavior.

Creating

The Creating scale included items describing activities like building, exploring, categorizing, and choosing a game character. Creating was the only behavior scale that was not significantly correlated with either online play frequency or participant sex. The fact that it was not correlated with online play frequency suggests that these activities are not necessarily incorporated into online video games. In addition, it suggests that men and women engage in these activities at approximately the same frequency, at least in this sample.

The Creating scale was negatively correlated with the Conscientiousness scale and positively correlated with the Interpersonal Manipulation factor. It is not immediately obvious why those who are diligent and organized would be less inclined to create and build in video games, or why those who are manipulative would create more often. Furthermore, although Openness to Experience was positively correlated with exploration and immersion behaviors in World of Warcraft (Worth & Book, 2014), there was no significant correlation between Openness to Experience and Creating in the current study. The absence of a significant relationship with Openness to Experience is rather counterintuitive, as creating and exploring appear to be behaviors well-suited to those who are more inquisitive and creative. Further research will be needed to determine whether these findings can be replicated.

Helping

The Helping scale contains five items describing cooperating with or assisting others in video games. Helping was modestly positively correlated with Agreeableness, and this correlation remained significant after controlling for participant sex. Those who

are kind and patient are, not surprisingly, more likely to help others in video games just as they are likely to do in the real world. This finding provides support for the previous studies of behavior in World of Warcraft, which also found that positive interactions and helping behaviors were related to Agreeableness (Worth & Book, 2014; Yee et al., 2011).

It is interesting to note, however, that the Helping scale was not correlated with any other HEXACO trait or with any of the psychopathic traits. One might expect that a tendency to help others in-game would be associated with higher levels of Extraversion or perhaps lower levels of Callous Affect, as was observed in the study of behavior in World of Warcraft (Worth & Book, 2014). It may be that these personality traits have less influence on the tendency to help in video games generally because some video games encourage helping others as part of a strategy for winning the game. Some video games, including some violent video games, have cooperative missions or modes that encourage players to work together to complete a task. Thus, if helping others is sometimes required by certain video games, player personality will likely play a smaller role in determining who helps and who does not.

Limitations and Conclusions

Although the current study provides some important clues as to the connections between personality and dimensions of behavior in video games generally, certain limitations are worth noting. First, partial correlations controlling for participant sex revealed that differences between men and women accounted for some of the relationships between personality and behavior. Participant sex was significantly correlated with online frequency and all behavior scales except Creating, indicating that men play online more frequently and engage in these in-game behaviors more frequently

than women. Male university students tend to play video games more often than female university students (e.g., Terlecki et al., 2011), and this had a significant (and unanticipated) impact on the relationships between personality and in-game behavior in the current study. Differences between men and women have also been found in behavior in Second Life (Guadagno, Muscanell, Okdie, Burk, & Ward, 2011). Thus, one potential limitation of the current study was the relatively small proportion of men in the sample. A study involving a larger sample, and including more men, might be useful for further explicating the links between personality and behavior in video games.

Second, the majority of the participants in the current study played video games relatively infrequently, and this presents an additional possible limitation to the current study. The modal response was “less than once a month” and the mean was between “between once a month and once a week” and “about twice week”. The low average frequency of playing video games suggests that very few participants could be considered serious gamers, and many were essentially non-players. When they do play video games, individuals who rarely play may be playing video games chosen by others (e.g., at a party), and while playing they may only be focused on whatever goal is most common or important. Thus, their behavior may be less likely to be influenced by personality traits than might be the case for individuals who play more often. Individuals who play video games a great deal would presumably have more time to select activities that are compatible with their interests, attitudes, and preferences. For example, average playing time for World of Warcraft is generally reported at over 20 hours per week (e.g., Billieux et al., 2013; Graham & Gosling, 2013), and behaviors in World of Warcraft were

generally more strongly related to personality traits than was the case in the current study (Worth & Book, 2014).

Third, the general video game behavior questionnaire used in the current study was intended as a very general measure of behaviors that are broadly applicable to a variety of video games. Further research examining behavior in video games might aim to improve the breadth of in-game behaviors covered by this scale.

Nonetheless, the current study provides some important information as to the connections between personality and dimensions of behavior in video games. Several of the observed correlations, particularly those found between Honesty-Humility and Aggressing and between Agreeableness and Helping, could be reasonably understood as compatible with personality trait definitions. It appears that, rather than prompting players to behave in ways that are truly contrary to their general tendencies, video games seem to provide players with an additional outlet to express certain personality traits. The current study, therefore, suggests that behavior in video games is not quite so different from real-world behavior. In consequence, many interesting avenues of research are possible regarding the correspondence between real and virtual behavior.

References

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91,* 340-345. doi: 10.1080/00223890902935878

Ashton, M.C., & Lee, K., & de Vries, R.E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality factors: A review of research and theory. *Personality and Social Psychology Review, 18,* 139-152. doi: 10.1177/1088868314523838

Ashton, M.C., Lee, K., Perugini, M., Szarota, P., de Vries, R.E., Di Blas, L., Boies, K., & De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology, 86,* 356-366. doi: 10.1037/0022-3514.86.2.356

Axelsson, A.-S., & Regan, T. (2006). Playing online. In P. Vorderer & B. Jennings (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 291-306). Mahwah, N.J.: Lawrence Erlbaum Associates.

Bartle, R (1996). *Hearts, Clubs, Diamonds, Spades: Players who suit MUDs*. Retrieved from http://www.mud.co.uk/richard/hcds.htm

Bayraktar, F., & Amca, H. (2012). Interrelations between virtual-world and real-world activities: Comparisons of genders, age groups, and pathological and nonpathological internet users. *Cyberpsychology, Behavior, and Social Networking, 15,* 263-269. doi: 10.1089/cyber.2011.0337

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29,* 103-109. doi: 10.1016/j.chb.2012.07.021

Chory, R.M., & Goodboy, A.K. (2011). Is basic personality related to violent and non-violent video game play and preferences. *Cyberpsychology, Behavior, and Social Networking, 14,* 191-198. doi: 10.1089/cyber.2010.0076

Ducheneaut, N. (2010). Massively multiplayer online games as living laboratories: Opportunities and pitfalls. In W.S. Bainbridge (Ed.), *Online Worlds: Convergence of the Real and the Virtual, Human-Computer Interaction Series* (pp.135-145). London: Springer-Verlag. doi: 10.1007/978-1-84882-825-4_11

Eastwick, P.W., & Gardner, W.L. (2009). Is it a game? Evidence for social influence in the virtual world. *Social Influence, 4,* 18-32. doi: 10.1080/15534510802254087

Entertainment Software Association (2014). *Essential facts about the computer and video game industry: 2014 Sales, demographic, and usage data.* [PDF]. Retrieved from: http://www.theesa.com/about-esa/industry-facts/

Graham, L.T., & Gosling, S.D. (2013). Personality profiles associated with different motivations for playing World of Warcraft. *Cyberpsychology, Behavior, and Social Networking, 16,* 189-193. doi: 10.1089/cyber.2012.0090

Griffiths, M.D., Davies, M.N.O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology and Behavior, 7,* 479-487. doi: 10.1089/1094931041774631

Guadagno, R.E., Muscanell, N.L., Okdie, B.M., Burk, N.M., & Ward, T.B. (2011). Even in virtual environments women shop and men build: A social role perspective on Second Life. *Computers in Human Behavior, 27,* 304-308. doi: 10.1016/j.chb.2010.08.008

Hare, R.D. (2003). *The Hare Psychopathy Checklist - Revised.* (2nd Ed.). Toronto, ON, Canada: Multi-Health Systems.

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

Jeng, S.-P., & Teng, C.-I. (2008). Personality and motivations for playing online games. *Social Behavior and Personality, 36,* 1053-1060. doi: 10.2224/sbp.2008.36.8.1053

Lee, K., & Ashton, M.C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39,* 329-358, doi: 10.1207/s15327906mbr3902_8

Lee, K., & Ashton, M.C. (2006). Further assessment of the HEXACO personality inventory: Two new facet scales and an observer report form. *Psychological Assessment, 18,* 182-191. doi: 10.1037/1040-3590.18.2.182

Lee, K., & Ashton, M.C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality, 76,* 1001-1053. doi: 10.1111/j.1467-6494.2008.00512.x

Lee, K., & Ashton, M.C. (n.d.) *Descriptive statistics and internal consistency reliabilities of the HEXACO-60 scales in a college student sample* [PDF]. Retrieved from http://hexaco.org/downloading.html.

Makuch, E. (2014, October 15). *World of Warcraft gains 600,000 subscribers since June: MMO now has 7.4 million subscribers; milestone achieved ahead of the November launch of the Warlords of Draenor expansion*. Retrieved from http://www.gamespot.com/articles/world-of-warcraft-gains-600-000-subscribers-since-/1100-6422961/

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

Neal, T.M.S., & Sellbom, M. (2012). Examining the factor structure of the Hare Self-Report Psychopathy scale. *Journal of Personality Assessment, 94,* 244-253. doi: 10.1080/00223891.2011.648294

Nielsen, S.E., Smith, J.H., Tosca, S.J. (2008). *Understanding video games: An essential introduction*. New York, NY: Routledge.

Park, J., Song, Y., & Teng, C-I. (2011). Exploring the links between personality traits and motivations to play online games. *Cyberpsychology, Behavior, and Social Networking, 14,* 747-751. doi: 10.1089/cyber.2010.0502

Paulhus, D.L., Neumann, C.S., & Hare, R.D. (in press). *Manual for the Hare Self-Report Psychopathy (SRP) scale*. Toronto, ON, Canada: Multi-Health Systems.

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology and Behavior, 11,* 157-161. doi: 10.1089/cpb.2007.0026

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* (5th Ed.). Boston, MA: Pearson Education.

Terlecki, M., Brown, J., Harner-Steciw, L., Irvin-Hannum, J., Marchetto-Ryan, N., Ruhl, L., & Wiggins, J. (2011). Sex differences and similarities in video game experience, preferences, and self-efficacy: Implications for the gaming industry. *Current Psychology, 30,* 22-33. doi: 10.1007/s12144-010-9095-5

Turkle, S. (1995). *Life on the screen: Identity in the age of the internet.* New York: Simon & Schuster.

Watters, C. (2011, Nov. 9*). Modern Warfare 3 sticks to its competitive, cooperative, and single-player guns and reminds you why the series is one of the best in the business.* Retrieved from http://www.gamespot.com/reviews/call-of-duty-modern-warfare-3-review/1900-6344654/

What is World of Warcraft? (n.d.) In *World of Warcraft: Beginner's Guide*. Retrieved from http://us.battle.net/wow/en/game/guide/

Williams, K.M., Paulhus, D.L., & Hare, R.D. (2007). Capturing the four-factor structure of psychopathy in college students via self-report. *Journal of Personality Assessment, 88,* 205-219. doi: 10.1080/00223890701268074

Williams, D., Yee, N., & Caplan, S.E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication, 13,* 993-1018. doi: 10.1111/j.1083-6101.2008.00428.x

Worth, N.C., & Book, A.S. (2014). Personality and behavior in a massively multiplayer online role-playing game. *Computers in Human Behavior, 38,* 322-330. doi: 10.1016/j.chb.2014.06.009

Yee, N. (2006a). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments, 15,* 309-329.0020

Yee, N. (2006b). Motivations for play in online games. *CyberPsychology and Behavior, 9,* 772-775. doi:10.1089/cpb.2006.9.772

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

Yee, N., Harris, H., Jabon, M., & Bailenson, J.N. (2011). The expression of personality in virtual worlds. *Social Psychological and Personality Science, 2,* 5-12. doi: 10.1177/1948550610379056

CHAPTER 4: Study 3

Note: This chapter is based on the following article:

Worth, N.C., & Book, A.S. (in preparation). *Me, myself, and avatar: Avatar personality in World of Warcraft.*

Introduction

Avatars

Many video games involve the use of customizable player-controlled game characters, or avatars. An avatar is a usually described as a virtual representation of the player, which the player controls within a video game. Video games that use player-customizable avatars include Massively Multiplayer Online Roleplaying Games (MMORPGs, e.g., *World of Warcraft*) and virtual worlds (e.g., *Second Life*). Although many video games allow players to create multiple avatars, most players generally have one avatar that they consider to be their "main" or most frequently played character (Ducheneaut, Wen, Yee, & Wadley, 2009).

Exploring the connections between players and avatars is an important task in video game research. It is not yet clear whether players create avatars that are quite similar to themselves or whether players tend to take the opportunity that video games provide to experiment with truly different alternate selves. In addition, many players spend a significant portion of their time in avatar-mediated action and interaction, suggesting that self-representation via avatars is no small part of many players' lives. On average, players of MMORPGs spend more than 20 hours per week in these games (Billieux et al., 2013; Griffiths, Davies, & Chappell, 2004; Williams, Yee, & Caplan,

2008; Yee, 2006a), and mean playing-time may be even higher for virtual worlds like Second Life (McLeod, Liu, & Axline, 2014).

In addition, self-representation via an avatar can influence how players think and act, a phenomenon that has been named the *Proteus effect* (Yee & Bailenson, 2007; Yee, Bailenson, & Ducheneaut, 2009). Studies have shown that characteristics of avatars can influence players' thoughts (Fox, Bailenson, & Tricase, 2013) and behaviors outside of the game (Hollingdale & Greitemeyer, 2013; Yoon & Vargas, 2014). It is important, therefore, to better understand those who play avatar-based games and the characteristics of these individuals' avatars. The aim of the current study was to examine the degree to which players and avatars share personality traits, and how avatar personality traits relate to in-game behavior, identification with and attachment to the avatar.

The current study focused on the popular MMORPG World of Warcraft, which is a fantasy-type game with multiple options for game-play and a vast open-world design. In World of Warcraft, players can customize their avatar's sex and physical appearance, as well as the avatar's race (e.g., troll or gnome), class (e.g., hunter or priest), and role (e.g., damage-dealer or healer). Previous research has suggested that there are no significant differences in mean levels of player personality traits between different avatar races, classes, or roles in World of Warcraft (Bean & Groth-Marnat, 2014). Although avatar personality traits are not among the customization options, players may view their avatars as having certain traits as a result of the avatars' behaviors within the game world.

Players and Avatars: Previous research

In order to understand player-avatar personality similarity, we must first understand the various ways that players may relate to their avatars. Depending on the

game, situation, or player, players may view their avatars in different ways. In some cases, avatars may be viewed simply as objects identifying the player or tools for playing the game (Chan & Vorderer, 2006; Zhong & Yao, 2013). In other cases, avatars may be viewed as acquaintances or friends, with the player experiencing liking for the avatar but little sense of similarity. A third possibility is that the player may experience the avatar as a kind of "alternate self" (Przybylski, Weinstein, Murayama, Lynch, & Ryan, 2012; Van Looy, Courtois, De Vocht, & De Marez, 2012). That is, players may create avatars intended to represent aspects of their actual or ideal-selves (Przybylski et al., 2012).

Because the avatar represents the player within the game and performs behaviors on the player's behalf, it can reasonably be proposed that (at least some) players experience a sense of merging with or perhaps "inhabiting" their avatars (Eastwick & Gardner, 2009). This perceived merging is generally called *identification*, and can be defined as the experience of (temporarily) feeling that the player "is" the avatar (Klimmt, Hefner, & Vorderer, 2009). While the player identifies with the avatar, the player feels that events in the game world are happening to him/her (Cohen, 2001).

Several recent studies have examined avatar identification in video games, but there has been little consensus as to the proper operationalization of the concept. For example, the measure of identification used by Li, Liau, & Khoo (2013) included 15 items measuring four factors which can be described as reflecting empathy for the avatar, absorption in the game, pride and other positive feelings regarding the avatar, and merging with the avatar. In contrast, Trepte & Reinecke (2010) used a short, two-item measure of identification that primarily addresses the degree to which the player merges with the avatar.

In an attempt to resolve some of the problems involved in the measurement of avatar identification, Van Looy et al. (2012) reviewed the available literature and concluded that avatar identification should be conceptualized as consisting of three components: similarity identification (feeling similar to the avatar), wishful identification (wanting to be more like the avatar, feeling that the avatar has enviable traits), and embodied presence (feeling as though one has merged with the avatar). Van Looy et al. (2012) found that identification was related to role-playing and customization of the avatar in World of Warcraft.

Some studies have examined aspects of identification described by Van Looy et al. (2012). Van Reijmersdal, Jansz, Peters, and Van Noort (2013) used a short measure of similarity identification developed with reference to Van Looy et al.'s (2012) definition, while Jin (2010) used a questionnaire labeled "avatar-self connection" which appears to measure a construct much like Van Looy's (2012) similarity identification. Zhong & Yao (2013) measured parts of both similarity and wishful identification, and Dolgov, Graves, Nearants, Schwakr, and Volkman (2014) used a shortened version of Van Looy's (2012) questionnaire, measuring all three components. Thus, although several studies have examined identification with avatars in video games, there continues to be only partial agreement between studies on the best way to measure the concept.

The concept of wishful identification shares a good deal in common with the idea that avatars can resemble aspects of the ideal-self. The ideal-self, or the version of the self that a person would like to be (as opposed to how she/he actually is), is particularly relevant to the study of avatars because of the qualities avatars can possess (Przybylski et al., 2012). In creating avatars, players are not confined to creating realistic replicas of

themselves, but can opt to increase or decrease relevant traits as they choose. Furthermore, avatars in many games are stronger and more skilled than the player, and can do things that the player (in the real world) cannot. Games that allow players to experience aspects of their ideal selves tend to be more intrinsically motivating (Przybylski et al., 2012). Therefore, the extent to which players engage in wishful identification with their avatars, or view their avatars as having characteristics of their ideal selves, is an important aspect of the connection between players and avatars.

Another concept that is closely related to identification is attachment, or feelings of liking and empathy for the avatar. Cohen (2001) proposed that affinity or liking for the avatar should be distinguished from identification, as liking involves feelings of closeness with a character but requires the individual to retain a feeling of separation from the character that is not maintained with identification (Cohen, 2001). However, in some studies, items reflecting attachment, liking, or feelings of friendship have been included in the same scale with items measuring identification (e.g., Bowman, Schultheiss, & Schumann, 2012: Lewis, Weber, & Bowman, 2008; McLeod et al., 2014). Therefore, further examination of the constructs is needed to determine the degree to which player-avatar attachment and the various elements of identification are related.

The extent to which players identify with their avatars may depend on several different factors, including individual differences, similarity of player and avatar, and features of the game. First, some individuals may be more likely to identify with their avatars than others; in a study focusing on an avatar-based video game geared towards girls, younger girls and girls who played the game more often identified more with their avatars than older girls and those who played less often (Van Reijmersdal et al., 2013).

Features of the video game itself may also encourage or discourage identification; for example, one study showed that players who are able to customize their own avatars identify more with their avatars than players who are simply given a generic avatar to play (Dolgov et al., 2014). In another study, identification was higher among individuals who created avatars that physically resembled their ideal-selves as compared to individuals who created avatars that resembled their actual selves (Jin, 2010). In addition, one study found that identification is positively related to game enjoyment (Trepte & Reineke, 2010), although this study did not resolve whether enjoyable games promote identification or whether identifying with an avatar makes a video game more enjoyable.

Identification is also related to the degree of personality similarity between player and avatar (Trepte & Reineke, 2010). In one study, participants were given descriptions of six different video games, asked to imagine creating avatars for each of the games, and then rate each avatar on five personality traits (Trepte & Reineke, 2010)). Absolute difference scores between players and avatars were computed across all five traits. Results showed that players who identified more strongly with their (hypothetical) avatars were those who created avatars with more similar personalities to their own (Trepte & Reineke, 2010). This finding suggests that personality similarity between players and avatars is either an important determinant of the degree to which players identify with their avatars or a consequence of identification.

Player-Avatar Similarity

Because avatars are, in a sense, alternate versions of the player, it is important to understand the degree of similarity between players and avatars. Previous studies have

found some similarities and some differences between players and avatars in terms of basic characteristics. For example, players usually create avatars of the same sex as themselves (Koles & Nagy, 2012; McLeod et al., 2014; Sung, Moon, Kang, & Lin, 2011), although some players (particularly men) do create avatars of the opposite sex (Ducheneaut et al., 2009; Yee, Ducheneaut, Yao, & Nelson, 2011). Some studies indicate that avatars are generally similar in age to their creators (e.g., Ducheneaut et al., 2009; Sung et al., 2011), but other studies suggest that avatar age is not easily defined (Koles & Nagy, 2012). In terms of physical appearance, avatars often look very different from their creators (Lin & Wang, 2014).

In terms of personality traits, there has been relatively little research examining the similarities and differences between players and their avatars. One study examined Big Five personality traits (i.e., Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience; see, e.g., John, Naumann, & Soto, 2008) in World of Warcraft avatars and found that World of Warcraft players tended to rate their avatars as being more similar to their ideal selves than their actual selves on Extraversion, Neuroticism, and Conscientiousness (Bessière, Seay, & Kiesler; 2007). For these traits, avatars' mean scores were somewhat higher than actual self scores and somewhat lower than ideal self scores. In contrast, avatars were rated as having lower Openness to Experience scores than both the players' actual and ideal selves. However, there was no difference between players and avatars on Agreeableness. Although the results of this study suggest that avatars are more like players' ideal selves than actual selves for certain personality traits, Bessière et al. (2007) do not report whether avatar mean scores were significantly different from actual self mean scores. Thus, the degree to which players

view their avatars as similar to or different from themselves is not entirely clear from this study.

Subsequently, a study by Ducheneaut et al. (2009) suggested that there may be significant personality differences between avatars and the actual selves of the players that create them. In a study of players of three online video games (World of Warcraft, *Second Life*, and *Maple Story*), Ducheneaut et al. (2009) found that players rated their avatars as being generally higher on Extraversion and Conscientiousness, and lower on Neuroticism and Openness to Experience than their actual selves. Like Bessière et al. (2007), Ducheneaut et al. (2009) found no significant difference between players and avatars on Agreeableness. In a similar study, Jónsson & Snorrason (2012) found that players of the MMORPG *Eve Online* rated their avatars as being higher on Extraversion and Conscientiousness, and lower on Honesty-Humility, Emotionality, Agreeableness, and Openness to Experience (i.e., players and avatars were compared on the HEXACO personality traits; Ashton & Lee, 2007).

