PERCEPTION OF AUTONOMY AND ITS EFFECT ON INTRINSIC MOTIVATION,
IMMERSION, AND PERFORMANCE

A thesis presented to the faculty of the Graduate School of Western Carolina University
in partial fulfillment of the requirements for the degree of Master of Arts in Clinical
Psychology.

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July 2012

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ABSTRACT

PERCEPTION OF AUTONOMY AND ITS EFFECT ON INTRINSIC MOTIVATION, IMMERSION, AND PERFORMANCE

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Self-determination theory (SDT) states that satisfaction of three basic psychological needs leads to intrinsic motivation. These needs are autonomy, competence, and relatedness. Satisfaction of the need for autonomy comes from having the choice or freedom to engage in what one wants to do. This study primarily focused on the need for autonomy. The purpose of the current study is to examine the association between autonomy, in the form of game character personalization, and immersion, intrinsic motivation and performance. This study employed an experimental design in order to manipulate the levels of autonomy each participant received. Two conditions were used in this study to determine how differing levels of autonomy affected the participants. One of the conditions, the autonomy condition, allowed each participant to create a customized in-game character which they would then use in either *Kinect Sports* or *Kinect Adventures*. In the second condition, the non-autonomy condition, the examiner removed all character customization ability from the participants' control. The examiner fully dictated how to create this character (bodily characteristics, facial characteristics, clothing and character name). Regardless of the game they were asked to play, all participants played each game for two rounds. All participants played only one game and

engaged in both conditions within the same game. After each round, they completed the PENS scales (In-Game Autonomy, In-Game Competence, Physical/Emotional/Narrative Presence, and Intuitive Controls) and game enjoyment was evaluated with an adapted form of the Intrinsic Motivation Inventory (IMI), the Interest/Enjoyment scale. Personality data, based on the five factor model of personality (FFM), and data regarding participants' satisfaction of the basic psychological needs of autonomy and competence were also collected. No significant differences in immersion, autonomy or intrinsic motivation were found between the autonomy and non-autonomy conditions for either *Kinect Adventures* or *Kinect Sports*. Performance within *Kinect Adventures* did not significantly differ between the autonomy and non-autonomy conditions. However, there were significant positive correlations between the domains of personality and the PENS measures of autonomy, competence, intuitive controls and immersion and the Interest/Enjoyment (IMI) scale. Significant correlations were also found between personality domains and participants' satisfaction of the basic psychological needs of autonomy and competence for both *Kinect Adventures* and *Kinect Sports*. These results suggest that video game research that utilizes SDT needs to further evaluate the relationship between the domains of personality and autonomy, competence, immersion and enjoyment.

INTRODUCTION

Noted educator David Warlick (2011) speculates that a truly effective educational experience should be composed of seven concepts. The experience should be responsive, fueled by questions, provoke conversation, reward accomplishments, relate strongly to identity, demand personal investment and be guided by safely made mistakes. As of now, no studies have been conducted to test the validity of these concepts. Warlick's concept of identity is similar to the psychological need for autonomy described within self-determination theory (Deci & Ryan, 2000). SDT proposes that the innate psychological needs of competence, autonomy and relatedness are factors which influence human intrinsic motivation to engage in various types of tasks (Deci & Ryan, 2000). SDT has been extensively studied within the realm of psychology and provides sufficient groundwork to validate Warlick's concept of identity. The concept of identity relates to an experience that one can identify with and feel a personal connection toward. The concept of identity strongly relates to the psychological need of autonomy within SDT, which consists of the need for opportunity when engaging in a task. This relates to freedom, or the choice to do what one would want to do when engaging in a given activity.

While levels of autonomy have been manipulated in previous experiments, (Deci, Eghrari, Patrick, & Leone, 1994; Sheldon & Filak, 2008) they were limited to events that the participants may not have thought of as important such as picking what color grid can be used when playing the puzzle game Boggle (Sheldon & Filak, 2008). And no studies,

to date, have utilized the customization options of in-game characters within video games as a manipulation of autonomy.

Warlick (2011) states that video games can provide valuable insight into keeping children engaged and motivated while doing schoolwork. Warlick states that rather than using video games to teach children, we must capture the aspects of video games that engage and motivate children, and adapt them for use in the classroom. Video games provide a novel environment in which to test the psychological need for autonomy.

In recent years, video games have become increasingly popular; and increasingly complex. Many video games now allow players the opportunity to create an in-game character to represent themselves. The complexity of customization within each game varies, but a vast number of facial and bodily features can be altered in the manner the player chooses. This customization of an in-game character can be seen as an expression of autonomy and, in turn, identity. Though SDT has been adapted for use in schools (Deci, Nezlek, & Sheinman, 1981; Reeve, Jang, Carrell, Jeon, & Barch, 2004) and in sports (Adie, Duda, & Ntoumanis, 2008; Ryan, Williams, Patrick & Deci, 2009), it was not until 2006 that an article was published that used SDT in determining what motivated individuals to play video games (Ryan, Rigby, & Przybylski, 2006).

Research on video game engagement has focused on virtual worlds and Massively Multiplayer Online Role Playing Games (Ryan et al, 2006; Przybylski, Rigby & Ryan, 2010), but no studies have utilized motion control technology; an example of this form of technology is the Kinect for the Microsoft Xbox 360. The Kinect is an external peripheral connected to the Xbox 360 gaming console that senses human bodily movements. This is used in conjunction with Kinect games that use the player's bodily movements to

complete certain tasks. The Kinect requires much more movement and interaction than traditional games, because the only input device is the human body and the movement's one makes. It therefore engages proprioceptive and neuromuscular sensory dimensions that are commonly involved in everyday tasks, sports, and skills that are not involved in typical video games. The Kinect is particularly unique because it is the only peripheral that is entirely motion control based, and thus provides an environment in which to test SDT in a manner that has been neglected until this point in time.

The current study focuses on gaps within SDT literature as it relates to video games; specifically, the lack of a true experimental manipulation of autonomy and the non-usage of modern video game technology. This study uses modern video game technology to test how autonomy relates to performance, intrinsic motivation and immersion within the game environment. The autonomy manipulation involved in-game character personalization. Participants were either allowed to customize their in-game character to their discretion or they were forced to use a default, gender appropriate character. This study also measured personality to determine if it was correlated to immersion, enjoyment, autonomy, competence and intuitive controls.

LITERATURE REVIEW

Self-Determination Theory and Intrinsic Motivation

In the Aristotelian view of human development, people are presumed to possess the innate tendency to strive toward psychological growth and integration (Deci & Ryan, 2002). Endowed with this tendency, "individuals tend naturally to seek challenges, to discover new perspectives, and to actively internalize and transform cultural practices" (Deci & Ryan, 2002, p. 3). By following these tendencies, people actualize their human potentials. The view of an "active, integrating organism with the potential to act from a coherent sense of self" (Deci & Ryan, 2002, p. 3) can be found in psychodynamic and humanistic theories.

In psychodynamic theory, the concept of *neutralization* was used to explain the transformation of drive energies (e.g. sexual and aggressive) into motivational energies