In contrast, a study by Sung et al. (2011) showed that avatar personality is generally similar to player personality. In this study, participants were first asked to rate themselves on the Big Five traits. Later, participants were asked to imagine creating an avatar for one of four online contexts (i.e., online game, brand community, social network, or virtual class), and then rate their avatar's personality traits. In this study, each avatar personality trait was strongly positively correlated with the corresponding player personality trait. In the online gaming condition specifically, participants rated their avatars as having significantly higher scores on Openness to Experience, and lower scores on Neuroticism; no significant differences were observed on Extraversion,

Agreeableness, or Conscientiousness. Thus, this study suggests that individuals tend to create avatars with similar personality traits to themselves (Sung et al., 2011).

Although the study by Sung et al. (2011), in particular, provides some useful information regarding the similarity between players and avatars, further research is yet required. Sung et al. (2011), as well as Trepte and Reineke (2010), asked individuals to rate the personality traits of an imagined avatar, rather than an actual pre-existing avatar, which means that the results may or may not reflect the true extent of similarity between players and the avatars they use to play a video game. Although Bessière et al. (2007) and Ducheneaut et al. (2009) both asked players to rate existing avatars, the results of these two studies leave several questions unanswered regarding player-avatar personality similarity. Therefore, the current study examined player-avatar personality similarity in avatars that World of Warcraft players had previously created and used to play the game.

Personality and Behavior in Video games

The current study will also examine avatar personality in relation to in-game behavior. Previous research has shown that behavior in video games generally, and in World of Warcraft specifically, is related to player personality traits (Worth & Book, 2014; Worth & Book, 2015; Yee, Ducheneaut, Nelson, & Likarish, 2011). In general, the relationships between player personality and behavior tend to be within the scope of personality trait definitions. In World of Warcraft, behaviors that involve attacking and killing opposite-faction players are negatively related to Honesty-Humility and positively related to psychopathic traits (Worth & Book, 2014). In addition, activities that require cooperation and interaction between players are positively related to Extraversion, helping behaviors are positively related to Openness to Experience and Extraversion, and

exploration and role-playing behaviors are also positively related to Openness to Experience (Worth & Book, 2014).

Although it seems clear that player personality is a factor in determining in-game behavior, avatar personality may also play a role. In video games that use avatars, the avatar carries out the behaviors selected by the player. Therefore, the personality characteristics that the player views the avatar as possessing may be related to behavior within the game. For example, a player who views his/her avatar as outgoing and sociable might direct the avatar to interact with others and participate in group activities more often than might a player who views his/her avatar as being more introverted. Conversely, if a player directs her/his avatar to frequently interact with other avatars, the player may begin to view the avatar as more extraverted. In fact, McCreery, Krach, Schrader, and Boone (2012) found that avatar Agreeableness (but not player Agreeableness) was a unique predictor of agreeable behaviors within World of Warcraft. It was not entirely clear, however, why other avatar traits were not predictive of other kinds of behaviors in that same study. The current study, therefore, examined the correlations between avatar personality traits and in-game behaviors.

The Current Study

Previous research on player-avatar personality similarity and avatar identification has left several questions unanswered. In the current study, we have attempted to uncover answers to some of these questions.

First, the current study examined the degree of personality similarity between players and avatars in World of Warcraft. In order to measure personality in a comprehensive manner, we employed the HEXACO model of personality, which

includes the six broad personality traits that have been found in lexical studies of personality-related terms in several different languages (Ashton et al., 2004; Lee & Ashton, 2008). These traits are Honesty-Humility (i.e., sincere and fair versus manipulative and deceitful), Emotionality (i.e., sentimental and anxious versus brave and insensitive), Extraversion (i.e., lively and outgoing versus shy and withdrawn), Agreeableness (i.e., patient and tolerant versus angry and inflexible), Conscientiousness (i.e., organized and diligent versus irresponsible and reckless), and Openness to Experience (i.e., unconventional and creative versus conventional and unimaginative). Although this model shares some features in common with the Big Five model of personality, the differences between the two models are important (Ashton & Lee, 2007). Most previous studies examining player-avatar personality similarity have focused on Big Five personality traits (Bessière et al., 2007; Ducheneaut et al., 2009; Sung et al., 2011), and the results of these studies do not converge sufficiently to prompt specific hypotheses. Instead, we proposed the following research questions:

RQ1: How are player HEXACO personality traits related to avatar HEXACO personality traits?

RQ2: What are the mean differences between player and avatar HEXACO personality traits?

In addition to examining the relationship between player and avatar personality on the HEXACO traits, we investigated player-avatar personality similarity for psychopathic traits. Psychopathic traits include manipulativeness, callousness, irresponsibility, impulsivity, and antisocial tendencies (Hare, 2003; Hare & Neumann, 2008). These traits have particularly negative and serious consequences (e.g., Williams, Paulhus, & Hare,

2007), and are therefore important to study in addition to broad personality traits. We therefore proposed the following research questions:

RQ3: How are player psychopathic personality traits related to avatar psychopathic personality traits?

RQ4: What are the mean differences between player and avatar psychopathic personality traits?

Further, the current study examined how players' perceptions of identification with and attachment to their avatars were related to players' and avatars' personality traits as well as player-avatar personality similarity. As previously discussed, definitions and measures used for identification and attachment have been quite varied across studies. In order to measure these concepts, we developed the Avatar Connection Scale, which includes items relating to avatar similarity identification, wishful identification, embodied presence, and attachment or liking for the avatar.[4] Therefore, we proposed the following research question:

RQ5: What is the component structure of the Avatar Connection Scale?

We also examined how the components of the Avatar Connection Scale were related to player and avatar personality traits, and to the degree of similarity between player and avatar personality traits. Although player-avatar personality similarity was found to be positively related to identification (Trepte & Reineke, 2010), it is not clear whether this effect is likely to be replicated. Further, given that the structure of the Avatar Connection Scale was not known, it was not possible to develop specific

[4] Data collection for the current study was conducted in July and August, 2010. Therefore, we did not have access to research published subsequently by Van Looy et al. (2011) and others on avatar identification. Coincidentally, however, our Avatar Connection Scale included items reflecting each of the aspects that Van Looy et al. (2011) later described as important for measuring avatar identification.

hypotheses regarding the likely connections between personality traits and identification or attachment. Therefore, we proposed the following research questions:

RQ6: How are the components of the Avatar Connection Scale related to avatar personality traits and player personality traits?

RQ7: How are the components of the Avatar Connection Scale related to player-avatar personality similarity scores?

Finally, the current study examined the degree to which avatar personality is related to in-game behaviors. Previous research has shown that player personality is related to in-game behaviors in predictable ways (Worth & Book, 2014; Worth & Book, 2015; Yee et al., 2011), and that avatar personality may be relevant for predicting some kinds of in-game behavior as well (McCreery et al., 2012). Because avatars are the agents that actually perform the behaviors that take place in video games, it may be that there is a stronger connection between avatar personality and behavior than between player personality and behavior. However, it is the players' preferences and decisions that direct avatars' actions, and therefore it may be that players' personalities better predict in-game behavior as compared to avatars' personalities. Therefore, we proposed the following research questions:

RQ8: How are avatar HEXACO personality traits related to in-game behaviors?

RQ9: How are avatar psychopathic traits related to in-game behaviors?

Methods

Participants

The participants for the current study were 90 current or recent players of the MMORPG World of Warcraft. Participants ranged in age from 16 to 51 (M = 22.15, SD

= 8.03). Sixty-five (72%) of the participants were men. Participants in the current study were a self-selected subset of a larger sample involved in a study of player personality and in-game behavior in World of Warcraft; the data from this larger sample was reported in Worth and Book (2014).

Measures

HEXACO-60 (Ashton & Lee, 2009).

The HEXACO-60 (Ashton & Lee, 2009) contains 10 items for each of the 6 HEXACO factors. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). For the present study, the HEXACO-60 was administered both in the self-report and observer-report forms. The observer-report form of the HEXACO-60 was modified slightly to address the players' avatars rather than another real person. For the avatar-report version, the following directions were provided: "The following statements are about what your character would be like if he/she was a real person. Please try to imagine how your character would feel and act. Please read each statement and decide how much you agree or disagree with that statement about your character."

For the self-report (and observer-report) forms of the HEXACO-60, respectively, the following internal consistency reliabilities have been reported (n = 1126; Lee & Ashton, n.d.): Honesty-Humility, .76 (.80); Emotionality, .80 (.84); Extraversion, .80 (.83); Agreeableness, .77 (.84); Conscientiousness, .76 (.84); Openness to Experience, .78 (.81). The HEXACO-60 has demonstrated high levels of self-observer agreement (Ashton & Lee, 2009).

Self-Report Psychopathy Scale – III (SRP-III; Paulhus, Neumann, & Hare, in press).

The SRP-III contains 16 items for each of four factors: Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Criminal Tendencies. This scale was developed to reflect the structure of the Psychopathy Checklist – Revised (Hare, 2003; Williams et al., 2007), and it is intended for non-criminal populations. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Neal and Sellbom (2012) report the following internal consistency reliabilities for the scales: Interpersonal Manipulation, .82; Callous Affect, .78; Erratic Lifestyle, .79; Criminal Tendencies, .75; total score, .92. The total score and the four factors have demonstrated appropriately strong correlations with other measures of psychopathy and with relevant external measures, demonstrating good convergent and criterion-related validity (Neal & Sellbom, 2012).

For the present study, the SRP-III was administered in two forms; first in self-report form and second in an avatar-report form. For the avatar-report form, the following directions were provided: "The following statements are about what your character would be like if he/she was a real person. Please try to imagine how your character would feel and act. Please read each statement and decide how much you agree or disagree with that statement about your character." Scale items were modified to address the avatar (rather than the self) by changing "I" to "he/she".

Avatar Connection Scale.

The Avatar Connection Scale was developed for the purposes of the current study (please see Appendix C). It consists of 22 items that were developed to measure aspects

of identification with the avatar (i.e., similarity identification, wishful identification, and embodied presence), and attachment to the avatar. In order to reduce the possible effect of acquiescence on scores, some items were written to reflect identification with (or attachment to) the avatar (e.g., "My character is basically an extension of me"), and some were written to reflect lack of identification (or attachment; e.g., "My character would be a very different person than me"). Items were rated on a scale ranging from 1 (*Disagree Strongly*) through 7 (*Agree Strongly*).

In-Game Behavior Questionnaire.

The In-Game Behavior Questionnaire contains 38 items measuring behaviors that are common in World of Warcraft (please see Appendix A). Participants were asked to rate how often they engaged in each behavior on a scale ranging from 1 (*Never*) to 7 (*Almost all of the time*). In a previous study (Worth & Book, 2014), we reported on the characteristics of this scale involving the total sample of 219 participants; the 90 participants in the current study are a subset of this larger sample. The results of a principal components analysis in the full sample showed the scale has six components: Player-versus-Player, Social Player-versus-Environment, Working, Helping, Immersion, and Core Content (Worth & Book, 2014). In the full sample, these scales have been shown to have appropriate levels of internal consistency reliability, ranging from .62 for Core Content to .86 for Player-versus-Player (Worth & Book, 2014).

Procedure

Messages were posted to a forum frequented by World of Warcraft players, inviting current and recent players to participate in a study about World of Warcraft and directing players to a website hosting the study. On the study website, players viewed a

welcome message explaining the purpose of the study and the requirements to participate, followed by an informed consent form. Players who provided consent then completed demographic questions, items relating to World of Warcraft play (e.g., "How long have you been playing World of Warcraft?"), the In-Game Behavior Questionnaire, the HEXACO-60 (for player), the SRP-III (for player), items regarding general video game preferences, and items regarding the World of Warcraft character that the player had played most frequently in the past six months. Participants were then given the choice to continue the study or to quit and submit their responses up to that point. Players who continued with the second part of the survey then were asked to complete the Avatar Connection Scale, the HEXACO-60 for avatar, and the SRP-III for avatar.

A total of 219 participants submitted data on the first part of the survey; 90 participants also submitted data on the second part of the survey. The current study is based on the data provided by those who completed both the first and second parts of the survey.

Results

Descriptive Statistics

Although a total of 219 participants completed the questionnaires in the first part of the survey (see Worth & Book (2014), for a discussion of this data), a subset of just 90 participants chose to continue the survey and submitted responses on the second part. As the current study examines the connections between questionnaires presented in the first and second parts of the survey, the total *n* available was limited to those 90 participants. Furthermore, examination of the data provided by these 90 participants revealed that some of the participants responded to large portions of the Avatar Connection Scale,

Avatar HEXACO-60, and/or Avatar SRP-III with identical responses. As a result, these participants had very little or no variability in scores on these scales. Therefore, only participants who provided complete data with a minimum level of variability were retained for analyses. Sample sizes were therefore reduced to 86, 71, and 70 for the Avatar Connection Scale, Avatar HEXACO-60, and Avatar SRP-III scales, respectively.

For Player HEXACO-60 and Player SRP-III scales, we retained for analysis only those participants who provided complete data on the corresponding Avatar scales. For the in-game behavior scales, all participants who submitted data on the second half of the survey were retained for descriptive purposes (regardless of whether or not they were omitted from other analyses due to lack of variability), although the total *n* available for correlations between personality scales and behavior scales were necessarily reduced to the number of participants who provided data on the personality scales.

The Player Criminal Tendencies scale of the SRP-III had one outlying value (z = 3.85). The outlying score was therefore adjusted to a value just above the next highest occurring value, thus maintaining the participant's rank-order within the data set but reducing the impact of the outlier on the results (as recommended by Tabachnick & Fidell, 2007). Following this change, the score was no longer a significant outlier (z = 3.12). No other scales had significant outlying values.

Table 4-1 presents the means, standard deviations, and Cronbach's alpha reliabilities for all scales involved in the current study. All scales, except for the Player Criminal Tendencies subscale, were normally distributed. The Player Criminal Tendencies scale was significantly positively skewed (z_{skew} = 5.01), which is expected given the content of the scale, and therefore no transformation was made.

Table 4-1
Means, Standard Deviations, and Cronbach's Alpha Reliabilities for Player Personality, Identification, and Attachment, Avatar Personality, and In-Game Behavior

	M	*SD*	alpha
Player scales			
Honesty-Humility	3.36	.73	.82
Emotionality	2.83	.71	.83
Extraversion	2.99	.63	.78
Agreeableness	3.21	.60	.72
Conscientiousness	3.50	.61	.80
Openness to Experience	3.71	.57	.73
Interpersonal Manipulation	2.69	.67	.88
Callous Affect	2.61	.59	.83
Erratic Lifestyle	2.59	.63	.85
Criminal Tendencies	1.46	.47	.88
SRP Total	2.34	.46	.93
Identification	4.35	1.19	.87
Attachment	4.14	1.26	.87
Avatar scales			
Honesty-Humility	3.10	.87	.86
Emotionality	2.25	.62	.78
Extraversion	3.44	.62	.79
Agreeableness	2.92	.80	.86
Conscientiousness	3.39	.73	.85
Openness to Experience	3.40	.69	.81
Interpersonal Manipulation	3.07	.91	.95
Callous Affect	3.06	.85	.92
Erratic Lifestyle	3.16	.74	.88
Criminal Tendencies	2.50	.88	.91
SRP Total	2.94	.74	.97
In-Game Behavior Scales			
Player-versus-Player	3.06	1.16	.87
Social Player-versus-Environment	4.14	1.01	.73
Working	4.07	1.01	.75
Helping	4.31	.88	.64
Immersion	3.03	1.07	.77
Core Content	5.08	.98	.60

Sample characteristics

Participants in the current study were a self-selected subset of a larger sample, as discussed in the Methods section. In order to better understand the differences between participants in the current study (i.e., those who completed one or more of the questionnaires in the second part of the survey) and individuals who completed questionnaires in the first but not the second part of the survey, we compared these two groups on age, player HEXACO scores, and player SRP-III scores.

An independent samples t-test for age showed that participants who completed at least one questionnaire in the second part of the survey (M = 22.32, SD = 8.16) were significantly older than those who did not complete any portion of the second part (M = 19.49, SD = 4.29), t (119.26) = -2.91, p =.004 (equal variances not assumed). An independent samples t-test for SRP-III total scores showed that participants who completed the Avatar SRP-III (M = 2.34, SD = .46) had lower scores on the Player SRP-III than participants who did not complete the Avatar SRP-III (M = 2.53, SD = .43), t(194) = 2.86, p = .005.

A one-way between-subjects multivariate analysis of variance was conducted using SPSS GLM, comparing those who did and those who did not complete the Avatar HEXACO scale. The six player HEXACO traits served as dependent variables. Results of evaluations of assumptions were satisfactory. Results of the MANOVA showed that player HEXACO traits were significantly affected by group membership (group 1 – did not complete Avatar HEXACO versus group 2 – completed Avatar HEXACO), F(6, 191) = 2.41, p = .028, Wilks' λ = .93, partial η^2 = .07. Univariate tests showed that the mean scores for those who completed the Avatar HEXACO (group 2) were higher than those

for those who did not complete the Avatar HEXACO (group 1) on Honesty-Humility and Openness to Experience (see Table 4-2). The univariate test for Agreeableness approached significance, again with those who completed the Avatar HEXACO (group 2) having higher scores than those who did not (group 1).

Principal Components Analysis of the Avatar Connection Scale

In order to determine the structure of the Avatar Connection scale, we first conducted an exploratory principal components analysis extracting all components with eigenvalues greater than one. A parallel analysis (with n = 86 and 34 variables) was then conducted, and the resulting eigenvalues compared with those from the principal components analysis. Two eigenvalues from the principal components analysis were larger than those from the parallel analysis, suggesting that two components should be extracted from our data. Next, we conducted a principal components analysis with varimax rotation, extracting 2 components, which accounted for 49% of the variance. Items with loadings >.50 on each component were retained (see Table 4-3 for items included in each component). Two items did not have loadings >.50 on either component and were not included in the scales. These items were “My character is much like the worst side of me” and “My character is much like the best side of me”.

The first component was primarily defined by items describing attachment to and wishful identification with the avatar, with two items describing a lack of attachment to the avatar loading negatively on the component. For this component, we first reverse-coded the two items describing lack of connection to the avatar, and then computed the scale as the mean of the items loading >.50. We have named this scale Attachment, with higher scores on the items reflecting a higher level of attachment to the avatar.

Table 4-2
Univariate Results for MANOVA for Group (Group 1: Did Not Complete Avatar HEXACO (n = 126) vs. Group 2: Completed Avatar HEXACO (n = 72)) on Player HEXACO Traits

	Group 1		Group 2			
Variable	*M*	*SD*	*M*	*SD*	*F*	*p*
H	3.14	.70	3.36	.73	4.27	.040
E	2.87	.65	2.83	.71	0.18	.671
X	3.09	.66	2.99	.63	0.99	.321
A	3.03	.66	3.21	.60	3.72	.055
C	3.33	.63	3.50	.61	3.25	.073
O	3.49	.70	3.71	.57	5.22	.023

Note: Group 1: Did not complete the Avatar HEXACO; Group 2: Completed the Avatar HEXACO; H: Player Honesty-Humility, E: Player Emotionality, X: Player Extraversion, A: Player Agreeableness, C: Player Conscientiousness, O: Player Openness to Experience.

The second component was defined primarily by items describing the avatar as different from the player. Items that described player-avatar similarity identification and embodied presence loaded negatively on this component. For this component, we reverse-coded all of the items with positive loadings (i.e., items reflecting player-avatar difference) and retained as-is all items that loaded negatively on the component (i.e., items reflecting player-avatar similarity identification and embodied presence). The scale was computed as the mean of the items with loadings >.50, and labeled Identification, with higher scores indicating greater identification with the avatar.

Table 4-3
Avatar Connection Scale Component Names and Items

Component Name	Item List
Attachment	21. I care about what happens to my character.
	19. I feel sorry for my character when he/she dies.
	11. I feel some attachment to my character.
	13. I don't really have any feelings about my character. [R]
	4. I feel upset when something bad happens to my character.
	5. My character is better than me in a lot of ways.
	9. I only care about my character as a piece of the game. [R]
	7. My character has qualities that I don't have.
	14. My character has more good qualities than me.
Identification	17. My character would be a very different person than me. [R]
	15. My character is not much like me. [R]
	22. My character is quite different from me. [R]
	6. My character's behavior doesn't reflect how I would behave. [R]
	1. My character behaves much like I would.
	12. My character is a lot like me.
	20. My character is like me in many ways.
	16. My character is worse than me in a lot of ways. [R]
	2. My character is basically an extension of me.
	3. My character has more bad qualities than me. [R]
	8. My character is me.

Note: Items are listed in order from highest loading to lowest loading. Items marked [R] were reverse-coded prior to creating the scale.

Similarity between Player and Avatar

Table 4-4 shows the correlations between Player and Avatar HEXACO traits.[5] Each player HEXACO trait was significantly positively correlated with the corresponding avatar HEXACO trait, except for Extraversion, which showed no significant player-avatar correlation. Likewise, each player psychopathic trait was strongly positively correlated with the corresponding avatar psychopathic trait (see Table 4-5).[6]

In order to determine the degree to which mean avatar personality scores differed from mean player personality scores, we conducted two separate one-way repeated-measures multivariate analyses of variance using SPSS GLM. The first MANOVA compared player HEXACO scores with avatar HEXACO scores. Results of tests of assumptions were satisfactory. Results of the MANOVA showed that HEXACO traits were significantly affected by subject of the questionnaire (player versus avatar), $F(6, 65) = 16.42$, $p < .001$, Wilks' $\lambda = .40$, partial $\eta^2 = .60$. Univariate results indicated that mean scores for players versus avatars were significantly different on five of the six traits (see Table 4-6). Players' mean scores were higher than avatars' on Honesty-Humility, Emotionality, Agreeableness, and Openness to Experience. However, avatars' mean scores were higher than players' on Extraversion.

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[5] Due to the exploratory nature of the current study, we adopted an alpha of .05 throughout the current study. It should be noted, however, that the risk of Type 1 error is elevated given the number of analyses conducted. A Bonferroni correction could be used to provide a much more conservative alpha level. For example, a total of 106 correlations were conducted between player personality traits, avatar personality traits, attachment, and identification, resulting an adjusted alpha of .05/106 = .0005. Using this more conservative alpha level, all of the correlations between corresponding player and avatar personality traits remained significant, excepting Conscientiousness. Among the correlations between personality traits and attachment and identification, only those marked as $p < .001$ still remained significant.

[6] Although not directly relevant to the primary research questions, correlations between player and avatar personality traits, controlling for participant sex, were also examined. Controlling for participant sex, all correlations remained similar in size and identical in direction. The largest difference appears to be for Emotionality, which fell to $r = .29$, $p = .016$.

Table 4-4

Correlations between Player HEXACO and Avatar HEXACO Scales, Identification, and Attachment (n = 71)

	Avatar							
Player	H	E	X	A	C	O	Ident[a]	Attach[a]
H	**.537*****	-.043	-.118	.183	.038	.108	.192	-.044
E	.109	**.415*****	-.016	-.083	.092	-.051	-.029	.113
X	-.151	-.072	**.184**	-.097	-.045	.093	-.023	-.182
A	.183	.030	.098	**.487*****	.001	.234†	.091	-.044
C	.252*	.056	-.164	-.152	**.378****	.007	-.009	.005
O	.089	-.151	.028	-.007	.214	**.578*****	.352**	.304*
Ident	.395**	.105	.313**	.522***	.466***	.618***	--	.132
Attach	-.008	-.253*	.249*	.057	.215	.261*	.132	--

Note: H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience, Ident: Identification, Attach: Attachment. Corresponding Player-Avatar correlations are highlighted in bold.

[a] n = 86

† p = .05 * p < .05. ** p < .01. *** p < .001.

Table 4-5

Correlations between Player SRP-III and Avatar SRP-III Scales, Identification, and Attachment (n = 70)

	Avatar						
Player	IPM	CA	ELS	CT	SRP	Ident[a]	Attach[a]
IPM	**.686*****	.463***	.384**	.486***	.581***	-.180	.198
CA	.258*	**.455*****	.177	.155	.299*	-.107	.097
ELS	.549***	.340**	**.613*****	.525***	.572***	.010	.194
CT	.377**	.271*	.271*	**.495*****	.407***	.006	.142
SRP	.618***	.512***	.481***	.548***	**.617*****	-.065	.217*
Ident	-.379**	-.481***	-.285*	-.355**	-.429***	--	.132
Attach	.161	.023	.110	.240*	.154	.132	--

Note: IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies, SRP: Self-Report Psychopathy Total Score, Ident: Identification, Attach: Attachment. Corresponding Player-Avatar correlations are highlighted in bold.

[a] n = 86

* p < .05. ** p < .01. *** p < .001.

Table 4-6
Univariate results for MANOVAs Comparing Player and Avatar HEXACO and SRP-III Scores

	Player		Avatar				
Variable	*M*	*SD*	*M*	*SD*	*F*	*p*	*Partial* η^2
H	3.36	.73	3.10	.87	7.61	.007	.098
E	2.83	.71	2.25	.62	45.57	.000	.394
X	2.99	.63	3.44	.62	22.72	.000	.245
A	3.21	.60	2.92	.80	11.01	.001	.136
C	3.50	.61	3.39	.73	1.31	.256	.018
O	3.71	.57	3.40	.69	19.78	.000	.220
IPM	2.70	.66	3.09	.89	24.06	.000	.261
CA	2.60	.59	3.04	.84	21.85	.000	.243
ELS	2.60	.63	3.15	.74	60.38	.000	.470
CT	1.47	.47	2.50	.89	123.09	.000	.644

Note: H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience, IPM: Interpersonal Manipulation, CA: Callous Affect, ELS: Erratic Lifestyle, CT: Criminal Tendencies.

The second MANOVA compared player SRP-III factor scores with avatar SRP-III factor scores. Results of tests of assumptions showed two issues: the player Criminal Tendencies scale was positively skewed and one participant was a significant multivariate outlier on the avatar Criminal Tendencies scale. The multivariate outlier on the avatar Criminal Tendencies scale was deleted from the sample for the purpose of this analysis. Transformation of the player Criminal Tendencies scale did not appreciably improve the distribution, therefore the scale was retained as-is. No other problems with assumptions for MANOVA were observed.

Results of the MANOVA showed that SRP-III factor scores were significantly affected by subject of the questionnaire (player versus avatar), $F(4, 65) = 37.79$, $p < .001$, Wilks' $\lambda = .30$, partial $\eta^2 = .70$. Univariate results showed that avatars' mean scores were higher than players' on all four factors (see Table 4-6).

Identification and Attachment

Identification and Attachment were not significantly correlated with each other, but both showed significant correlations with player and avatar personality (see Tables 4-4 and 4-5). Both Identification and Attachment were more strongly correlated with avatar personality traits than with player personality traits. Among the player HEXACO traits, only Openness to Experience was significantly correlated with Identification and Attachment, indicating that those with higher levels of Openness to Experience both identified more with and were more attached to their avatars. In contrast, higher Identification scores were associated with higher scores on all avatar HEXACO traits except Emotionality, indicating that players who identified more with their avatars rated their avatars as having higher levels of Honesty-Humility, Agreeableness, Extraversion,

Conscientiousness, and Openness to Experience. Higher attachment scores were associated with higher avatar Extraversion and Openness to Experience, but lower Emotionality.

Only one significant correlation was observed for player SRP-III scores: player SRP-III total scores were positively correlated with Attachment. Identification was negatively correlated with all avatar SRP-III factors, indicating that those who identify more with their avatars rated their avatars as having lower SRP-III scores. Attachment was related to just one avatar psychopathy scale; those who were more attached to their avatars rated their avatars as having higher levels of Criminal Tendencies.

In order to explore the connections between identification, attachment, and player-avatar personality similarity (*RQ7*)[7], we calculated absolute difference scores for each participant on each trait (e.g., |player Agreeableness – avatar Agreeableness|), and summed the absolute values to create a total absolute difference score for each participant. Total absolute difference scores for the HEXACO (M = 3.63, SD = 2.15) were significantly correlated with Identification, r = -.413, p < .001, but were not significantly correlated with Attachment, r = .216, p = .070. The same procedure was used to explore *RQ7* with regard to psychopathic traits, except that because the total score was already available, we simply calculated the absolute difference between player SRP-III total scores and avatar SRP-III total scores for each player. Absolute difference scores for SRP-III total scores (M = 0.66, SD = 0.52) were significantly negatively correlated

[7] As an alternative way to explore *RQ7*, we calculated an absolute distance score between player HEXACO personality and avatar personality (where absolute distance = the square root of the sum of squared differences between player and avatar on each HEXACO trait). Absolute distance on HEXACO traits (M = 1.76, SD = .94) was negatively correlated with avatar Identification, r = -.395, p = .001, and the correlation with avatar Attachment approached, but did not reach, significance, r = .228, p = .056. Therefore, both the distance scores and difference scores present essentially the same information in this case.

with Identification, $r = -.491$, $p < .001$, but were not correlated with Attachment, $r = .001$, $p = .992$. Therefore, smaller absolute distance scores (i.e., greater similarity between player and avatar) were associated with higher scores on identification only.

Avatar Personality and In-Game Behavior

Four significant correlations were observed between avatar HEXACO traits and in-game behaviors. Avatar Honesty-Humility was negatively correlated with the Player-versus-Player scale ($r = -.328$, $p = .006$) and positively with Core Content ($r = .254$, $p = .032$). Avatar Conscientiousness was positively correlated with the Working scale ($r = .263$, $p = .026$) and avatar Openness to Experience was positively correlated with Helping ($r = .286$, $p = .016$). Three significant correlations were observed between avatar psychopathic traits and in-game behaviors. The Player-versus-Player scale was positively correlated with avatar Callous Affect ($r = .247$, $p = .040$), avatar Criminal Tendencies ($r = .276$, $p = .022$), and avatar SRP total scores ($r = .273$, $p = .023$).

Discussion

Player and Avatar Personality

The results of the current study show that World of Warcraft players generally view their avatars as being similar to themselves in terms of HEXACO personality traits and psychopathic traits. Large and positive player-avatar correlations were observed for psychopathic traits, with all values exceeding .45. Likewise, five of the six HEXACO traits also showed significant positive player-avatar correlations, with values greater than .37. These results provide some support for the findings of Sung et al. (2011).

Although players and avatars showed significant personality similarity for most traits, significant mean differences were also observed between players and avatars on all

but one of the personality traits investigated in the current study. Players' mean scores were higher than avatars' mean scores for Honesty-Humility, Emotionality, Agreeableness, and Openness to Experience, indicating that players generally viewed themselves as being more honest, sensitive, agreeable, and open than their avatars. Similarly, players had lower mean scores on all of the psychopathic traits, showing that players viewed their avatars as being more manipulative, callous, irresponsible, and prone to anti-social behavior. Conscientiousness was the only trait for which there was no significant difference between players and avatars. These differences are similar to those reported by Jónsson & Snorrason (2012) in their sample of players of Eve Online.

Thus, avatars are generally similar to their players in terms of rank order within the sample (as demonstrated by the positive correlations), but the mean differences also indicate a tendency to rate the avatar as higher on psychopathic traits and lower on most HEXACO traits. This means that, for example, players who are lower in Agreeableness have avatars that are lower in Agreeableness and players with higher levels of that trait also have avatars with higher levels, but on average both low- and high-scoring players rated their avatars as being somewhat lower than themselves on that trait.

These player-avatar mean differences may exist because of the nature of the game of World of Warcraft. The challenges that avatars overcome and the means they use to do so may influence how players views their avatars' personalities. In World of Warcraft, avatars are powerful beings, encountering and defeating progressively more difficult challenges and destroying enemies while suffering no permanent damage. Given that avatars face these dangerous challenges without apparent fear, it is perhaps not surprising that players should view their avatars as being brave and tough (i.e., low in

Emotionality). Similarly, avatars ruthlessly kill a variety of fierce enemies, often attacking without provocation, making it plausible that they would be viewed as low in Agreeableness and high in psychopathic traits. Overall, it appears that players view their avatars as possessing trait levels that are somewhat more suited for the game environment than players' own levels might be.

Extraversion presented a notable exception to the general trends observed for the other HEXACO traits. The player-avatar correlation for Extraversion was not significant, and avatar mean scores were higher than player mean scores (in contrast with the other HEXACO traits). Jónsson & Snorrason (2012), Ducheneaut et al. (2009) and Bessière et al. (2007) likewise observed higher mean Extraversion scores for avatars as compared to players. These results suggest that the expression of Extraversion in World of Warcraft and other MMORPGs is different from the expression of other traits. For Extraversion, low- and high-scoring players alike view their avatars as being more gregarious and outgoing than themselves, and (approximate) rank order within the data set is not maintained as it is for the other HEXACO traits in the current study.

It is possible that the tendency to view avatars as more extraverted than players is a reflection of the online, multiplayer aspect of World of Warcraft (and other MMORPGs). Players communicate and interact with other players through their avatars, and many aspects of the game require or promote player interaction (e.g., raids). Social interaction is an important motivation both for creating avatars (in Second Life; Lin & Wang, 2014) and for playing World of Warcraft (Yee, 2006b). In contrast with many real-world situations, it is both easy and relatively risk-free to chat with other players in the game. Players may, therefore, view their avatars as being more extraverted than

themselves because their avatars interact with others more often and more easily than the players themselves can do in the real world.

Identification and Attachment

In contrast with some previous studies, which have included items relating to identification and attachment in the same subscale (e.g., Bowman et al., 2012: Lewis et al., 2008; McLeod et al., 2014), the current study found that items reflecting identification and items reflecting attachment to the avatar loaded on separate components. Specifically, the first component of the Avatar Connection Scale included items relating to attachment and to wishful identification (i.e., feeling that the avatar possesses enviable qualities), and the second included items relating to similarity identification and embodied presence (as described by Van Looy et al., 2012). The identification and attachment scales were not significantly correlated, and had differing correlations with avatar personality traits, which suggests that these constructs might best be measured separately.

Mean scores for identification and attachment were between 4 and 5 on a 7-point scale, indicating that, on average, players did not feel very strong attachment or identification with their avatars. Players of other games also do not identify very strongly with their avatars (e.g., Van Reijmersdal et al., 2013), so this finding is not unique to this sample. On the other hand, it is possible that this finding is due in part to the nature of World of Warcraft. World of Warcraft encourages players to focus on game content and the ways that the avatar can overcome game challenges, rather than relating to the avatar itself. It may be that in a virtual world like Second life, where there is more interest in

avatar customization (e.g., Ducheneaut et al., 2009) and little emphasis on achieving "game" objectives, players may identify more with or feel more attached to their avatars.

Players who were higher in Openness to Experience identified more with and were more attached to their avatars. Identifying with an avatar in World of Warcraft means that the player feels a sense of merging and similarity with a virtual animated character possessing magical abilities and often appearing distinctly non-human. When viewed in this light, it is perhaps not surprising that players who are more unconventional and open to new ideas are more likely to report identifying with their avatars. Players who are more conventional (i.e., low in Openness to Experience) may be less interested in considering the qualities of their avatars, except as the avatar allows them to progress through standard game content. However, this finding is in contrast with the results reported by McLeod et al. (2014), who found no effect of player Intellect (i.e., Openness to Experience) on identification, and further research will be needed to determine whether the effect observed in the current study is indeed replicable.

Identification and Attachment were related to several avatar personality traits. Identification was positively related to all the avatar HEXACO traits except avatar Emotionality, indicating that players experienced a greater degree of merging and similarity with avatars that they perceived as being honest, extraverted, agreeable, conscientious, and open. In contrast, Attachment was negatively related to avatar Emotionality and positively related to avatar Extraversion and Openness to Experience. Thus, players generally felt more attached to avatars they viewed as being brave, outgoing, and unconventional. Higher levels of Extraversion and Openness to Experience, and low levels of Emotionality may be viewed as particularly valuable

characteristics for avatars in World of Warcraft, as indicated by the fact that these traits were associated with items reflecting wishful identification.

With regard to player-avatar personality difference/distance scores, different correlations were observed with Identification and Attachment. Smaller total absolute difference scores (i.e., greater similarity between player and avatar) for both the HEXACO and SRP-III were related to higher identification, which supports the findings of Trepte and Reineke (2010). Given the content of the Identification scale, this correlation makes some intuitive sense. High identification scores indicate feelings of similarity to the avatar, and this is reflected in the higher degree of actual personality similarity between player and avatar. However, difference scores for HEXACO and SRP-III were not significantly related to Attachment.

Avatar Personality and In-Game Behavior

Some avatar personality traits were modestly correlated with certain in-game behaviors. These correlations are in keeping with the correlations between player personality and behavior observed by Worth and Book (2014). For both player personality (Worth & Book, 2014) and avatar personality (in the current study), Honesty-Humility was negatively correlated with the Player-versus-Player scale, Conscientiousness was positively correlated with the Working scale, and Openness to Experience was positively related to the Helping scale. Many of the correlations between player personality and behavior were not observed in the current study, however, suggesting that player personality is a better predictor of a range of different in-game behaviors than avatar personality.

Limitations and Conclusions

The current study has certain limitations worth noting. First, the current study used two relatively new scales, the Avatar Connection Questionnaire and the In-Game Behavior Questionnaire. As these are both newly-developed measures, they may require further refinement and validation. Future research should investigate whether these scales can be improved by refining or adding items.

Second, the size and composition of the sample in the current study may limit the generalizability of the findings somewhat. Participants in the current study were a self-selected subset of a larger sample of World of Warcraft players, and the relatively small size of the sample was likely due in part to the length of the survey as a whole. Although the complete survey could reasonably be completed within one hour, many video game players probably expect to spend less time on a survey. Future research might seek to increase sample sizes by reducing the number of questionnaires included in the survey or by splitting the administration of player-personality and avatar-personality questionnaires into separate testing sessions (a method used by Sung et al., 2011).

On average the participants in the current study were higher in Honesty-Humility and Openness to Experience than those participants who did not choose to complete the second part of the survey. It is, perhaps, not surprising to find that individuals who were willing to continue the survey were more sincere and inquisitive than those who chose to quit. Given the differences between the participants in the current sample and those in the larger sample, as well as the relatively small sample size in the current study, caution should be used in estimating the degree to which the current results might apply to a wider sample of World of Warcraft players. Nevertheless, the current study provides

support for many of the findings reported in previous studies of avatar personality (e.g., Ducheneaut et al., 2009; Jónsson & Snorrason, 2012; Sung et al., 2011), in-game behavior (e.g., Worth & Book, 2014), and avatar identification (e.g., Trepte & Reineke, 2010).

The current study presents some important preliminary findings regarding the nature of personality similarity between players and avatars, and the connections between personality, Identification, Attachment, and in-game behavior. Overall, it appears from the current study that players maintain a certain consistency between their real-world selves and their World of Warcraft avatars, while at the same time imbuing their avatars with some desirable characteristics. Thus, although it remains to be seen whether players experiment more with less-frequently played avatars, it appears from the current study that players' main (or most-frequently played) avatars can generally be described as similar to their creators, albeit with traits slightly enhanced to suit to the demands of the game. These differences between players and avatars likely reflect the players' view of the ways that avatars must adapt to successfully deal with the elements of the game-world.

References

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91,* 340-345. doi: 10.1080/00223890902935878

Ashton, M.C., Lee, K., Perugini, M., Szarota, P., de Vries, R.E., Di Blas, L., Boies, K., & De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology, 86,* 356-366. doi: 10.1037/0022-3514.86.2.356

Bean, A., & Groth-Marnat, G. (2014). Video gamers and personality: a five-factor model to understand game playing style. *Psychology of Popular Media Culture.* Advance online publication. doi: 10.1037/ppm0000025

Bessière, K, Seay, A.F., & Kiesler, S. (2007). The ideal elf: Identity exploration in World of Warcraft. *Cyberpsychology and Behavior, 10,* 530-535. doi: 10.1089/cpb.2007.9994

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29,* 103-109. doi: 10.1016/j.chb.2012.07.021

Bowman, N.D., Schultheiss, D., & Schumann, C. (2012). "I'm attached, and I'm a good guy/gal!": How character attachment influences pro- and anti-social motivations to play massively multiplayer online role-playing games. *Cyberpsychology, Behavior, and Social Networking, 15,* 169-174. doi: 10.1089/cyber.2011.0311

Chan, E., & Vorderer, P. (2006). Massively Multiplayer Online Games. In In P. Vorderer & B. Jennings (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 77-88). New York: Routledge.

Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication and Society, 4,* 245-264. doi: 10.1207/S15327825MCS0403_01

Dolgov, I., Graves, W.J., Nearents, M.R., Schwakr, J.D., & Volkman, C.B. (2014). Effects of cooperative gaming and avatar customization on subsequent spontaneous helping behavior. *Computers in Human Behavior, 33,* 49-55. doi: 10.1016/j.chb.2013.12.028

Ducheneaut, N., Wen, M.-H.D., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. *Proceedings of the 2009 SIGCHI conference on Human Factors in Computing Systems*, 1151- 1160. doi: 10.1145/1518701.1518877

Eastwick, P.W., & Gardner, W.L. (2009). Is it a game? Evidence for social influence in the virtual world. *Social Influence, 4,* 18-32. doi: 10.1080/15534510802254087

Fox, J., Bailenson, J.N., & Tricase, L. (2013). The embodiment of sexualized virtual selves: The Proteus effect and experiences of self-objectification via avatars. *Computers in Human Behavior, 29,* 930-938. doi: 10.1016/j.chb.2012.12.027

Griffiths, M.D., Davies, M.N.O., & Chappell, D. (2004). Demographic factors and playing variables in online computer gaming. *CyberPsychology and Behavior, 7,* 479-487. doi: 10.1089/1094931041774631

Hare, R.D. (2003). *The Hare Psychopathy Checklist - Revised.* (2nd Ed.). Toronto, ON, Canada: Multi-Health Systems.

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

Hollingdale, J., & Greitemeyer, T. (2013). The changing face of aggression: the effect of personalized avatars in a violent video game on levels of aggressive behavior. *Journal of Applied Social Psychology, 43,* 1862-1868. doi: 10.1111/jasp.12148

Jin, S. A. (2010). "I feel more connected to the physically ideal mini me than the mirror-image mini me": Theoretical implications of the "malleable self" for speculations on the effects of avatar creation on avatar-self connection in Wii. *Cyberpsychology, Behavior, and Social Networking, 13,* 567- 570. doi: 10.1089/cyber.2009.0243

John, O.P., Naumann, L.P., & Soto, C.J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, Measurement, and conceptual issues. In Oliver P. John, Richard W. Robins, Lawrence A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3rd Ed., pp. 114-158). New York, NY: Guilford Press.

Jónsson, S.A., & Snorrason, S.K. (2012). *Differences in the self between real life and MMORPGs measured through the HEXACO personality model: A case of EVE online.* (Undergraduate thesis, University of Iceland, Iceland). Retrieved from http://hdl.handle.net/1946/11867

Klimmt, C., Hefner, D., & Vorderer, P. (2009). The video game experience as "true" identification: A theory of enjoyable alterations of players' self-perception. *Communication Theory, 19,* 351-373. doi: 10.1111/j.1468-2885.2009.01347.x

Koles, B., & Nagy, P. (2012). Who is portrayed in Second Life: Dr. Jekyll or Mr. Hyde? The extent of congruence between real life and virtual identity. *Journal of Virtual Worlds Research, 5(1),* 1-17. doi: 10.4101/jvwr.v5i1.2150

Lee, K., & Ashton, M.C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality, 76*, 1001-1053. doi: 10.1111/j.1467-6494.2008.00512.x

Lee, K., & Ashton, M.C. (n.d.) *Descriptive statistics and internal consistency reliabilities of the HEXACO-60 scales in a college student sample* [PDF]. Retrieved from http://hexaco.org/downloading.html.

Lewis, M.L., Weber, R., & Bowman, N.D. (2008). "They may be pixels, but they're MY pixels:" Developing a metric of character attachment in role-playing video games. *Cyberpsychology and Behavior, 11,* 515-517. doi: 10.1089/cpb.2007.0137

Li, D.D., Liau, A.K., & Khoo, A. (2013). Player-avatar identification in video gaming: Concept and measurement. Computers in Human Behavior, 29, 257-263. doi: http://dx.doi.org/10.1016/j.chb.2012.09.002

Lin, H., & Wang, H. (2014). Avatar creation in virtual worlds: Behaviors and motivations. *Computers in Human Behavior, 34,* 213-218. doi: 10.1016/j.chb.2013.10.005

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

McLeod, P.L., Liu, Y.-C., & Axline, J.E. (2014). When your Second Life comes knocking: Effects of personality on changes to real life from virtual world experiences. *Computers in Human Behavior, 39,* 59.70. doi: 10.1016/j.chb.2014.06.025

Neal, T.M.S., & Sellbom, M. (2012). Examining the factor structure of the Hare Self-Report Psychopathy scale. *Journal of Personality Assessment, 94,* 244-253. doi: 10.1080/00223891.2011.648294

Paulhus, D.L., Neumann, C.S., & Hare, R.D. (in press). *Manual for the Hare Self-Report Psychopathy (SRP) scale.* Toronto, ON, Canada: Multi-Health Systems.

Przybylski, A.K., Weinstein, N., Murayama, K., Lynch, M.F., & Ryan, R.M. (2012). The ideal self at play: The appeal of video games that let you be all you can be. *Psychological Science, 23,* 69-76. doi: 10.1177/0956797611418676

Sung, Y., Moon, J.H., Kang, M., & Lin, J.-S. (2011). Actual self vs. avatar self: The effect of online social situation on self-expression. *Journal of Virtual Worlds Research, 4,* 4-21. doi: http://dx.doi.org/10.4101/jvwr.v4i1.1927

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* (5th Ed.). Boston, MA: Pearson Education.

Trepte, S., & Reinecke, L. (2010). Avatar creation and video game enjoyment: Effects of life-satisfaction, game competitiveness, and identification with the avatar. *Journal of Media Psychology, 22,* 171-184. doi: 10.1027/1864-1105/a000022

Van Looy, J., Courtois, C., De Vocht, M., & De Marez, L. (2012). Player identification in online games: Validation of a scale for measuring identification in MMOGs. *Media Psychology, 15,* 197-221. doi: 10.1080/15213269.2012.674917

Van Reijmersdal, E.A., Jansz, J., Peters, O., & Van Noort, G. (2013). Why girls go pink: Game character identification and game-players' motivations. *Computers in Human Behavior, 29,* 2640-2649. doi: 10.1016/j.chb.2013.06.046

Williams, D., Yee, N., & Caplan, S.E. (2008). Who plays, how much, and why? Debunking the stereotypical gamer profile. *Journal of Computer-Mediated Communication, 13,* 993-1018. doi: 10.1111/j.1083-6101.2008.00428.x

Williams, K.M., Paulhus, D.L., & Hare, R.D. (2007). Capturing the four-factor structure of psychopathy in college students via self-report. *Journal of Personality Assessment, 88,* 205-219. doi: 10.1080/00223890701268074

Worth, N.C., & Book, A.S. (2014). Personality and behavior in a massively multiplayer online role-playing game. *Computers in Human Behavior, 38,* 322-330. doi: 10.1016/j.chb.2014.06.009

Worth, N.C., & Book, A.S. (2015). Dimensions of video game behavior and their relationships with personality. *Computers in Human Behavior, 50,* 132-140. doi: 10.1016/j.chb.2015.03.056

Yee, N. (2006a). The demographics, motivations, and derived experiences of users of massively multi-user online graphical environments. *Presence: Teleoperators and Virtual Environments, 15,* 309-329.

Yee, N. (2006b). Motivations for play in online games. *CyberPsychology and Behavior, 9,* 772-775. doi:10.1089/cpb.2006.9.772

Yee, N., & Bailenson, J. (2007). The Proteus effect: The effect of transformed self-representation on behavior. *Human Communication Research, 33,* 271-290. doi: 10.1111/j.1468-2958.2007.00299.x

Yee, N., Bailenson, J.N., & Ducheneaut, N. (2009). The Proteus effect: Implications of transformed digital self-representation on online and offline behavior. *Communication Research, 36,* 285-312. doi: 10.1177/0093650208330254

Yee, N., Ducheneaut, N., Yao, M., & Nelson, L. (2011). Do men heal more when in drag? Conflicting identity cues between user and avatar. *Proceedings of the 2011*

SIGCHI conference on Human Factors in Computing Systems, 773-776. doi: 10.1145/1978942.1979054

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

Yoon, G., & Vargas, P.T. (2014). Know thy avatar: The unintended effect of virtual-self representation on behavior. *Psychological Science, 25,* 1043-1045. doi: 10.1177/0956797613519271

Zhong, Z.-J., & Yao, M.Z. (2013). Gaming motivations, avatar-self identification and symptoms of online game addiction. *Asian Journal of Communication, 23,* 555-573. doi: 10.1080/01292986.2012.748814

CHAPTER 5: Study 4

Note: This chapter is based on the following article:

Worth, N.C., & Book, A.S. (in preparation). *Virtually Similar: Player-Character Personality Similarity and Behavior in The Sims 3.*

Introduction

Many video games use avatars (in-game characters controlled by players) as the means by which players act on objects in the game world. An avatar is a player's in-game representative – essentially, a player's virtual "self" – and it has been proposed that using an avatar in a video game gives the player the opportunity to experiment with alternate versions of his/her offline self (e.g., Ducheneaut, 2010; Gilbert et al., 2014; Turkle, 1995). It is, therefore, important to understand how players view and relate to their avatars. In particular, examining the similarities and differences between player personality traits and the traits that players ascribe to their avatars may be a useful method of determining the extent to which players develop alternate selves for use in video games.

Of particular interest is the degree to which players and their avatars resemble each other in terms of personality traits. Some research has suggested that avatars may resemble their creators to a certain degree (Sung, Moon, Kang, & Lin, 2011; Worth & Book, 2015b), although there are also important differences between players and avatars on some personality traits (Ducheneaut, Wen, Yee, & Wadley, 2009; Jónsson & Snorrason, 2012; Worth & Book, 2015b). In addition, the actions that are carried out in video games by avatars are generally related to player personality traits (Worth & Book,

2014; Worth & Book, 2015a; Yee, Ducheneaut, Nelson, & Likarish, 2011), and to a lesser extent, avatar personality traits (McCreery, Krach, Schrader, & Boone, 2012; Worth & Book, 2015b). Thus, research to date suggests that players may maintain some aspects of their real-world selves within video game environments, but also that there are relevant differences between real-life and virtual selves. The current study will extend this previous research by examining the connections between player personality and avatar traits, as well as player personality and in-game behavior, in a video game called *The Sims 3* (see Electronic Arts, 2009). The current study allowed players to create their own avatars and made use of game-play recordings to analyze behavior.

The Sims 3 is a life-simulation video game in which the player controls one or more human characters (called *Sims*) and directs all aspects of these characters' lives. Players can create characters, specifying their appearances, clothing, and personality traits. Within the game, players can direct their characters to satisfy basic needs (like the need to eat or sleep), interact with other characters, get a job, and explore the town in which they live. Because this game simulates "real life," rather than representing unusual or impossible activities as many video games do, it is an interesting game to study with regard to the correspondence between personality and in-game behavior. In addition, this video game features a relatively easy-to-learn point-and-click interface and all actions chosen by the player are clearly shown on the screen as text menus, facilitating identification of players' choices. The current study will focus on the connections between player personality traits and two aspects of *The Sims 3*, specifically the selection of character traits in the character creation portion of the game and character interactions within the game proper.

Player Personality and In-Game Behavior

Many video games allow or encourage behavior that is different from typical real-world behavior, including violent actions and actions that are impossible in the real world. Because the actions players choose within video games are relatively free of real-world consequences, players are free to try out behaviors that they might never consider in the real world. Nonetheless, in video games that allow a range of choices for behavior (e.g., kill the monster or fly over it; steal the car or offer to buy it), different actions may be preferred by different individuals (Egenfeldt-Nielsen, Smith, & Tosca, 2013). Personality has an influence on behavior that may persist into video game environments in spite of elements that make the virtual worlds of video games different from the real world (Ducheneaut, 2010).

In fact, recent research suggests that personality is related to in-game behaviors in ways that are generally consistent with personality trait definitions (Peng, Liu, & Mou, 2008; Worth & Book, 2014). For example, several studies have shown that frequency of aggressive behavior in video games is related to several relevant personality traits. In particular, individuals who tend to be manipulative and deceptive (i.e., lower in the personality trait Honesty-Humility) more often engage in aggressive behaviors in video games generally (Worth & Book, 2015a) and in behaviors that involve attacking other players' avatars in the fantasy-type Massively Multiplayer Online Role-playing Game *World of Warcraft* (Worth & Book, 2014). Similarly, high levels of aggressive personality traits are related to more aggressive behaviors in violent video games (Peng et al., 2008). Low levels of Agreeableness have also been found to be related to aggressive behavior directed at other players (Yee et al., 2011).

In contrast, individuals who are higher in Agreeableness more frequently engage in helping others within video games, generally, and in World of Warcraft, specifically (Worth & Book, 2014; Worth & Book, 2015a). Extraversion is related to behaviors that involve cooperation and communication with other players (Worth & Book, 2014; Yee et al., 2011) and Openness to Experience to related to exploration (Worth & Book, 2014). Thus, these relationships suggest that personality traits are related to certain in-game behaviors in ways that are consistent with the content of these traits. Although many video games allow players to try out behavior that is quite different from their typical real-world behavior, players may still behave rather like they would do in the real world, relative to other players.

Player and Avatar Personality Similarity

Many video games allow players to create more than one avatar, but typically only one avatar can be used in-game at a time. Most players of World of Warcraft and similar video games have a “main” avatar (i.e., one avatar that is used most frequently; Ducheneaut et al., 2009), and in long-running games, players may keep the same avatar for years. Some video games present players with extensive options for creating and customizing the avatar(s) that they will use in the game, while others simply allow players to choose one avatar from several pre-made choices. Video games that include avatar customization may allow the player to choose such traits as appearance, sex, and role or occupation, depending on the game.

In creating an avatar, players can choose to reproduce their own traits, or to choose alternate traits. Players might choose to create avatars that are more like their ideal selves (i.e., as they would like to be) rather than their real selves (Przybylski,

Weinstein, Murayama, Lynch, & Ryan, 2012). In addition, players might view their avatars as having certain traits that are not specifiable in the avatar creation process. Recent evidence suggests both that, in terms of personality traits, players view their avatars as being rather similar to (Sung et al., 2011; Worth & Book, 2015b) and different from themselves (Bessière, Seay, & Kiesler, 2007; Ducheneaut et al., 2009; Jónsson & Snorrason; 2012; Worth & Book, 2015b).

In particular, Worth & Book (2015b) have shown that player personality traits are strongly correlated with the corresponding avatar personality traits. When players of World of Warcraft were asked to rate themselves and their avatars on a set of six broad personality traits (i.e., the HEXACO personality traits), five of six traits showed reasonably high correlations. Specifically, player and avatar Honesty-Humility, Emotionality, Agreeableness, Conscientiousness, and Openness to Experience traits were positively correlated, but there was no significant correlation for Extraversion. However, mean differences were also observed between players and avatars on five of six traits (Worth & Book, 2015b). Players rated their avatars as lower than themselves on Honesty-Humility, Emotionality, Agreeableness, and Openness to Experience, and higher on Extraversion (no significant difference was observed for Conscientiousness).

Similarly, a study focusing on the MMORPG *Eve Online* found significant differences between players and avatars for all six of the HEXACO factors (Jónsson & Snorrason; 2012). The directions of the differences were identical to those observed by Worth & Book (2015b), with the exception of Conscientiousness (which showed a small but significant difference between players and avatars, with avatars having higher scores; Jónsson & Snorrason, 2012). Given that two different games were used in the studies by

Worth and Book (2015b) and Jónsson and Snorrason (2012), it is interesting that the results were so similar. Unfortunately, however, Jónsson and Snorrason (2012) do not report the correlations between player and avatar traits.

Another study focusing on Big Five personality traits found that player and avatar traits were positively correlated with each other (Sung et al., 2011). That is, correlations between participants' ratings of themselves and their avatars on Big Five Extraversion, Agreeableness, Neuroticism, Conscientiousness, and Openness to Experience were consistently positive and significant. However, the study by Sung et al. (2011) differed from those conducted by Jónsson and Snorrason (2012) and Worth & Book (2015b) in that participants did not rate avatars that they used to play a video game, but rather were asked to imagine creating an avatar for use in an online context. Those participants who imagined creating an avatar for use in an online gaming context rated their avatars as having higher Openness to Experience and lower Neuroticism scores, as compared to themselves (Sung et al., 2011).

Therefore, previous research suggests the studies by suggest that players may view their avatars as having similar personality traits to themselves (e.g., Sung et al., 2011; Worth & Book, 2015b), but also that players may view higher or lower levels of certain traits as important for avatars within the gaming context (Ducheneaut et al., 2009; Jónsson & Snorrason, 2012; Worth & Book, 2015b). However, none of these studies examined whether individuals create avatars by selecting personality traits that are similar to their own. This is an important distinction, as participants in three of the studies were estimating the personality traits of existing avatars (Ducheneaut et al., 2009; Jónsson & Snorrason, 2012; Worth & Book, 2015b), and participants in the third study were

estimating the personality traits of an imagined avatar (Sung et al., 2011). In each case, players rated their avatars' personality traits using the same personality scales as were used to rate their own traits. Although this benefit certainly facilitates comparison of player and avatar traits, it requires participants to consider the likely traits of their avatars using items that may not be directly relevant to the gaming context in which the avatar is used. The current study will extend on the previous research, then, by allowing individuals to create avatars and select traits for these avatars from a menu of traits that are provided by the game. This method will ensure that the traits are relevant to the gaming context and eliminate the need for participants to imagine the likely behaviors and thoughts of their avatars.

Connection with the Avatar: Identification and Attachment

In addition to determining the degree to which avatars resemble their creators in terms of personality traits and behaviors, we were also interested in determining the degree to which players feel connected to their avatars. The degree of connection that exists between players and avatars may be related to player-avatar personality similarity (Trepte & Reineke, 2010; Worth & Book, 2015b). Two elements of player-avatar connection to be considered here are identification and attachment. Identification with the avatar can be defined as a feeling of "merging" with the avatar (Klimmt, Hefner, & Vorderer, 2009), such that players feel that they are directly experiencing the events of the game through their avatars (Cohen, 2001). Three components of identification have been proposed: similarity identification (i.e., the player feels similar to the avatar), wishful identification (i.e., the player wishes to be more like the avatar and feels that the

avatar has wished-for traits), and embodied presence (i.e., the player experiences a sense of merging with the avatar; Van Looy, Courtois, De Vocht, & De Marez, 2012).

The second element of connection to the avatar that will be examined in the current study is attachment, or players' feelings of liking and empathy for the avatar. In World of Warcraft, attachment and identification were found to be uncorrelated, and greater identification (but not attachment) was related to greater player-avatar personality similarity (Worth & Book, 2015b). In addition, players with higher levels of Openness to Experience reported higher levels of both attachment and identification with their avatars (Worth & Book, 2015b). Openness to Experience has also been found to be positively related to the degree of connection more generally between players and avatars created for a fantasy-type video game (Dunn & Guadagno, 2012) and to identification with avatars in Second Life (although it was not a significant predictor when combined in a model with other predictors; McLeod, Liu, & Axline, 2014).

Because of differences between fantasy-type video games like World of Warcraft and a life-simulation video game like The Sims 3, it is unclear whether identification and attachment will play the same role in both games. In both games, players are free to create many different avatars and to change avatars at any time. However, World of Warcraft allows players to control only one avatar at a time, and players must log out in order to select another character. In The Sims 3, players can place several controllable characters in the game at one time, and although they can only control one character at a time, they can switch between characters quickly (and without exiting the game) so that all characters maintain a persistent stream of activity. As a result, Van Looy et al. (2012) have suggested that identification might be very different in a game like The Sims, where

the player is often in control of multiple characters, as compared to a game like World of Warcraft, where the player controls a single avatar. Likewise, the length of time that a player had had an avatar may influence the degree of attachment and identification (Van Reijmersdal, Jansz, Peters, & Van Noort, 2013).

Personality

Previous research on video games have made use of both the Big Five/Five-Factor Model of personality (e.g., Bessière et al., 2007; Ducheneaut et al., 2009; McCreery et al., 2012) and the HEXACO model of personality (e.g., Jónsson & Snorrason, 2012; Worth & Book, 2014; Worth & Book, 20151; Worth & Book, 2015b). In the current study, we focused on player personality as measured by the HEXACO model of personality (Ashton & Lee, 2007). This model consists of six broad personality factors, which have been identified in multiple studies of personality-descriptive adjectives in a variety of different languages (Ashton et al., 2004; Lee & Ashton, 2008). The traits are Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. This model shares some similarities with the well-known Big Five model of personality (e.g., John, Naumann, & Soto, 2008), but it also provides some additional explanatory power, in particular with relation to the Honesty-Humility factor, and captures some important elements of personality variation that are not captured by the Big Five (Ashton & Lee, 2007; Ashton, Lee, & De Vries, 2014).

The Honesty-Humility, Agreeableness, and Emotionality factors are theoretically connected to altruistic behavior; specifically, reciprocal altruism (in the case of Honesty-Humility and Agreeableness) and kin altruism (in the case of Emotionality; Ashton & Lee, 2007; Ashton et al., 2014; Lee & Ashton, 2014). Individuals with high levels of

Honesty-Humility tend to be honest and sincere, and generally avoid taking advantage of others, whereas individuals who are low in Honesty-Humility tend to be deceptive and manipulative, and feel entitled to special treatment. Individuals with high levels of Agreeableness tend to be patient and forgiving, and are generally willing to cooperate with others, whereas individuals who are low in Agreeableness tend to be angry and intolerant. Finally, individuals with high levels of Emotionality tend to be sentimental and anxious, and value close ties with family, whereas individuals with low levels of Emotionality tend to be brave and independent (Ashton & Lee, 2007)

The Extraversion, Conscientiousness, and Openness to Experience factors all describe tendencies regarding effort in particular domains (Ashton & Lee, 2007). More specifically, individuals who are high in Extraversion tend to put forth more effort in the domain of interpersonal interaction; they tend to sociable and gregarious. Individuals who are low in Extraversion tend to be more reserved and sometimes shy. Individuals who are high in Conscientiousness put forth more effort in work-related domains; these individuals tend to be organized and diligent. Individuals who are low in Conscientiousness tend to be more reckless and irresponsible. Finally, individuals who are high in the Openness to Experience tend to put forth more effort in idea-related domains; these individuals tend to be creative and inquisitive. Individuals who are low in Openness to Experience tend to be more conventional and unimaginative (Ashton & Lee, 2007).

In addition to the HEXACO model of personality, we also employed a measure of psychopathic personality traits. Individuals with high levels of psychopathic traits tend to be deceptive, manipulative, callous, irresponsible, and impulsive, and they tend to engage

in more antisocial and criminal behaviors (Hare, 2003; Hare & Neumann, 2008). Psychopathy as a construct is most closely related to (low levels of) the Honesty-Humility and Emotionality factors in the HEXACO model, but also to (low levels of) the Agreeableness and Conscientiousness factors (Book, Visser, & Volk, 2015; Lee & Ashton, 2014). Although the HEXACO model comprehensively describes personality variation, there is a benefit to examining psychopathic traits more directly. Use of a measure of psychopathic traits can help to demonstrate more specifically how this particular constellation of tendencies is related to in-game behaviors. Because previous research has indicated that psychopathic traits are related to aggressive in-game behaviors as well as player-versus-player combat (Worth & Book, 2014; Worth & Book, 2015a), it is worth investigating these traits in the context of the current study as well.

Research Questions

In the current study, we asked participants to create a character that would represent them (the *self-character*) and a second character with which their own character would interact (the *other-character*). First, we proposed hypotheses regarding the connections between participant personality traits and self-character traits.[8] Given that previous research suggests there is some correspondence between player traits and avatar traits (e.g., Worth & Book, 2015b), and given that players were instructed to create a character that would represent themselves, we generally hypothesized that players would create self-characters with traits that correspond to their own.

Participants were provided with a list of character traits and their definitions (shown on-screen when selecting the trait, and also provided in a printed list). The Sims

[8] Given that other-characters were not intended to specifically represent the player, and thus are not avatars in the typical sense, we did not propose any hypotheses regarding the traits chosen for them.

3 provides 64 possible traits, although some are mutually exclusive (e.g., if the *Evil* trait is selected for a character, the player cannot also choose the *Good* trait). Some of these traits clearly do not reflect personality characteristics (e.g., *Heavy Sleeper*), therefore no hypotheses were proposed for these traits. We generated hypotheses primarily based on the name of the trait as opposed to the definition of the trait. This decision was based on the assumption that most participants would not read the trait descriptions carefully. Each of the following hypotheses was generated based on logical connections between defining qualities of each personality trait (as discussed above) and character trait names. Thus, we proposed the following six hypotheses for HEXACO traits:

H1: Levels of Honesty-Humility will be higher among those who choose the *Good* and *Friendly* traits, and lower among those who choose the *Evil* and *Snob* traits.

H2: Levels of Emotionality will be higher among those who choose the *Coward*, *Family-Oriented*, *Friendly*, *Good*, *Hopeless Romantic*, *Neurotic*, and *Over-Emotional* traits. Emotionality will be lower among those who choose the *Brave* and *Evil* traits.

H3: Levels of Extraversion will be higher among those who choose the *Charismatic*, *Friendly*, *Flirty*, and *Party-Animal* traits, as compared to those who do not choose these traits. Levels of Extraversion will be lower among those who choose the *Loner* and *Unflirty* traits as compared to those who do not choose these traits.

H4: Levels of Agreeableness will be higher among those who choose the *Good* and *Friendly* traits. Levels of Agreeableness will be lower among those who choose the *Evil*, *Grumpy*, *Hot-Headed*, and *Mean-Spirited* traits.

H5: Levels of Conscientiousness will be higher among those who choose the *Genius*, *Neat*, *Perfectionist*, and *Workaholic* traits. Levels of Conscientiousness will be lower among those who choose the *Absent-Minded* and *Slob* traits.

H6: Levels of Openness to Experience will be higher among those who choose the *Artistic* and *Virtuoso* traits, and lower among those who choose the *Can't Stand Art* trait.

For psychopathic traits, we proposed the following hypotheses:

H7: Levels of psychopathic traits will be higher among those who choose the *Brave*, *Evil*, and *Snob* traits. Levels of Psychopathic traits will be lower among those who choose the *Coward*, *Family-Oriented*, *Friendly*, *Good*, *Hopeless Romantic*, *Neurotic*, and *Over-Emotional* traits.

For personality and in-game behavior, we likewise proposed the general hypothesis that participant personality traits would be related to character interaction categories in a manner that is consistent with personality trait definitions. Therefore, we proposed the following specific hypotheses:

H8: The number of *Friendly* character interactions selected will be higher among those who are higher in Extraversion, Agreeableness, or Honesty-Humility.

H9: The number of *Mean* character interactions will be higher among those who are lower in Honesty-Humility, Emotionality, or Agreeableness.

H10: The number of *Friendly* character interactions will be lower among those who are higher in psychopathic traits.

H11: The number of *Mean* character interactions will be higher among those who are higher in psychopathic traits.

H12: The number of *Romantic* character interactions will be higher among those who are higher in psychopathic traits.

For the other behavior categories, it was not clear which player personality traits might be related to their selection. Therefore, in addition to these specific hypotheses, we also proposed the following general research question regarding in-game behavior:

RQ1: What are the connections between player personality traits and number of character interactions selected within the *Funny*, *Special*, and *None* (i.e., no category specified) categories?

Previous studies have found a positive connection between player Openness to Experience and feelings of connection to the avatar (Dunn & Guadagno, 2012), Identification and Attachment (Worth & Book, 2015b). Therefore, we proposed the following hypothesis:

H13: Player Openness to Experience will be positively correlated with Identification and Attachment to the self-character.

Methods

Participants

The participants for the current study were 93 university students (67.7% women). Participants ranged in age from 18 to 27 (M = 18.94, SD = 1.50). The majority (73%) were White.

Measures

HEXACO-60 (Ashton & Lee, 2009).

The HEXACO-60 includes 10 items for each of the 6 HEXACO factors. Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). For the

self-report form of the HEXACO-60, Lee and Ashton (n.d.) report the following internal consistency reliabilities (*n* = 1126): Honesty-Humility, .76; Emotionality, .80; Extraversion, .80; Agreeableness, .77; Conscientiousness, .76; Openness to Experience, .78. The HEXACO-60 has demonstrated high levels of self-observer agreement (Ashton & Lee, 2009).

Self-Report Psychopathy Scale – III (SRP-III; Paulhus, Neumann, & Hare, in press).

The SRP-III contains a total of 64 items measuring four factors of psychopathic traits: Interpersonal Manipulation, Callous Affect, Erratic Lifestyle, and Criminal Tendencies (16 items per factor). Items are rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The SRP-III was developed to measure psychopathic traits in non-criminal populations (Williams, Paulhus, & Hare, 2007) and its structure reflects that of the Psychopathy Checklist – Revised (Hare, 2003). The scale has demonstrated appropriately strong correlations with other measures of psychopathy and with relevant external measures (Neal & Sellbom, 2012). Neal and Sellbom (2012) report an internal consistency reliability of .92 for total scores.

Game Enjoyment and Competence.

Fifteen items were written to measure interest in and enjoyment of the game, as well as feelings of competence for playing the game (please see Appendix D). Items were rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Preference for Self-character over Other-character.

Five items were written to measure the degree to which players preferred their self-character over their other-character (please see Appendix E). Three items reflected

preference for the self-character and two reflected no preference for one character over the other (reverse-coded). Items were rated on a scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Avatar Connection Scale.

The Avatar Connection Scale is a recently-developed measure (see Worth & Book, 2015) consisting of 22 items reflecting identification with the avatar (i.e., similarity identification, wishful identification, and embodied presence), and attachment to the avatar (please see Appendix C). In order to reduce the possible effect of acquiescence on scores, some items reflect identification with (or attachment to) the avatar (e.g., "My character is basically an extension of me"), and some were written to reflect lack of identification (or attachment; e.g., "My character would be a very different person than me"). Items were rated on a scale ranging from 1 (*Disagree Strongly*) through 7 (*Agree Strongly*).

Additional Items.

Previous experience with the game was measured with the following item: "How often have you played this game (the Sims, any version) before?" Responses were "Never – I have **never** played this game before today", "Some – I have played it once or twice before today", and "A lot – I have played it often before today".

A suspicion-checking question was included to determine whether participants particularly noticed the icon the screen that indicated the game was being recorded. The item was as follows: "During your game play, were there any icons or graphics on the computer screen that you thought were strange or out-of-place?" Response options were: "I didn't notice anything in particular that seemed strange" and "There was a graphic on

the screen that seemed out-of-place or strange. (Please explain)". Space was provided for participants to explain what they noticed.

Several additional items about previous experience with video games were also included in the questionnaire package (administered during the time that the researcher was setting up the game) but these were not analyzed for the purposes of the current study.

Self-Character Traits.

Self-character traits were selected by the participant during the character creation portion of the study. Participants were asked to "create a character that will represent you". A total of 64 traits are provided by the game, however some traits are mutually exclusive with each other. Many traits reflect individual differences in personality (e.g., *Friendly, Artistic*), however, other traits reflect other kinds of individual differences (e.g., *Heavy Sleeper*; *Vehicle Enthusiast*). Five traits can be selected per character. Traits are divided into four categories; participants were instructed to choose one trait from each category, and then one more trait from any category. Only those traits that could be considered to reflect personality were considered for the current study. The five traits chosen for each self-character were listed on-screen at the beginning of the game recording for each participant. Participants also selected traits for other-characters, but these traits were not analyzed for the purposes of the current study.

In-Game Behavior.

Video game play for each participant was recorded using the in-game screen-capture video recording functionality, and all character interactions initiated by the participant were counted by the first author. In order to perform an action in The Sims 3,

the player must click on an object or character and select from a menu of choices. For example, while controlling the self-character, the participant can click on the other-character or another (game-controlled) character, whereupon a menu of categories for interactions appears. Categories of interactions analyzed in the current study were *Friendly*, *Funny*, *Romantic*, *Mean*, *Special* (i.e., interactions in this category are based on the character traits selected during character creation), and *None* (i.e., no category specified by the game). After clicking on a category, a menu of specific actions appears (e.g., within the Friendly category, options frequently include “chat”, “ask about day”, and “enthuse about new house”, although additional options may appear depending on the degree of friendship between the two characters). Once the participant selects a specific action, an icon appears in the top left-hand corner of the screen indicating the chosen interaction. Thus, each character interaction category and specific action chosen by the player can be readily observed in the video recording. It is important to note, therefore, that the coding of interactions did not involve any judgment on the part of the first author, but consisted simply of viewing the recordings and noting which category was chosen for each character interaction.

Procedure

Participants completed the study individually in a small office. All participants completed the study in the following order: 1) Consent form, researcher introduces the study; 2) Participant completes Demographic information, HEXACO-60, and SRP-III; 3) Participant creates self-character (15 minutes); 4) Participant creates other-character (10 minutes); 5) Participant completes previous video game experience questionnaire; 6) Researcher provides instructions for game-play, participant plays The Sims 3 (20

minutes); 7) Participant completes previous experience with The Sims question, Game Enjoyment Questionnaire, Preference for Self-character over Other-character scale, Avatar Connection Scale, and suspicion-checking question; 8) Researcher provides debriefing and participant provides consent to use video recording. In total, participation took about 1.5 hours, and all participants consented to the use of their game recording. Further details regarding each portion of the study procedure are provided in Appendix F. The complete script used by the researcher is provided in Appendix G.

Results

Descriptive Statistics

Due to researcher error, two participants were not provided with the HEXACO-60 during the administration of questionnaires, therefore, total $n = 91$ for the HEXACO-60.

One participant was identified as having outlying scores on both the Honesty-Humility and Agreeableness scales ($z = -3.54$ and $z = -3.40$, respectively). The participant's scores on these two scales were therefore adjusted upwards to one raw score below the next lowest score, in order to reduce the potential impact of this participant on analyses (as recommended by Tabachnick & Fidell, 2007). Following adjustment, no significant outliers were observed on any of the HEXACO scales.

All scales were approximately normally distributed. Means, standard deviations, and reliabilities for the HEXACO-60 and SRP-III are presented in Table 5-1. Reliabilities for all scales were satisfactory.

Most of the participants had had some experience playing (a version of) The Sims; 31 participants had never played, 36 had played once or twice, and 24 had played often prior to entering the current study (two participants did not reply to this item). On

Table 5-1
Means, Standard Deviations, and Cronbach's Alpha Reliabilities for Player Personality Traits, Self-Character Connection Variables, and Game Enjoyment

	M	*SD*	Possible range	alpha
Honesty-Humility	3.22	0.58	1-5	.75
Emotionality	3.30	0.67	1-5	.80
Extraversion	3.48	0.55	1-5	.75
Agreeableness	3.16	0.62	1-5	.79
Conscientiousness	3.38	0.60	1-5	.77
Openness to Experience	3.34	0.63	1-5	.76
SRP Total	2.36	0.36	1-5	.89
Identification	4.86	1.10	1-7	.92
Attachment	4.12	1.09	1-7	.76
Self-Character Preference	2.85	.72	1-5	.80
Game Enjoyment	3.70	.54	1-5	.91

Note: SRP Total: Self-Report Psychopathy Scale Total Scores; Self-Character Preference: Preference for Self-character over Other-character; Game Enjoyment: Game Enjoyment and Competence.

average, players enjoyed and felt able to play the game; the mean score of 3.70 on the game enjoyment scale corresponds with a response between “neutral” and “agree”.

Only one participant mentioned the recording icon in response to the suspicion-checking question. However, an additional four participants verbally mentioned to the researcher that they had been aware of the recording while they were playing. Because no attempt was made to conceal the fact that the game was being recorded, it should be assumed that participants were aware that it was.

Connection with Self-Character

In order to verify the structure of the Avatar Connection Scale in the current sample, we conducted an exploratory principal components analysis on the scale. First, we conducted a parallel analysis (with n = 93 and 34 variables) and the resulting eigenvalues were compared with the eigenvalues resulting from an exploratory principal components analysis of the Avatar Connection Scale. Two eigenvalues from the principal components analysis of the Avatar Connection Scale were larger than those from the parallel analysis, suggesting that two components should be extracted from our data. Next, we conducted a principal components analysis with promax rotation, extracting two components, which accounted for 51.15% of the variance. Items with loadings >.50 on each component were retained (see Table 5-2 for items included in each component). Six items (items #3, 4, 6, 9, 13, and 18) did not load above >.50 on either component and were dropped from further analysis. One item (item 7) loaded >.60 on both components and was also dropped.

Table 5-2
Avatar Connection Scale Component Names and Items

Component Name	Item List
Identification	22. My character is quite different from me. [R]
	12. My character is a lot like me.
	8. My character is me.
	20. My character is like me in many ways.
	17. My character would be a very different person than me. [R]
	15. My character is not much like me. [R]
	2. My character is basically an extension of me.
	1. My character behaves much like I would.
	16. My character is worse than me in a lot of ways. [R]
	10. My character was much like the worst side of me. [R]
Attachment	14. My character has more good qualities than me.
	5. My character is better than me in a lot of ways.
	19. I feel sorry for my character when he/she dies.
	11. I feel some attachment to my character.
	21. I care about what happens to my character.

Note: Items are listed in order from highest loading to lowest loading. Items marked [R] were reverse-coded prior to creating the scale.

Ten items had loadings > .50 on the first component; five of these had negative loadings and reflected feelings that the self-character was different from the player; five items had positive loadings, and reflected the feeling that the self-character was much like the player. This component was therefore named Identification. To create a scale for this component, the 5 items with negative loadings were reverse-coded and mean scores on the 10 items were calculated for each participant.

Five items had loadings >.50 on the second component; two of these reflected the feeling that the self-character was better than the player and three items reflected attachment or caring for the self-character (see Table 5-2). This component was named Attachment, and a scale created as the mean of these five items. Means, standard deviations, and reliabilities for Identification and Attachment are presented in Table 5-1.

Identification and Attachment were positively correlated, $r = .40$, $p < .001$. Neither scale was significantly correlated with Openness to Experience, $p > .25$, thus *H13* was not supported. However, Identification was positively correlated with Extraversion ($r = .22$, $p = .034$) and with Conscientiousness ($r = .24$, $p = .023$). Attachment was negatively correlated with Extraversion ($r = -.24$, $p = .025$).[9]

The mean score on the Preference for Self-character over Other-character scale ($M = 2.85$, $SD = .72$) corresponds with a value between the responses “disagree” and “neutral”, and indicates that, on average, participants did not prefer their self-characters over their other-characters. Scores on the Preference for Self-character over Other-

[9] As the current study represents a first attempt to examine player personality traits in relation to aspects of The Sims 3, we chose to maintain an alpha of .05 to reduce the risk of interpreting results as showing no significant relationships when relationships do, in fact, exist. However, this does increase the risk of Type 1 error. Given that we conducted 15 correlations on the relationships between Identification, Attachment, Preference for Self-Character, and personality traits, a Bonferroni correction could be used to provide a more conservative alpha of .05/15 = .003. Using this more conservative alpha, only the correlation between Identification and Attachment remains significant.

character scale were not significantly correlated with either Identification or Attachment (ps > .13).

Player and Avatar Personality Traits

First, we examined the traits selected for self-characters across the entire sample. In total, 47 of the 64 traits were selected by at least one participant, but only 15 were selected by at least 10 participants (see Table 5-3). In order to reduce the risk of capitalizing on chance associations, we restricted our analyses to the 10 character traits for which we proposed hypotheses and that had a minimum of n = 10. Therefore, we conducted 19 t-tests comparing those who did and did not choose these 10 character traits for differences in the hypothesized personality traits. Results are presented in Table 5-4.

For *H1*, we analyzed differences in Honesty-Humility among those who did and did not choose the *Good* and *Friendly* traits. Levels of Honesty-Humility were higher among those who chose the *Friendly* trait as compared to those who did not; no significant difference was observed for the *Good* trait.

For *H2*, we analyzed differences in Emotionality among those who did and did not choose the following traits: *Brave*, *Family-Oriented*, *Friendly*, and *Good*. Levels of Emotionality were higher among those who chose the *Friendly* trait compared to those who did not; no significant differences were observed for the remaining traits.

For *H3*, we analyzed differences in Extraversion among those who did and did not choose *Charismatic*, *Flirty*, or *Friendly* traits. Levels of Extraversion were higher among

Table 5-3
Number of Participants Selecting Each Self-Character Trait

Character Trait	*n*
Ambitious	28
Artistic	25
Athletic	45
Brave	14
Charismatic	15
Excitable	18
Family-Oriented	19
Flirty	16
Friendly	53
Genius	11
Good	19
Good Sense of Humor	32
Loves the Outdoors	22
Neat	10
Perfectionist	11

Note: Only those traits that were selected by at least 10 participants are listed.

Table 5-4
Results of t-tests Comparing Participants Who Did and Did Not Select Character Traits on HEXACO Personality Traits and SRP-III Total Scores

Avatar Trait	Personality trait	Trait selected?	Mean (SD)	*t*	*p*
Artistic	O	No	3.25 (.62)	-2.18	.032
		Yes	3.57 (.64)		
Brave	E	No	3.31 (.68)	0.17	.864
		Yes	3.28 (.60)		
	SRP	No	2.34 (.35)	-0.90	.369
		Yes	2.44 (.39)		
Charismatic	X	No	3.42 (.56)	-2.57	.012
		Yes	3.82 (.38)		
Family-Oriented	E	No	3.26 (.66)	-1.34	.185
		Yes	3.49 (.68)		
	SRP	No	2.38 (.36)	1.47	.146
		Yes	2.25 (.32)		
Flirty	X	No	3.44 (.53)	-1.45	.152
		Yes	3.66 (.63)		
Friendly	H	No	3.06 (.59)	-2.17	.033
		Yes	3.32 (.56)		
	E	No	3.02 (.70)	-3.55	.001
		Yes	3.50 (.57)		
	X	No	3.39 (.68)	-1.17 [a]	.248
		Yes	3.54 (.44)		
	A	No	2.96 (.62)	-2.70	.008
		Yes	3.30 (.58)		
	SRP	No	2.49 (.38)	3.20	.002
		Yes	2.26 (.31)		

Table 5-4 (Continued)
Results of t-tests Comparing Participants Who Did and Did Not Select Character Traits on HEXACO Personality Traits and SRP-III Total Scores

Avatar Trait	Personality trait	Trait selected?	Mean (SD)	*t*	*p*
Genius	C	No	3.33 (.58)	-2.27	.026
		Yes	3.76 (.68)		
Good	H	No	3.21 (.61)	-0.07	.943
		Yes	3.22 (.46)		
	E	No	3.24 (.69)	-1.91	.060
		Yes	3.57 (.53)		
	A	No	3.12 (.61)	-1.32	.190
		Yes	3.33 (.66)		
	SRP	No	2.38 (.36)	1.18	.241
		Yes	2.27 (.32)		
Neat	C	No	3.35 (.62)	-1.92[a]	.074
		Yes	3.63 (.40)		
Perfectionist	C	No	3.33 (.60)	-2.27	.026
		Yes	3.76 (.52)		

Note: H: Honesty-Humility, E: Emotionality, X: Extraversion, A: Agreeableness, C: Conscientiousness, O: Openness to Experience, SRP: Self-Report Psychopathy Total Score.
[a] Equal variances not assumed.

those who chose the *Charismatic* trait as compared to those who did not; no significant differences were observed for the remaining traits.

For *H4*, we analyzed differences in Agreeableness among those who did and did not choose the *Good* and *Friendly* traits. Levels of Agreeableness were higher among those who chose the *Friendly* trait as compared to those who did not; no significant difference was observed for the *Good* trait.

For *H5*, we analyzed differences in Conscientiousness among those who did and did not choose the *Genius*, *Neat*, and *Perfectionist* traits. Levels of Conscientiousness were higher among those who chose the *Genius* or *Perfectionist* traits as compared to those who did not choose those traits; no significant difference was observed for the *Neat* trait.

For *H6*, we analyzed differences in Openness to Experience among those who did and did not choose the *Artistic* trait. Levels of Openness to Experience were higher among those who chose the *Artistic* trait, as compared to those who did not.

Finally, for *H7*, we analyzed differences in SRP-III total scores among those who did and did not choose the *Family-Oriented*, *Friendly*, and *Good* traits. Levels of SRP-III traits were lower among those who chose the *Friendly* trait, as predicted, but there was no difference on the *Family-Oriented* or *Good* traits.

Overall, eight significant tests (out of 19) were observed at the $p < .05$ level, and all significant tests were in the expected direction.[10] Each HEXACO trait showed at least

[10] Given that 19 t-tests were performed for character traits, a Bonferroni correction could be used to provide a more conservative alpha of .05/15 = .003. Using this more conservative alpha, only two t-tests reach significance: those who selected the Friendly trait were higher in Emotionality and lower in SRP total scores than those who did not select the trait.

one significant difference in mean levels based on the selection of a least one character trait.

Personality and In-Game Behaviors

Due to technical problems, two game-play recordings were lost, resulting in a total $n = 91$ for in-game behavior. In addition, two other participants had shorter recordings (< 20 minutes) due to errors with the recording. These two participants' available interactions were counted, but it is possible that the number of interactions was limited by the shortened recording.

For each participant, all available interactions chosen by the participant for both the self-character and the other-character were counted. Interactions had to be selected by the participant and appear in the action queue in order to be counted.

For self-characters, the number of interactions ranged from 0 to 33 ($M = 10.84$, $SD = 6.75$). For other-characters, the number of interactions ranged from 0 to 49 ($M = 8.65$, $SD = 8.22$). For all subsequent analyses, we combined interactions performed by the self-character and by the other-character within each category. Means and standard deviations for each interaction category are presented in Table 5-5.

All of the interaction categories, except the *None* category, showed very strong positive skew. The *None* category was not significantly skewed and showed no significant outliers. We therefore examined the correlations between the *None* category and HEXACO personality traits, as well as between the None category and SRP-III total scores; there were no significant correlations ($p > .20$).

Table 5-5
Means and Standard Deviations for Interaction Categories

Category	*M*	*SD*
Friendly	5.01	6.19
Funny	2.65	2.67
Mean	0.16	0.52
None	6.65	4.36
Romantic	2.71	6.11
Special	1.83	2.60

For the remaining interaction categories, the level of skew was quite high (*zskew* ≥ 7.45). Therefore, we dichotomized the remaining behavior categories, as recommended by Tabachnick and Fidell (2007) in cases where skew is extreme. For the *Mean*, *Romantic*, and *Special* categories, we compared those who used the category zero times with those who used the category 1 or more times. For the *Friendly* and *Funny* categories, we compared those who used the category 0, 1, or 2 times with those who used the category 3 or more times.

For each interaction category, we conducted a one-way between-subjects multivariate analysis of variance with HEXACO traits as dependent variables using SPSS GLM. In each case, we compared those with low scores to those with high scores on the relevant behavior category. The MANOVA for the *Friendly* category was not significant, $p = .35$, so *H8* was not supported. The MANOVAs for the *Funny* and *Special*

categories were also not significant, p > .50. The MANOVA for the *Romantic* category approached significance, $F(6, 83) = 1.96$, $p = .081$, Wilks' $\lambda = .88$, partial $\eta^2 = .12$.

Results of the MANOVA for the *Mean* category showed that that HEXACO traits differed significantly between low scorers (i.e., those who did not use any behavior from the category) and high scorers (those who used at least one behavior from the category), $F(6, 83) = 5.76$, $p < .001$, Wilks' $\lambda = .71$, partial $\eta^2 = .29$. Univariate tests showed that mean Emotionality and Agreeableness scores were lower for those who used the *Mean* category than those for those who did not (see Table 5-6). Therefore, *H9* was partially supported.

For psychopathic traits, we conducted t-tests comparing those with low scores to those with high scores on each interaction category (see Table 5-7). The significant test for the *Friendly* category showed that participants who used the category more had lower SRP-III scores than those who used the category less, therefore *H10* was supported. For the *Mean* category, the significant test showed that those who used the category more had higher SRP-III scores than those who did not, therefore *H11* was supported. The *Romantic* category approached significance, and as predicted (*H12*), the trend was for those who used the category more to have higher SRP-III scores than those who did not.

Discussion

The results of the current study indicate that player personality is only moderately related to in-game behavior and avatar traits in The Sims 3. Overall, the results provide some support for previous studies that have found that player personality traits are related to relevant avatar traits and in-game behaviors (e.g., Sung et al., 2011; Worth & Book, 2014; Worth & Book, 2015a; Worth & Book, 2015b; Yee et al., 2011).

Table 5-6
Univariate Results for MANOVA for Mean Interaction Category (Low Scorers (n = 78) versus High Scorers (n = 12)) on HEXACO Traits

	Low		High			
Variable	*M*	*SD*	*M*	*SD*	*F*	*p*
H	3.19	.58	3.35	.64	.76	.387
E	3.41	.63	2.61	.52	17.93	.000
X	3.47	.52	3.55	.76	.21	.651
A	3.21	.59	2.83	.74	3.99	.049
C	3.39	.60	3.33	.66	.13	.722
O	3.33	.65	3.39	.55	.09	.769

Note: H: Player Honesty-Humility, E: Player Emotionality, X: Player Extraversion, A: Player Agreeableness, C: Player Conscientiousness, O: Player Openness to Experience.

Player and Avatar Personality Traits

The results of the current study indicate that, to a certain extent, players select traits for self-characters (i.e., the characters in the current study that were intended to resemble avatars) that are related to their own personality traits. Of the 10 character traits we tested (with a total of 19 t-tests), 7 traits were associated with significant differences in relevant player personality traits between those who did and those who did not choose them. Perhaps not surprisingly, the differences that were observed suggest that these individuals chose traits that complement rather than oppose their general tendencies.

Table 5-7
Results of t-tests Comparing Low and High Scorers on Interaction Categories on SRP-III Total Scores

Category	Group	*M (SD)*	*t*	*p*
Friendly	Low	2.45 (.35)	2.73	.008
	High	2.26 (.34)		
Funny	Low	2.37 (.35)	0.38	.707
	High	2.34 (.36)		
Mean	Low	2.32 (.34)	-2.32	.023
	High	2.57 (.39)		
Romantic	Low	2.29 (.31)	-1.94	.056
	High	2.43 (.38)		
Special	Low	2.36 (.34)	0.18	.861
	High	2.35 (.37)		

Nonetheless, the fact that 8 of the 15 character traits tested showed no significant differences in the hypothesized player personality traits suggests that further work is needed to determine which other factors may be related to character trait selection. For example, it is certainly possible that some participants chose traits more or less at random, which would have reduced the degree of connection between character traits and player personality traits. In addition, participants who have played The Sims 3 before may have selected traits according to their prior knowledge of the ways that different traits influence characters' actions in the game. That is, in some cases the rules of the

game may have had more influence on players' choices than player personality (Ducheneaut, 2010).

It is also possible that some players selected character traits that reflect characteristics that they would like to have (i.e., "ideal self" characteristics), rather than characteristics that they currently do have (see, e.g., Przybylski et al., 2012). Some previous research indicates that players perceive their avatars as having traits that resemble their ideal selves more closely than their actual selves (e.g., Bessière et al., 2007). Similarly, several studies have found that there are significant mean differences between players and avatars on many personality traits, when players rate themselves and their avatars on the same scale (e.g., Ducheneaut et al., 2009; Worth & Book, 2015b). This suggests that players may view their avatars as being somewhat different than themselves, and it may be that this tendency was reflected in the current study. Although participants were instructed to create characters that would represent them, we did not instruct participants to specifically choose traits reflecting their current actual selves, rather than their ideal selves, or the version of themselves that they feel would be best suited to success in the video game. Future research could test the possibility that players tend to select more ideal (or more game-appropriate) traits by examining the connections between character personality traits and participants' self-reported ideal (and game-appropriate) personality traits.

Player Personality and In-Game Behaviors

In the current study, there were fewer connections between player personality and behavior than we anticipated, given previous research on the subject (e.g., Peng et al., 2008; Worth & Book, 2014; Worth & Book, 2015a). However, we found that

participants who used the *Friendly* category less often were higher in psychopathic traits, and that those who used the *Mean* category more often were higher in psychopathic traits and lower in Emotionality and Agreeableness. These connections are consistent with the quick-tempered, cold-hearted, and callous aspects of low Agreeableness, low Emotionality, and high psychopathy, respectively (Ashton et al., 2014; Hare & Neumann; 2008). However, given that so few participants chose to use actions from the *Mean* category, further research is needed to determine whether this effect can be replicated.

Two possible reasons for the absence of additional connections between personality and behavior should be considered. First, some participants may have been aware that the game was being recorded, which may have affected their willingness to use certain categories. Future research could address this possibility by using unobtrusive screen-capture software, rather than the in-game recording system, although participants might still assume that they are being recorded. Second, some participants may have spent much of the game-play time simply learning to play the game, rather than choosing preferred actions. The number of interactions for some participants was quite low, and game recordings for some participants seemed to show that they may not have fully understood how to control their characters. Although The Sims 3 was chosen in part for its relative simplicity of use, and, on average, participants reported enjoying and feeling able to play the game, lack of ability may have been a factor for some participants.

Connections between Players and Avatars

On average, participants reported that they did not prefer their self-characters over their other-characters. In addition, on average, players felt only moderate levels of Identification with and Attachment to their self-characters. Although this may have been

due, in part, to the fact that players were only acquainted with their avatars for a very short period of time, mean scores on Identification and Attachment were in fact quite similar to those observed for World of Warcraft avatars (Worth & Book, 2015b). Identification and Attachment were not correlated with Openness to Experience, which was unexpected based on previous research (Dunn & Guadagno, 2012; Worth & Book, 2015b). Instead, Identification was positively correlated with Extraversion and Conscientiousness, and Attachment was negatively correlated Extraversion. It is possible that these relationships indicate The Sims 3 encourages Identification and Attachment among different individuals than does World of Warcraft. In the Sims 3, realistic human-type characters are used, whereas in World of Warcraft, avatars may be human or they may be other fantasy-type characters (e.g., trolls, elves). Differences between games in the physical appearances or roles of the characters within the games may influence the degree to which players feel connected and similar to with their avatars.

Limitations and Conclusions

Some limitations of the current study were due to restrictions presented by the game itself. First, the game presents interaction options to the player based on chosen character traits as well as degree of intimacy and liking between characters. Therefore, the range of interactions available to different players is by no means the same. We attempted to reduce the influence of this by examining interaction categories only rather than specific behaviors. The interaction categories analyzed in the current study were presented to all participants, and thus the choices that participants made between these categories can be considered to be meaningful.

Second, due to the nature of the game, several specific actions can be selected from within different categories. For example, the specific action "Ask about day" is often presented to the player under the *Friendly* category. However, it can also be found under the *Special* category if the player has selected certain traits for the avatar, such as *Friendly* and *Good*, and it can sometimes be found as a direct action (with no category specified, thus placing it into the *None* category in the current study) if both characters are sitting down. Thus, two players might choose different categories but in fact choose the same action.

In the future, researchers might attempt to avoid potential complications arising from the categorization of actions by analyzing frequency of selection of specific actions. To do so, researchers would need to implement some method by which to group specific actions, as analyzing connections with each specific action would lead to an impractically large number of analyses. One possible solution would be to ask players familiar with The Sims 3 to group interactions into logical categories based on provided criteria. A high level of familiarity with the game would likely be needed so that judges could accurately rate whether an interaction tends to have positive or negative effects. This additional step was beyond the scope of the current study, but this method could prove useful for future studies.

Nonetheless, the current study presents some useful information regarding the correspondence between player personality traits, avatar personality traits, and in-game behaviors. In providing some support for previous studies (e.g., Jónsson & Snorrason, 2012; Worth & Book, 2014; Worth & Book, 2015b; Yee et al., 2011), the current study adds to the growing body of literature regarding the importance of personality in

influencing game-play decisions, and suggests that meaningful choices between different actions is important within complex video games. As more people spend more time playing video games, the ability to experience events in virtual worlds that are compatible with players' general tendencies will likely become increasingly important to player satisfaction.

References

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91,* 340-345. doi: 10.1080/00223890902935878

Ashton, M.C., & Lee, K., & de Vries, R.E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality factors: A review of research and theory. *Personality and Social Psychology Review, 18,* 139-152. doi: 10.1177/1088868314523838

Ashton, M.C., Lee, K., Perugini, M., Szarota, P., de Vries, R.E., Di Blas, L., Boies, K., & De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology, 86,* 356-366. doi: 10.1037/0022-3514.86.2.356

Bessière, K, Seay, A.F., & Kiesler, S. (2007). The ideal elf: Identity exploration in World of Warcraft. *Cyberpsychology and Behavior, 10,* 530-535. doi: 10.1089/cpb.2007.9994

Book, A., Visser, B.A., & Volk, A.A. (2015). Unpacking "evil": Claiming the core of the Dark Triad. *Personality and Individual Differences, 73,* 29-38. doi: 10.1016/j.paid.2014.09.016

Cohen, J. (2001). Defining identification: A theoretical look at the identification of audiences with media characters. *Mass Communication and Society, 4,* 245-264. doi: 10.1207/S15327825MCS0403_01

Ducheneaut, N. (2010). Massively multiplayer online games as living laboratories: Opportunities and pitfalls. In W.S. Bainbridge (Ed.). *Online Worlds: Convergence of the Real and the Virtual* (pp. 135-145). London: Springer-Verlag. doi: 10.1007/978-1-84882-825-4_11

Ducheneaut, N., Wen, M.-H.D., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. *Proceedings of the 2009 SIGCHI conference on Human Factors in Computing Systems*, 1151- 1160. doi: 10.1145/1518701.1518877

Dunn, R.A., & Guadagno, R.E. (2012). My avatar and me – Gender and personality predictors of avatar-self discrepancy. *Computers in Human Behavior, 28,* 97-106. doi: 10.1016/j.chb.2011.08.015

Egenfeldt-Nielsen, S., Smith, J.H., & Tosca, S.P. (2013). *Understanding video games: The essential introduction.* (2nd ed.). New York: Routledge.

Electronic Arts (2009). *The Sims 3* [PC Game]. Retrieved from http://www.theSims 3.com/home.html

Gilbert, R., Thadani, V., Handy, C., Andrews, H., Sguigna, T., Sasso, A., & Payne, S. (2014). The psychological functions of avatars and alt(s): A qualitative study. *Computers in Human Behavior, 32,* 1-8. doi: 10.1016/j.chb.2013.11.007

Hare, R.D. (2003). *The Hare Psychopathy Checklist – Revised.* (2nd Ed.). Toronto, ON, Canada: Multi-Health Systems.

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

John, O.P., Naumann, L.P., & Soto, C.J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, Measurement, and conceptual issues. In Oliver P. John, Richard W. Robins, Lawrence A. Pervin (Eds.), *Handbook of Personality: Theory and Research* (3rd Ed., pp. 114-158). New York, NY: Guilford Press.

Jónsson, S.A., & Snorrason, S.K. (2012). *Differences in the self between real life and MMORPGs measured through the HEXACO personality model: A case of EVE online.* (Undergraduate thesis, University of Iceland, Iceland). Retrieved from http://hdl.handle.net/1946/11867

Klimmt, C., Hefner, D., & Vorderer, P. (2009). The video game experience as "true" identification: A theory of enjoyable alterations of players' self-perception. *Communication Theory, 19,* 351-373. doi: 10.1111/j.1468-2885.2009.01347.x

Lee, K., & Ashton, M.C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality, 76,* 1001-1053. doi: 10.1111/j.1467-6494.2008.00512.x

Lee, K., & Ashton, M.C. (2014). The Dark Triad, the Big Five, and the HEXACO model. *Personality and Individual Differences, 67,* 2-5. doi: 10.1016/j.paid.2014.01.048

Lee, K., & Ashton, M.C. (n.d.) *Descriptive statistics and internal consistency reliabilities of the HEXACO-60 scales in a college student sample* [PDF]. Retrieved from http://hexaco.org/downloading.html.

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

McLeod, P.L., Liu, Y.-C., & Axline, J.E. (2014). When your Second Life comes knocking: Effects of personality on changes to real life from virtual world experiences. *Computers in Human Behavior, 39,* 59.70. doi: 10.1016/j.chb.2014.06.025

Neal, T.M.S., & Sellbom, M. (2012). Examining the factor structure of the Hare Self-Report Psychopathy scale. *Journal of Personality Assessment, 94,* 244-253. doi: 10.1080/00223891.2011.648294

Paulhus, D.L., Neumann, C.S., & Hare, R.D. (in press). *Manual for the Hare Self-Report Psychopathy (SRP) scale.* Toronto, ON, Canada: Multi-Health Systems.

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology and Behavior, 11,* 157-161. doi: 10.1089/cpb.2007.0026

Przybylski, A.K., Weinstein, N., Murayama, K., Lynch, M.F., & Ryan, R.M. (2012). The ideal self at play: The appeal of video games that let you be all you can be. *Psychological Science, 23,* 69-76. doi: 10.1177/0956797611418676

Sung, Y., Moon, J.H., Kang, M., Lin, J.-S. (2011). Actual self vs. avatar self: The effect of online social situation on self-expression. *Journal of Virtual Worlds Research, 4,* 4-21. doi: http://dx.doi.org/10.4101/jvwr.v4i1.1927

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics.* (5th Ed.). Boston, MA: Pearson Education.

Trepte, S., & Reinecke, L. (2010). Avatar creation and video game enjoyment: Effects of life-satisfaction, game competitiveness, and identification with the avatar. *Journal of Media Psychology, 22,* 171-184. doi: 10.1027/1864-1105/a000022

Turkle, S. (1995). *Life on the screen: Identity in the age of the internet.* New York: Simon & Schuster.

Van Looy, J., Courtois, C., De Vocht, M., & De Marez, L. (2012). Player identification in online games: Validation of a scale for measuring identification in MMOGs. *Media Psychology, 15,* 197-221. doi: 10.1080/15213269.2012.674917

Van Reijmersdal, E.A., Jansz, J., Peters, O., & Van Noort, G. (2013). Why girls go pink: Game character identification and game-players' motivations. *Computers in Human Behavior, 29,* 2640-2649. doi: 10.1016/j.chb.2013.06.046

Williams, K.M., Paulhus, D.L., & Hare, R.D. (2007). Capturing the four-factor structure of psychopathy in college students via self-report. *Journal of Personality Assessment, 88,* 205-219. doi: 10.1080/00223890701268074

Worth, N.C., & Book, A.S. (2014). Personality and behavior in a massively multiplayer online role-playing game. *Computers in Human Behavior, 38,* 322-330. doi: 10.1016/j.chb.2014.06.009

Worth, N.C., & Book, A.S. (2015a). Dimensions of video game behavior and their relationships with personality. *Computers in Human Behavior, 50,* 132-140. doi: 10.1016/j.chb.2015.03.056

Worth, N.C., & Book, A.S. (2015b). *Me, Myself, and Avatar: Avatar Personality in World of Warcraft.* Manuscript in preparation.

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

CHAPTER 6: General Discussion

The four studies included in this dissertation investigated the connections between player personality traits and self-representation and behavior in video games. More specifically, the studies examined the ways in which player personality traits, as measured by HEXACO traits and psychopathic traits, were linked to avatar personality traits and in-game behaviors (both self-reported and observed). In Studies 1, 2, and 4, the connections between player personality and in-game behavior in a MMORPG, in video games generally, and in a life-simulation game, respectively, were examined. In Studies 3 and 4, we examined the connections between player personality traits and avatar personality traits in a MMORPG and in a life-simulation video game, respectively. Together, these four studies present some reasonably similar results regarding the connections between player personality traits, avatar personality traits, and behaviors in video games. In addition, the results suggest that behavior and self-representation in video games is more consistent with, as opposed to contrary to, real-world tendencies.

Player Personality and Behavior in Video Games

The results of Study 1 and Study 2, and to a lesser degree, Study 4, show that player personality traits are related to different in-game behaviors in *World of Warcraft*, video games generally, and *The Sims 3*. These results contrast with those reported by McCreery, Krach, Schrader and Boone (2012), who found no significant relationships between player personality and behavior in World of Warcraft. The results of these three studies also showed some similarities in terms of the specific relationships observed.

Study 1 showed that self-reported player behaviors in World of Warcraft were related to player HEXACO and psychopathic traits. Six components of in-game behavior

were identified, and each component was related to at least one HEXACO trait and one psychopathic trait. In particular, the following correlations were observed: behaviors that involve attacking other players (i.e., the Player-versus-Player scale) were primarily negatively related to Honesty-Humility and positively related to psychopathic traits; behaviors that involve communicating and cooperating with other players in multi-player activities (i.e., the Social Player-versus-Environment scale) were positively related to Extraversion; behaviors aimed at collecting and producing goods (i.e., the Working scale) were positively related to Emotionality and Conscientiousness; helping other players (i.e., the Helping scale) was primarily positively related to Openness to Experience and Extraversion; role-playing and exploration behaviors (i.e., the Immersion scale) were primarily positively related to Openness to Experience; and activities that reflect the basic elements of the game (i.e., the Core Content scale) were primarily positively related to Emotionality and Honesty-Humility.

Likewise, Study 2 showed that self-reported player behaviors in video games were related to player HEXACO and psychopathic traits, although the magnitude of the correlations decreased somewhat after controlling for participant sex. The following correlations were observed: Aggressing behaviors were positively related to psychopathic traits and negatively related to Honesty-Humility; Helping behaviors were positively related to Agreeableness; Creating behaviors were negatively related to Conscientiousness and positively to the Interpersonal Manipulation facet of psychopathic traits; and Winning was positively related to the Erratic Lifestyle facet of psychopathic traits.

In Study 4, certain kinds of observed in-game behaviors in The Sims 3 were related to player psychopathic traits and HEXACO traits. Those who scored higher on psychopathic traits used more character interactions from the *Mean* and *Romantic*[11] categories, and fewer *Friendly* interactions, as compared to those who scored lower on psychopathic traits. In addition, those who scored lower on Emotionality and Agreeableness used more *Mean* character interactions than higher scorers. However, unlike Studies 1 and 2, in which all behavior scales were related to (at least one) personality trait(s), several interaction categories in Study 4 were not related to differences in personality traits.

Some similarities between the results of these three studies are particularly worth noting. First, all three studies showed some similarity in the connections between psychopathic traits and in-game behaviors. In each study, behaviors involving attacking, harassing (e.g., "unfair" player-versus-player behaviors like *corpse-camping*), or engaging in unkind interactions with other players' avatars or game-controlled characters were positively related to psychopathic traits. Therefore, it appears that individuals who tend to be manipulative, callous, irresponsible, and prone to antisocial behaviors (i.e., high in psychopathic traits; Hare & Neumann, 2008) act upon these tendencies in video games by behaving aggressively towards other players or other characters. Although previous research has not examined the connections between psychopathic traits specifically and behavior in video games, these correlations bear some similarity to the positive correlation between aggressive personality and aggressive behaviors observed by Peng, Liu, and Mou (2008).

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[11] At trend level.

Second, both player-versus-player behaviors specifically and aggressive behaviors generally were negatively related to Honesty-Humility. Much like the results discussed above regarding psychopathic traits, these results indicate that individuals who tend to be dishonest and entitled engage in more aggressive behaviors directed at other players' avatars and game-characters. It is interesting to note, however, that Honesty-Humility was not related to the use of *Mean* character interactions in The Sims 3. Instead, *Mean* interactions were related to low levels of Emotionality (i.e., coldness, independence; Ashton & Lee, 2007) and Agreeableness (i.e., impatience, anger). To a certain extent, these results provide support for the results of Yee, Ducheneaut, Nelson, & Likarish (2011), who found that those who were high in Big Five Agreeableness (which has some overlap with both Honesty-Humility and HEXACO Agreeableness; Ashton, Lee, & De Vries, 2014) was positively related to friendly interactions and negatively related to player-versus-player behavior in World of Warcraft.

Third, Helping behaviors in both Study 1 and Study 2 were positively related to Agreeableness, suggesting that general tendencies to be patient and kind are related to helping in a MMORPG and also video games generally. However, helping in World of Warcraft was more strongly related to both Openness to Experience and Extraversion than to Agreeableness. This may be a result of the nature of World of Warcraft and the likely connections between players in World of Warcraft as compared to video games more broadly. Players who help in World of Warcraft may often be helping players they do not know, as the online nature of this game allows players to interact with hundreds of other players. As discussed in Study 1, helping unknown others is likely to be influenced by general tendencies to prefer seeking out new experiences (i.e., high Openness to

Experience) and interacting with others (i.e., high Extraversion). In contrast, helping behaviors in video games generally may be more frequently directed towards others who are physically present with the player or who are already known to the player (i.e., friends and family members). This kind of helping is, therefore, less likely to be influenced by Openness to Experience and Extraversion, and more likely influenced by tendencies associated with Agreeableness like patience and kindness.

One of the primary goals of this dissertation was to evaluate the degree to which in-game behavior is consistent with player personality trait definitions. The results of studies 1, 2, and 4 suggest that behavior is, to a certain extent, consistent with player personality traits. Although some correlations are not easily interpretable as showing consistency with personality trait definitions (e.g., the correlation between Creating and Interpersonal Manipulation in Study 2), many of the observed correlations suggest some degree of consistency between real-world and in-game tendencies. Overall, the results do not provide conclusive evidence that players favor the use of video games as environments in which to behave in ways that would be contrary to their real-world tendencies, when compared with the behavior of other players. For example, there was no evidence that those who are typically sympathetic and kind are those who most frequently engage in aggressive behavior or behavior directed against other players (although they certainly may engage in these behaviors at a lower frequency). Likewise, it is perhaps not surprising to find that individuals who typically disregard the feelings of others in the real world (e.g., those who are high in psychopathic traits) do not behave more kindly in video games.

Although many of the observed correlations seem to be interpretable as consistent with individuals' general tendencies (i.e., personality trait definitions), several other correlations that might be considered to demonstrate consistency were not observed. For example, player-versus-player behavior was not significantly correlated with low levels of Emotionality, which might be expected given that some of the player-versus-player behaviors (e.g., corpse-camping) appear to show a general disregard for the feelings of others. It remains to be seen whether the absence of correlations like these reflects the particular pressures of the video games on individuals (i.e., restrictions imposed on players by the video games may have more influence on behavior than do players' general tendencies; Ducheneaut, 2010), or whether some other explanation is needed.

It is important to keep in mind that although many of the actions required in video games are unlike real-world actions, in-game behaviors are often related to real-world tendencies. The more relevant point is that the frequency with which players engage in certain behaviors can be understood as largely consistent with their general tendencies, in comparison with other players. Although "killing" is inconsistent with general tendencies to be kind (i.e., high Agreeableness) and honest (i.e., high Honesty-Humility), killing monsters in World of Warcraft is a largely unavoidable (and victimless) aspect of the game, and therefore, those who are high in Agreeableness and Honesty-Humility are likely to kill monsters regardless of the fact that this appears to be inconsistent with their personality traits. The observed correlations do not indicate that certain players do not engage in the violent aspects of the game. However, relative to those who are lower in Honesty-Humility, those with high levels of that trait engage in fewer attacks against

other players (Study 1), which suggests a difference in frequency of behavior that is consistent with personality.

The three studies examining in-game behavior present a somewhat unified picture of the connections between personality and in-game behavior. However, there are important differences to note as well. First, it is it is clear that personality is a better predictor of behavior in World of Warcraft (Study 1) than of behavior in video games more generally (Study 2), or of character interactions in The Sims 3 (Study 4). It is likely that there are several reasons for these differences. As I noted in the discussion section of Study 2, this may be due in part to the options inherent in different games and also to the people who play those games.

First, it is possible that the more time players spend in a video game, the more they are able to act on their personalities by choosing different behaviors. In Study 4, participants played The Sims 3 for a short period of time, and those who had not played the game before likely spent some portion of time exploring their available options or learning the interface rather than making personality-directed choices. Likewise, in Study 2, many participants played video games infrequently, and these participants also are likely to be sometimes acting on other goals (as discussed in the discussion section of Study 2). In contrast, many World of Warcraft players play for many hours every week (e.g., Billieux et al., 2013), and would therefore have more time to make choices based on their general tendencies.

Second, some games allow more behavioral choice than others. World of Warcraft, in particular, provides players with a high degree of behavioral choice. In general, players are not obliged to follow a particular path; players can choose to focus

primarily on end-game content like raids, but it is also possible to engage mainly in exploration and role-playing or player-versus-player activities. Some players experiment with truly alternative ways to play, such as leveling their avatars without killing anything (Petitte, 2012) or leveling without dying (Lylirra, 2012). Therefore, World of Warcraft may allow players more opportunity to choose from different behaviors than many other games where players must follow a set path or progress through standardized objectives. Thus, MMORPGs like World of Warcraft may encourage players to spend more time playing, and allow a greater variety of ways to play, than many other video games. As a result, players are likely to be better able to express their personalities by choosing in-game behaviors.

Player Personality and Avatar Personality

The results regarding player-avatar personality similarity observed in Studies 3 and 4 suggest that player personality traits are related to avatar personality traits. In Study 3, World of Warcraft players' and avatars' personality traits were positively correlated for five HEXACO traits, as well as for all psychopathic traits. The exception was Extraversion, which showed no significant correlation between players and avatars. This suggests that, for the majority of traits, the rank order for avatars within the sample was approximately similar to that of participants. In addition, avatars' mean scores were significantly lower scores than players' mean scores on Honesty-Humility, Emotionality, Agreeableness, and Openness to Experience, and significantly higher than players' mean scores on Extraversion and psychopathic traits (no difference was observed for Conscientiousness).

In Study 4, significant differences were observed in some player personality traits between those who did and did not choose certain avatar (i.e., self-character) traits in The Sims 3. Differences in all six HEXACO personality traits, as well as total psychopathic traits, were observed in relation to the selection of relevant avatar traits. Specifically, Openness to Experience was higher among those who chose the *Artistic* trait, Extraversion was higher among those who chose the *Charismatic* trait, and Conscientiousness was higher among those who chose the *Genius* or *Perfectionist* traits. Significant differences were also observed in relation to the selection of the *Friendly* avatar trait; players who chose the *Friendly* trait for their self-characters were higher in Honesty-Humility, Emotionality, and Agreeableness, and lower in total psychopathic traits.

The results of Study 3 provide some support for previous research. In particular, the correlations between players and avatars support the findings of Sung, Moon, Kang, and Lin (2011), and the mean differences between players and avatars are quite similar to those observed by Jónsson and Snorrason (2012) in the MMORPG *Eve Online*. In contrast, it is difficult to compare the results of Study 4 to those of previous research, given the specific nature of the avatar traits that were available within The Sims 3. However, the results of Study 4 can broadly be interpreted as showing that players often choose avatar traits that are similar to their own traits, and as such, also provide support for the findings of Sung et al. (2011).

In addition, Studies 3 and 4 both examined the degree to which players identified with and felt attached to their avatars. Greater player-avatar personality similarity was related to higher levels of identification in Study 3, which is in keeping with results

reported by Trepte & Reineke (2010). Further, player Openness to Experience was positively related to both Identification and Attachment in Study 3, whereas in Study 4, Identification was positively related to Extraversion and Conscientiousness, and Attachment was negatively related to Extraversion. As discussed in Study 4, this may indicate that different video games prompt higher levels of identification and attachment among different individuals.

Overall, it appears that player personality was more strongly related to avatar personality in Study 3 than in Study 4. This difference may be due simply to the constraints imposed by the design of Study 4. It is possible that the use of the game-defined character traits introduced too much variability and that greater similarity between players and avatars might have been revealed if players had rated their self-characters on the HEXACO-60. Future research could address this potential limitation by asking players to rate their self-characters in The Sims 3 on the HEXACO traits.

However, the difference in player-avatar similarity might also be a result of the length of time that players were “acquainted” with their avatars. In the study of World of Warcraft players (Study 3), players were reporting on the personalities of their most-frequently played avatars, which for many players would likely represent hours, days or even months of use. In contrast, in Study 4, participants created avatars in The Sims 3 as part of the study, and used these avatars to play the game for only 20 minutes. Participants in Study 3 may have felt more similar to their avatars because of the length of time they had spent using those avatars.

Overall, the evidence from Studies 3 and 4 suggests that there is some similarity between players and avatars, whether the avatars are pre-existing or newly-created. To a

certain degree, the results of these studies suggest that players create avatars with similar personality traits, but also that players may view their avatars as having traits that are particularly suited for the video game for which they are created. In these studies, avatars were not direct copies of their creators, but instead reflected the constraints or opportunities presented by the games. The results seem to support assertions made by Bartle (2004), who suggested that most players believe that their personalities in video games are slightly, but not completely, different from their real-world personalities.

Connections with Personality Research

In the four studies comprising this dissertation, two different yet complementary models were used to measure personality. First, the HEXACO model of personality (Ashton & Lee, 2007; Lee & Ashton, 2004), as operationalized by the HEXACO-60 (Ashton & Lee, 2009), was used to measure personality traits in a broad and comprehensive manner. Second, the Self-Report Psychopathy Scale – III (SRP-III; Paulhus, Neumann, & Hare, in press) was used to measure of four facets of psychopathic traits and total psychopathic traits. The results of the current studies suggest that both of these measures were useful for describing player and avatar personality traits and for examining connections with in-game behavior.

Several correlations between player personality and in-game behavior suggest that use of the HEXACO model helped to clarify personality-behavior connections that might not have been clear had a measure of the Big Five been used instead. The HEXACO model includes the Honesty-Humility factor, and the content included in this factor is not well-represented within the Big Five model (although some of this content is included in Big Five Agreeableness; Ashton et al., 2014). Correlations between Honesty-Humility

and both the Player-versus-Player scale (in World of Warcraft) and the Aggressing scale (in video games generally) suggest that it is tendencies to be manipulative and entitled that are most strongly related to these behaviors, rather than tendencies to be angry and impatient (i.e., low Agreeableness). The use of a personality model that includes honesty and agreeableness-related content, and which distinguishes between these two different tendencies, appears to have been useful in the current research.

The use of a measure of psychopathic traits (specifically, the SRP-III; Paulhus et al., in press) in the current research appears to have also provided some additional explanatory power, beyond that provided by the HEXACO-60. Several correlations were observed between in-game behaviors and psychopathic traits that were not likewise observed with HEXACO traits, suggesting that use of the SRP-III provided additional information regarding the ways that personality traits are related to in-game behaviors. Results generally showed that psychopathic traits are related to behaviors directed against other players. Given these results, and the fact that psychopathic traits have been found to be related to cyberbullying (Gibb & Devereux, 2014) and online trolling (Buckels, Trapnell, & Paulhus, 2014), psychopathic traits may be worth further exploration with respect to video game behaviors. It may be that video game environments are relatively consequence-free spaces where individuals with high levels of psychopathic traits can express their antisocial tendencies.

An additional implication for personality research relates to the participants themselves. World of Warcraft players (Study 1) were somewhat lower in Extraversion[12]

[12] Although mean scores for Emotionality also appear to be somewhat lower for *World of Warcraft* players in Study 1 (M = 2.86; SD = .67), as well as *Eve Online* players (M = 2.61; SD = .61; Jónsson & Snorrason; 2012) as compared to the large sample of students (M = 3.36; SD = .70; Lee & Ashton, n.d.), they are reasonably similar to the normal scores for men only (M = 2.87; SD = .64; Lee & Ashton, n.d.). Jónsson

(*M* = 3.05, *SD* = 0.65) as compared to Brock University students in Study 2 (*M* = 3.47, *SD* = .56) and in Study 4 (*M* = 3.48, *SD* = 0.55), as well as a large sample of students (*M* = 3.51, *SD* = 0.62) reported by Lee and Ashton (n.d.). Mean Extraversion scores for World of Warcraft players (Study 1) were more similar to those of the players of the MMORPG Eve Online (*M* = 3.10; *SD* = .73; Jónsson & Snorrason; 2012). It is not clear whether this indicates that MMORPG players, in general, tend to be less extraverted than students, or whether it is simply those players who completed the surveys who are less extraverted (perhaps the more extraverted players are too busy interacting with other players in-game to complete the surveys). Nevertheless, this lower level of Extraversion among MMORPG players in these samples is an interesting finding that deserves further attention in personality research more generally.

Connections with Video Game Research

The four studies included in this dissertation add to the previous research on video games by clearly demonstrating the importance of studying individual differences, and specifically player personality traits, in relation to video game contexts and outcomes. The current studies indicate that even within the same video game, different individuals prefer different behaviors. This supports the assertion made by Egenfeldt-Nielsen et al. (2013) that players can choose which games to play and how to play within those games. As a result, different players may have very different experiences of similar video games.

A great deal of research to date has focused on the possible effects of playing violent video games (e.g., Anderson et al., 2010; Elson & Ferguson, 2013). The current

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and Snorrason (2012) report that 95% of their sample was male, and the World of Warcraft sample (study 1) included 79% male players. Emotionality is typically found to be lower in men than in women (Ashton & Lee, 2007), and thus the lower mean score for Emotionality does not appear to be particularly unique to MMORPG players.

research adds to the growing evidence that there are a number of additional variables that should be considered in relation to these video games, such as degree of competition within the game (Adachi & Willoughby, 2011a, 2011b, 2013) and avatar characteristics (e.g., Yang, Huesmann, & Bushman, 2014; Yoon & Vargas, 2014). Specifically, the results of Study 1 suggest that players who are higher in psychopathic traits and lower in Honesty-Humility are more likely to engage in player-versus-player behavior. Players who more frequently engage in this kind of combat will kill more players' avatars than other players, and will, therefore, experience a greater number of player-directed violent acts than other players. Future research on violence in video games and related outcomes should take this into account, as it suggests that different players may experience different degrees or types of violence within the same video game. Future research might take into account whether participants are the initiators or targets of aggressive actions, and whether player-initiated aggressive actions are directed at other players' avatars or game-controlled characters, when examining the effects of video game violence on subsequent aggressive behaviors.

In addition, the current research suggests that video games offer both promise and potential problems with respect to the study of real-world concepts. Researchers have long been interested in the possibility of studying real-world concepts within video games like World of Warcraft or online virtual worlds like Second Life (Bainbridge, 2007; Ducheneaut, 2010). The current research suggests that there is some similarity between real-world tendencies and behavior in video games, which would allow researchers to have greater confidence in the applicability to the real world of effects observed in video games. However, differences between players and their avatars observed in the current

research also suggest that research in video games that is intended to elucidate real-world concepts should be interpreted with caution. Although video games may be viewed as potentially ideal environments in which to test real-world theories, they may be different enough to make this impractical (Ducheneaut, 2010).

Limitations and Future Research

Certain limitations of the current research must be taken into consideration. First, the current research may have been limited by the selection of participants. Three samples were involved in the current research; a sample of World of Warcraft players and two samples of students from the same university. The use of the World of Warcraft player sample ensured that the current research was not limited to university students alone and can be more broadly applied to video game players generally. However, in each sample, participants were self-selecting and may not be representative of either World of Warcraft players specifically or MMORPG players generally (in the case of Studies 1 and 3), or university students generally (in the case of Studies 2 and 4). Nonetheless, similarities between the four studies, as well as between the current studies and previous studies (e.g., Jónsson & Snorrason, 2012; Yee et al., 2011) provide some assurance that the current findings are not artifacts of the samples used. In order to determine the degree to which the current results apply across samples, future research on the connections between personality and behavior and self-representation in video games should include samples of players of varying demographics, as well as players of a variety of video games.

Second, the measures of behavior used in the current research were somewhat limited and require further development. The current research employed two different

self-report measures of in-game behavior and one observational measure of in-game behavior, in order to sample a variety of behaviors and avoid restricting results to one method or one set of behaviors. However, the behavior scales created for use in Studies 1 and 2 were otherwise untested, and therefore the extent to which they are comprehensive and valid measures of behavior in World of Warcraft and video games generally is not yet clear. In the future, researchers might survey players of a variety of video games on their typical video game behaviors using a free response format. The responses gathered from this kind of survey could then be condensed and compiled into surveys specific to individual video games or video games more generally.

In addition, the measure of behavior in Study 4 was limited to character interactions, and mean rate of usage for several of the categories was quite low. Therefore, this measure may have under-represented the kinds of behavioral choices that are available in The Sims 3. Participants in Study 4 were instructed to focus mainly on the interactions between characters, but there are many other possible activities within the game that are also worth examining in relation to personality. For example, players can take care of their characters' needs (e.g., need for sleep), and differences in the care that players take to keep their characters' needs satisfied might be related to personality traits like Conscientiousness or Emotionality. More generally, future research should examine the feasibility of including other forms of observed behavior into studies of different video games.

Third, the current research primarily addresses the ways that players behave and represent themselves in video games via their main or most-frequently played avatars. Study 2 did not specifically address the use of avatars in video games, and does,

therefore, provide additional evidence about the ways that different individuals behave in video games more generally. However, Studies 1 and 3 were limited to players' actions and self-representation via their most-frequently played avatar in World of Warcraft, and Study 4 was limited to players' actions and self-representation via two characters. Qualitative research suggests that players may use *alts* (i.e., alternate characters; characters that are less-frequently used than the main or primary character) in order to experiment with different activities or facets of their selves (Gilbert et al., 2014; McLeod & Leshed, 2011). In this sense, players may still use video games to experiment with different behaviors or versions of themselves, despite the fact that their primary avatars are much like themselves. Future research should investigate the connections between player personality and the characteristics of players' alternate characters, as this will help to elucidate more fully the degree to which players behave and represent themselves in video games in ways that are consistent with their real-world tendencies.

Conclusions

The four studies that comprise this dissertation provide some insight into the connections between player personality and in-game behavior and self-representation in video games. In all four studies, connections between player personality and avatar characteristics, as well as between player personality and in-game behavior, were observed that can be interpreted as more consistent with than contrary to personality trait definitions. The results of the current research suggest that although video games like World of Warcraft present players with opportunities to behave in ways that are very unlike real-world behaviors, players tend to select actions that are largely compatible with their real-world tendencies. Video games should not be viewed as environments in which

players largely break away from the constraints of the real world. Rather, video games are better understood as places in which players generally behave as they do in the real world, as compared to other players, and within the scope of options provided by the games they play. Self-representation in video games can similarly be described as largely consistent with real-world tendencies, but also as adapted to the pressures or opportunities of the video games being played.

In the future, video games may be used for many different reasons, and the trend to expand the scope of the purpose of video games will make the importance of understanding individual differences in behavior within video games increasingly evident. Even now, video games are being used to help accomplish real-world objectives. For example, players can use video games to make friends (Axelsson & Regan, 2006) and to engage in physical activity (Peng, Crouse, & Lin, 2013). Video games are also now being used to assist in the treatment of disorders (Fernandez-Aranda et al., 2012) and in scientific research (e.g., players of the video game *Play to Cure: Genes in Space* analyze real data related to certain cancers; Cancer Research UK, n.d.). Virtual reality headsets, which are currently in development and which are intended to allow players to feel as though they are truly immersed "within" a video game (Ward, 2015), will also add another dimension to the current state of video games and prompt researchers and the public alike to reconsider the boundaries between the real world and the virtual worlds in video games.

As video games become increasingly popular and are more fully integrated into different aspects of life, understanding different players' in-game behavior and self-representation will become ever more important. An increase in the prevalence of online

video games will likewise increase the frequency with which individuals play video games with friends and strangers around the world. The current research represents an important starting point for better understanding how different individuals behave in video games, and for understanding which individuals are more likely to behave in ways that are beneficial or detrimental to other players. In the future, it is likely that more people will play more often, that games will become more immersive, more fun, and more compelling for increasing numbers of individuals (Bainbridge, Lutters, Rhoten, & Lowood; 2010; Castronova, 2007). As a consequence, there will more people escaping from the real world in order to spend time in the virtual worlds of video games, and it is essential that we understand what they do and who they are while they are there.

References

Adachi, P.J.C., & Willoughby, T. (2011a). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1,* 259-274. doi: 10.1037/a0024908

Adachi, P.J.C., & Willoughby, T. (2011b). The effect of violent video games on aggression: Is it more than just the violence? *Aggression and Violent Behavior, 16*, 55-62. doi: 10.1016/j.avb.2010.12.002

Adachi, P.J.C., & Willoughby, T. (2013). Demolishing the competition: The longitudinal link between competitive video games, competitive gambling, and aggression. *Journal of Youth and Adolescence, 42,* 1090-1104. doi: 10.1007/s10964-013-9952-2

Anderson, C.A., Shibuya, A., Ihori, N., Swing, E.L., Bushman, B.J., Sakamoto, A., Rothstein, H.R., & Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin, 136,* 151-173. doi: 10.1037/a0018251

Ashton, M.C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review, 11,* 150-166. doi: 10.1177/1088868306294907

Ashton, M.C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment, 91,* 340-345. doi: 10.1080/00223890902935878

Ashton, M.C., & Lee, K., & de Vries, R.E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality factors: A review of research and theory. *Personality and Social Psychology Review, 18,* 139-152. doi: 10.1177/1088868314523838

Axelsson, A.-S., & Regan, T. (2006). Playing Online. In P. Vorderer & B. Jennings (Eds.), *Playing video games: Motives, responses, and consequences* (pp. 77-88). New York: Routledge.

Bainbridge, W.S. (2007). The scientific research potential of virtual worlds. *Science, 317,* 472-476.

Bainbridge, W.S., Lutters, W., Rhoten, D., & Lowood, H. (2010). The future of virtual worlds. In W.S. Bainbridge (Ed.). *Online Worlds: Convergence of the Real and the Virtual* (pp. 289-302) London: Springer-Verlag. doi: 10.1007/978-1-84882-825-4_2

Bartle, R.A. (2004). *Designing Virtual Worlds*. New Riders: Berkeley, CA.

Billieux, J., Van der Linden, M., Achab, S., Khazaal, Y., Paraskevopoulos, L., Zullino, D., & Thorens, G. (2013). Why do you play World of Warcraft? An in-depth exploration of self-reported motivations to play online and in-game behaviors in the virtual world of Azeroth. *Computers in Human Behavior, 29,* 103-109. doi: 10.1016/j.chb.2012.07.021

Buckels, E.E., Trapnell, P.D., & Paulhus, D.L. (2014). Trolls just want to have fun. *Personality and Individual Differences, 67,* 97-102. doi: 10.1016/j.paid.2014.01.016

Cancer Research UK (n.d.). Play to cure: Genes in space. Retrieved from: http://www.cancerresearchuk.org/support-us/play-to-cure-genes-in-space

Castronova, E. (2007). *Exodus to the virtual world*. New York: Palgrave MacMillan.

Ducheneaut, N. (2010). Massively multiplayer online games as living laboratories: Opportunities and pitfalls. In W.S. Bainbridge (Ed.). *Online Worlds: Convergence of the Real and the Virtual* (pp. 135-145). London: Springer-Verlag. doi: 10.1007/978-1-84882-825-4_11

Egenfeldt-Nielsen, S., Smith, J.H., & Tosca, S.P. (2013). *Understanding video games: The essential introduction.* (2nd ed.). New York: Routledge.

Elson, M., & Ferguson, C.J. (2013). Twenty-five years of research on violence in digital games and aggression: Empirical evidence, perspectives, and a debate gone astray. *European Psychologist, 19,* 33-46. doi: 10.1027/1016-9040/a000147

Fernández-Aranda, F., Jiménez-Murcia, S., Santamaría, J.J., Gunnard, K., Soto, A., Kalapanidas, E.,… Penelo, E. (2012). Video games as a complementary therapy tool in mental disorders: PlayMancer, a European multicenter study. *Journal of Mental Health, 21,* 364-374. doi: 10.3109/09638237.2012.664302

Gibb, Z.G., & Devereux, P.G. (2014). Who does that anyway? Predictors and personality correlates of cyberbullying in college. *Computers in Human Behavior, 38,* 8-16. doi: 10.1016/j.chb.2014.05.009

Gilbert, R., Thadani, V., Handy, C., Andrews, H., Sguigna, T., Sasso, A., & Payne, S. (2014). The psychological functions of avatars and alt(s): A qualitative study. *Computers in Human Behavior, 32,* 1-8. doi: 10.1016/j.chb.2013.11.007

Hare, R.D., & Neumann, C.S. (2008). Psychopathy as a clinical and empirical construct. *Annual Review of Clinical Psychology, 4,* 217-246. doi: 10.1146/annurev.clinpsy.3.022806.091452

Jónsson, S.A., & Snorrason, S.K. (2012). *Differences in the self between real life and MMORPGs measured through the HEXACO personality model: A case of EVE online.* (Undergraduate thesis, University of Iceland, Iceland). Retrieved from http://hdl.handle.net/1946/11867

Lee, K., & Ashton, M.C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39,* 329-358, doi: 10.1207/s15327906mbr3902_8

Lylirra. (Feb. 10, 2012). *Til death do you part*. [Blog posting]. Retrieved from http://us.battle.net/wow/en/blog/4452527/Till_Death_Do_You_Part-2_10_2012#blog

McLeod, P. L. & Leshed, G. (2011). As Long as They Don't Know Where I Live: Information Disclosure Strategies for Managing Identity in Second Life. In A. Peachy & M. Childs (Eds.). *Reinventing Ourselves: Contemporary Concepts of Identity in Virtual Worlds* (pp. 191 – 211). London, UK: Routledge.

McCreery, M.P., Krach, S.K., Schrader, P.G., & Boone, R. (2012). Defining the virtual self: Personality, behavior, and the psychology of embodiment. *Computers in Human Behavior, 28,* 976-983. doi: 10.1016/j.chb.2011.12.019

Paulhus, D.L., Neumann, C.S., & Hare, R.D. (in press). *Manual for the Hare Self-Report Psychopathy (SRP) scale.* Toronto, ON, Canada: Multi-Health Systems.

Peng, W., Crouse, J., & Lin, J.-H. (2013). Using active video games for physical activity promotion: A systematic review of the current state of research. *Health Education and Behavior, 40,* 171-192. doi: 10.1177/1090198112444956

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology and Behavior, 11,* 157-161. doi: 10.1089/cpb.2007.0026

Petitte, O. (Oct. 14, 2012). *Powerful pacifism: World of Warcraft player reaches level 90 with no kills.* Retrieved from: http://www.pcgamer.com/world-of-warcraft-level-90-no-kills/

Sung, Y., Moon, J.H., Kang, M., & Lin, J.-S. (2011). Actual self vs. avatar self: The effect of online social situation on self-expression. *Journal of Virtual Worlds Research, 4,* 4-21. doi: 10.4101/jvwr.v4i1.1927

Trepte, S., & Reinecke, L. (2010). Avatar creation and video game enjoyment: Effects of life-satisfaction, game competitiveness, and identification with the avatar. *Journal of Media Psychology, 22,* 171-184. doi: 10.1027/1864-1105/a000022

Ward, M. (Jan. 8, 2015). CES 2015: Is VR about to become a reality? Retrieved from: http://www.bbc.com/news/technology-30721093

Yang, G.S., Huesmann, L.R., & Bushman, B.J. (2014). Effects of playing a violent video game as male versus female avatar on subsequent aggression in male and female players. *Aggressive Behavior, 40,* 537-541. doi: 10.1002/1b.21551

Yee, N., Ducheneaut, N., Nelson, L., & Likarish, P. (2011). Introverted elves and conscientious gnomes: The expression of personality in World of Warcraft. *Proceedings of the 2011 SIGCHI conference on Human Factors in Computing Systems,* 753-762. doi: 10.1145/1978942.1979052

Yoon, G., & Vargas, P.T. (2014). Know thy avatar: The unintended effect of virtual-self representation on behavior. *Psychological Science, 25,* 1043-1045. doi: 10.1177/0956797613519271

Appendix A

Study 1 and Study 3

In-Game Behavior Questionnaire

The following questions are about some of the different things that people can do in World of Warcraft.

How often do you…

Rating scale:

1	2	3	4	5	6	7
Never	Almost Never	Rarely	Sometimes	Often	Very Often	Almost all of the time

1. Take on the role of tank in groups or raids?
2. Take on the role of DPS (damage per second) in groups or raids?
3. Take on the role of healer in groups or raids?
4. Work on earning or acquiring gold?
5. Fight players of the opposite faction (PvP combat)?
6. Make, build, or enchant things (such as potions, weapons, or armor)?
7. Work with others on a quest or in a dungeon?
8. Work on acquiring mounts or pets?
9. Make, acquire, or use unusual items (such as clothing with no armor value or items with funny or unexpected effects)?
10. Kill players of the opposite faction who are much lower level than you (gank)?
11. Work on completing achievements?
12. Give advice to other players?
13. Participate in raids?
14. Fight Non Player Characters (NPCs, like guards) of the opposite faction?
15. Work on quests alone?
16. Heal or cast buffs on other players?
17. Explore?
18. Compete in battlegrounds?

19. Roleplay?
20. Chat with other players?
21. Look for locations that few players know about?
22. Help other players?
23. Sell high-value items (such as high-level armor) or provide high-value services (such as high-level enchantments)?
24. Work on leveling up?
25. Give gold, armor, resources, etc., to other players?
26. Discuss or learn about game lore?
27. Act as a leader in dungeons or raids?
28. Work with guild members?
29. Work on improving your playing skills or technique?
30. Work on acquiring better or rare weapons or armor?
31. Make friends or develop relationships with other players?
32. Steal kills from another player?
33. Gather resources from the environment (such as herbs or ore)?
34. Duel with players from the same faction as you?
35. Work on improving your character's reputation?
36. Try to complete quests or dungeons as quickly as possible?
37. Fight monsters (mobs)?
38. Develop or act out a history or a personality for your character?
39. Engage in corpse camping?
40. Compete in arenas?
41. Work on progressing through raid content?

Appendix B

Study 2

General Video Game Behavior Questionnaire

The following questions are about some of the different things that people can do in different video games.

Please think about what you do in **ALL** the video game(s) you have played.

If an action is **impossible** to do in any of the games you play, **please select N/A (Not Applicable).**
If an action is possible, but you never do it, please select Never.

In the video games that you play, how often do you…

Rating scale:

1	1	2	3	4	5	6	7
N/A	Never	Almost Never	Rarely	Sometimes	Often	Very Often	Almost all of the time

1. Try to improve your own previous score or record?
2. Create or design something in the game?
3. Participate in a fight, battle, or war?
4. Help another (player or game character) get better at the game?
5. Select a game character to play as?
6. Destroy objects, buildings, cars, or other inanimate (non-living) things?
7. Work on acquiring new, better, or more items?
8. Try to do better than an opponent (player or game character)?
9. Try something that is not usually done?
10. Damage, injure, kill, or destroy other players (controlled by other people)?
11. Give advice to another (player or game character) about the game?
12. View the game action from the point of view of one character?
13. Build objects, items, or structures?

14. Try to prevent an opponent (player or game character) from winning or completing a task?
15. Use a weapon (e.g., a gun, knife, sword, etc.)?
16. Work on achieving a high score?
17. Try to make the game more difficult for an opponent (player or game character)?
18. Work with another (player or game character) on a task?
19. Organize, sort, or categorize objects?
20. Try to beat an opponent's (player or game character's) score or rank?
21. Work on finishing the game or completing all the parts of the game?
22. Try different strategies for playing the game?
23. Create a character to represent you in the game?
24. Try to win (the race/the match/the game/etc.)?
25. Give items/loot/objects to another (player or game character)?
26. Try a new character, strategy, direction, course, etc.?
27. Show or tell another (player or game character) how to do something in the game?
28. Damage, injure, kill, or destroy game characters (controlled by the game)?
29. Work on improving your playing skills or technique?
30. Explore?
31. Work on advancing to the next level/stage/part of the game?
32. Talk to or communicate with other players in the game?
33. Take on a leadership role?
34. Try to finish the game as quickly as possible?

Appendix C

Study 3 and Study 4

Avatar Connection Scale

Instructions for Study 3: The following statements are about the character that you have played **most frequently in the past 6 months** (the same character you just described).

Instructions for Study 4:
The following statements are about your **self-character** (the **first** character you created). Please rate the degree to which you agree with the following statements about **your self-character**.

Rating scale:

1	2	3	4	5	6	7
Disagree Strongly	Disagree Somewhat	Disagree Slightly	Neither Disagree nor Agree	Agree Slightly	Agree Somewhat	Agree Strongly

1. My self-character behaved much like I would.
2. My self-character was basically an extension of me.
3. My self-character had more bad qualities than me.
4. I felt upset when something bad happened to my character.
5. My character was better than me in a lot of ways.
6. My character's behaviour didn't reflect how I would behave.
7. My character had qualities that I don't have.
8. My character was me.
9. I only cared about my character as a piece of the game.
10. My character was much like the worst side of me.
11. I felt some attachment to my character.
12. My character was a lot like me.
13. I didn't really have any feelings about my character.

14. My character had more good qualities than me.

15. My character was not much like me.

16. My character was worse than me in a lot of ways.

17. My character would be a very different person than me.

18. My character was much like the best side of me.

19. I would feel sorry for my character if he/she died.

20. My character was like me in many ways.

21. I cared about what happened to my character.

22. My character was quite different from me.

Appendix D

Study 4

Game Enjoyment and Competence

The following statements are about your experience with the video game you just played. Please rate the degree to which you agree or disagree with the following statements. (Circle your response.)

Rating scale:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral (Neither Agree nor Disagree)	Agree	Strongly Agree

1. I enjoyed creating characters for this game.

2. I felt in control of what was happening in the game.

3. I wanted things to go well in the game.

4. This game was boring.

5. I thought the game was easy enough to play.

6. I didn't put too much thought into what I was doing in the game.

7. I didn't really enjoy the game.

8. I couldn't keep track of what was going on in the game.

9. I cared about what was happening in the game.

10. Overall, this game was interesting to play.

11. I felt like there was too much happening in the game.

12. I had fun playing this game.

13. I would **not** want to play this game again.

14. I didn’t really care about what happened in the game.

15. I enjoyed controlling the characters in the game.

Appendix E

Study 4

Preference for Self-character over Other-character

The following are statements about your self-character (the **first** character you created) and your other-character (the **second** character you created).

Please rate the degree to which you agree or disagree with these statements. (Circle your response.)

Rating Scale:

1	2	3	4	5
Strongly Disagree	Disagree	Neutral (Neither Agree nor Disagree)	Agree	Strongly Agree

1. I cared more about my self-character than about the other-character.
2. The well-being of my self-character was more important to me than that of the other-character.
3. I cared about the two characters about equally. (R)
4. I was more interested in what was happening to my self-character than to the other-character.
5. I didn't really keep track of which character was which. (R)

Appendix F

Study 4

Details regarding Procedure

1) Participants read and signed an informed consent form. The researcher informed the participants that the goal of the current study was to look at "the differences between people in their experiences with playing a video game", and explained the sequence of activities in the study.

2) Participants were asked to complete a demographic information form, the HEXACO-60, and the SRP-III.

3) Participants were provided with a basic explanation regarding the nature of the game, The Sims 3. Participants were then asked to create a *self-character* using the game's character creation interface. Specifically, they were asked to "create a character that will represent you" and were informed that they would use this character in the game later on. The game provides a random character to start with, and participants were informed that they could change everything about that random character in order to make it their own. Instructions were particularly provided regarding the way to add character traits for their characters. The experimenter explained that character traits were divided into four categories, and that participants should choose one trait from each category plus one more from any category, for a total of five traits. Participants were told that the traits selected would influence how their character would behave in the game. Participants were given approximately 15 minutes to create the self-character.

4) Participants were asked to create a second character (hereafter referred to as the *other-character*) with whom their own character would like to interact. Participants were

instructed to add character traits in the same manner as for the self-character, and reminded that "when you are choosing traits, think about what kind of person your character would like to interact with." Participants were given approximately 10 minutes to create the other-character.

5) Participants were asked to complete a short questionnaire about previous experience with video games. During this time, the first author placed the two characters created by the participant into a house within the game (the same house was used for all participants).

6) The first author then provided instructions for playing the game, and demonstrated how to use the game interface while the participant watched. Participants were asked to "focus mainly on the interactions between the characters you created" while playing the game. They were also informed that they should monitor and take care of their Sims needs, and were shown how to accomplish that. Participants played the game for 20 minutes using the characters they had created. Participants were able to control the behavior of both their own self-character and the other-character (one at a time), and could switch between characters at any time. Sound was turned off throughout the game, in order to reduce distraction. Participants were not informed that their game-play would be recorded; however, a small icon was present in the top right-hand corner of the screen indicated that the in-game recording system was working, and this would likely be recognizable to individuals with previous experience with the game.

7) Participants completed the previous experience with the Sims question, the Game Enjoyment Questionnaire, the Preference for Self-character over Other-character scale, the Avatar Connection Scale, and the suspicion-checking question.

8) Participants were debriefed, and the researcher explained that their game-play had been recorded. Participants were asked if they consented to have their recording used in the current study. All participants consented and signed a re-consent form allowing the use their recording. Finally, participants were presented with an information sheet and were thanked for participating.

Appendix G

Study 4

Script

Note: The researcher followed this script with each participant. The script was used starting after participants had signed the informed consent form (Step 1 in Details regarding Procedure).

Part 2 – Introduction to the Study and Instructions for Questionnaires

In this study we're looking at the differences between people in their experiences with playing a video game.

So there are three parts to this study.

First, I'd like you to fill out a couple of questionnaires that are about you. Second, you will try out the video game, and there will be one short questionnaire to do in between testing the two parts of the game. And then last, I'll ask you to answer some questions about your impressions of the video game.

So first, I'd like you to fill out these questionnaires. When you're done, please put your questionnaires into this envelope. And you can just let me know when you're finished.

[Part 3 – Participant completes Demographic Information, HEXACO-60, SRP-III)

Part 4 – Introduction to game and instructions for character creation (self)

Done? Great. Now we can get started on the second part of the study.

The video game you will be playing is called the Sims3. Have you ever played this game before?

The Sims3 is a game that involves controlling and managing the lives of virtual people, or characters. You will be creating 2 characters, who will live in a house and do all of the things that people normally do, like sleep, eat, and interact with each other.

So first you're going to create two characters. After that, you'll use the characters you created to play the game.

I'm going to give you some instructions for the character creation part now, and then I'll leave you alone so you can build your first character.

First, we would like you to create a character that will represent you. You will be using this character in the game later on.

I have loaded the character creation part of the game. You can see here that the game provides a random character to start with. You will be able to change everything about this character, to make it your own.

First, you'll need to name your character - but be sure that you don't give it your own name. This is to protect your anonymity, because I will see the name of your character when I load the next part of the game later on.

When you have decided on the basic characteristics of your character, just click on these buttons on the left to move on and choose the character's physical appearance, its clothes, and its personality traits.

I'm going to show you the personality trait selection screen now because there are some special instructions about that part. You just click here for personality traits, and then choose "add traits".

So, there are four categories of traits – mental, physical, social, and lifestyle (the first box just contains a list of all the traits together). For this study, we would like you to choose one trait from each of the 4 categories that you think would be best for your character. Then your character will have 4 traits, and then you should choose one more, from any category, so that your character will have 5 traits in total.

So just to clarify, you need to choose 5 traits all together for your character, and you must have at least one from each category. Try to choose the traits you think would really be best for your character, and not just the first ones that you see.

The reason why it matters what traits you choose is because these traits will affect how your character can behave in the game. So be sure to read the descriptions of the traits before you choose them, so you will know what they are and how they might affect your character. Here is a list of all the traits that you can refer to if that's easier. After you have chosen your personality traits, you will also need to choose a lifetime wish for your character, here.

That's all the instructions for now. Do you have any questions at this point?

Okay, you will have up to fifteen minutes to build a character that represents you.

I'll just be over here while you are doing that. When you are satisfied with the character you have made to represent you, you can just call me, and I'll come over and explain the next part.

Do you have any questions at this point?

[Part 5 – Participant creates self-character – up to 15 minutes]

Part 6 – Instructions for character creation (other)

All done? [or] That's all the time we have for this part of the study.

Did you select 5 personality traits for your character?

[If no]. Okay, I'll just give you two more minutes to do that now.
[If yes] Okay, great.

For the next part of the study, I would like you to create another character that your own character will be able to interact with. Again, the game just provides a random character to start with.

Remember, when you get to the personality traits part, I would like you to choose one trait from each of the 4 categories, plus one more trait, to make 5 all together. When you are choosing traits, think about what kind of person your character would like to interact with.

Since you have some experience now at creating a character, you will have 10 minutes for this part of the study. You can call me when you are done.

[Part 7 – Participant creates other-character – up to 10 minutes]

Part 8 – Instructions for Video Game Experience Questionnaire

All done? [or] That's all the time we have for that part of the study.

Did you choose 5 personality traits for this character?

[If no] Okay, I'll just give you 2 more minutes to do that now.
[if yes] Okay great.

Now that you have created the two characters you will use in the game, I need to load and set-up the game. While I'm doing that, I'd like you to switch places with me, and answer just a few questions about your previous experiences with video games.

It will just take a couple of minutes; I'll let you know when it's ready.

[Part 9 – Participant completes video game experience questionnaire while game loads]

Part 10 – Instructions for Game play

Okay, the game is ready to play now. Are you done with that questionnaire?

Great, just put it in the envelope with your other questionnaires.

You can come back and sit here again, and there are just a few instructions I need to give you before you start.

You can see that your two characters are here, standing in front of a house. Both of your characters live in this house. The game is paused right now, so that's why they're not moving.

Now, there are a lot of features to this game, but there just isn't time for you to try all of them. So I'll just explain some of the most important parts of the game that we would like you to try out.

For the purposes of this study, I'm going to ask that you focus mainly on the interactions between the characters you created.

You can see here that the character you made to represent you (your self-character) has a green diamond over his(her) head. That means you are controlling him(her) right now.

If you want your character to interact with the other character, just click on the other character. You can see that a number of options pop up. Click on the kind of behaviour you want your character to do, and then click on the specific behaviour you want, and your character will do it. You can see that the action your character is going to do appears here in the top left corner of the screen. If you want to stop your character from doing what he(she) is doing, just click on that square to cancel the behaviour.

You can also control the behaviour of your second character. To switch characters, just click on their portrait right here. Now you can see I have switched characters for you, and the green diamond now appears over your second character's head. If you ever need to find out where a character is, just double-click on their portrait, and the camera will center on that character.

In addition to having your characters interact with each other, the other thing that you will need to pay attention to is the needs of your characters. You can see the character's needs here, at the bottom right of the screen. Each bar represents a need that must be taken care of – you can see that the "fun" bar is lowest right now, but otherwise your character is pretty content.

It's important to pay attention to these needs, because you characters won't do anything unless you tell them too. And if a bar goes too low, your character will not want to do anything else except fulfill that need, and you won't be able to do much with that character.

For example, if the "energy" bar goes too low, your character is getting tired, and you can tell your character to go to sleep. To do that, just click on the bed, and choose sleep. If your character is getting hungry, just click on the fridge, and choose one of the options for eating.

The last thing I will just mention is rotating the camera. With these buttons here, you can rotate the camera around, to get a better view. You can also zoom in and out. That can help you see what's going on better.

There are a lot of other buttons and options available, but we would prefer that you leave them alone, and just focus on the things I have mentioned. There just isn't enough time to try out all of the parts of the game, and so we just want to learn about people's reactions to the basic elements of this game.

Just so you know, other characters, which are controlled by the game, might show up to meet your characters. You can choose to let your characters interact with them, or not, it's up to you.

This might seem like a lot to remember, but just do your best to figure things out as you go along.

Do you have any questions at this point?

Okay, I'll just be over here, and I will let you know when it is time to stop. I have pressed play on your game now, so you can begin at any time now.

If you have any questions at any time, just let me know.

[Part 11 – Participant plays game – 20 minutes]

Part 12 – Instructions for Post-Game Questionnaires

Okay, that's all the time we have for that part of the study. If you could stop now, I will end your game.

Now we'd like to find out about your impressions of playing that video game by filling out these questionnaires. When you're done, you can put them in your envelope again.

[Part 13 – Participant completes Post-Game Questionnaire, Avatar Identification and Attachment Questionnaire, and Suspicion-Checking Question]

Part 14 – Debriefing

All done? Great. That's the end of the tasks for this study.

Now before you go, I have to give you a short explanation about the study.

There are two main objectives for this study: to examine the differences between individuals in their evaluations of a video game, and to examine the differences between individuals in the actions they choose within a video game.

In order to study the differences between individuals in their actions in the game, we need to look at exactly what happens on the computer screen during each participants' game-play time.

To do that, we use screen-capture software to record what happens on the screen while participants play the game. So, your game-play was recorded. That means that everything that happened on the screen was recorded during the time you were playing.

We have to wait until the end of the study to tell you about this, because knowing about the recording ahead of time might affect how you behave in the game. For this research, it's important that participants be able to behave as normally as possible.

We would like to use the recordings of the game-play in this study. These game-play recordings will be stored on a secure hard-drive, and only my faculty supervisor and I will have access to these recordings.

After we have used to the recordings to code the actions that occur in the game, we will destroy the recordings. And the game-play recordings will only be used for the purposes of this research; they will not be used for any other purpose.

Now that you know about this, I need to ask whether you consent to have your game-play recording analyzed for this study. Please be assured that your game play is not connected to your name in any way, it is only connected to your participant number.

If you do not consent, your game play recording will be deleted right away.

Do you consent to the use of your game-play recording for this study?

[If yes]
Okay, great. In order to indicate that you do consent to the use of your recorded game-play, could you please read this form, and sign it if you consent.

[If no]
Okay, that's fine. I am going to delete your game play record now. [Researcher deletes game-play recording.]
It has been deleted now.

That's all then. Do you have any questions?

This feedback sheet provides some more information about the study. You might want to keep it for your information.

Thanks very much for participating!

Appendix H

Study 1 and Study 3

Research Ethics Board Approval

DATE: 6/24/2010

FROM: Michelle McGinn, Chair
Research Ethics Board (REB)

TO: Angela Book, Psychology
Narnia Christine Worth

FILE: 09-280 BOOK
Ph. D.

TITLE: A Study of Behaviour in World of Warcraft

The Brock University Research Ethics Board has reviewed the above research proposal.

DECISION: Accepted as clarified (with note)

This project has received ethics clearance for the period of **June 24, 2010 to August 1, 2011** subject to full REB ratification at the Research Ethics Board's next scheduled meeting. The clearance period may be extended upon request. ***The study may now proceed.***

Note:

- **Please state that participants must be at least 16 years of age on the forum posting and information and consent form.**

Please note that the Research Ethics Board (REB) requires that you adhere to the protocol as last reviewed and cleared by the REB. During the course of research no deviations from, or changes to, the protocol, recruitment, or consent form may be initiated without prior written clearance from the REB. The Board must provide clearance for any modifications before they can be implemented. If you wish to modify your research project, please refer to http://www.brocku.ca/research/policies-and-forms/forms to complete the appropriate form Revision or Modification to an Ongoing Application.

Adverse or unexpected events must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants and the continuation of the protocol.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the

ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-Council Policy Statement requires that ongoing research be monitored. A Final Report is required for all projects upon completion of the project. Researchers with projects lasting more than one year are required to submit a Continuing Review Report annually. The Office of Research Services will contact you when this form *Continuing Review/Final Report* is required.

Please quote your REB file number on all future correspondence.

MM/sp

Research Ethics Office
Brock University | Brock Research
Niagara Region | 500 Glenridge Ave. | St. Catharines, ON L2S 3A1
brocku.ca | T 905 688 5550 x3035 | F 905 688 0748

Appendix I

Study 2

Research Ethics Board Approval

Brock University
Research Ethics Board
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

DATE: 11/19/2010
PRINCIPAL INVESTIGATOR: BOOK, Angela - Psychology
FILE: 10-098 - BOOK
TYPE: Ph. D. STUDENT: Narnia Christine Worth
SUPERVISOR: Angela Book
TITLE: Video Game Preferences

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW Expiry Date: 11/30/2011

The Brock University Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from **11/19/2010 to 11/30/2011**.
The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before **11/30/2011**. Continued clearance is contingent on timely submission of reports.
To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page.
In addition, throughout your research, you must report promptly to the REB:
a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.
We wish you success with your research.
Approved:

_____
Michelle McGinn, Chair
Research Ethics Board (REB)

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.
If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix J

Study 4

Research Ethics Board Approval

Brock University
Research Ethics Board
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

DATE: 3/18/2011
PRINCIPAL INVESTIGATOR: BOOK, Angela - Psychology
FILE: 10-198 - BOOK Ph. D. STUDENT: Narnia Christine Worth
TYPE:
SUPERVISOR: Angela Book

TITLE: Personality and Reactions to a Video Game

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW Expiry Date: 3/30/2012

The Brock University Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 3/18/2011 to 3/30/2012.
The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 3/30/2012. Continued clearance is contingent on timely submission of reports.
To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page.
In addition, throughout your research, you must report promptly to the REB:
a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.
Approved:

_____
Michelle McGinn, Chair
Research Ethics Board (REB)
Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.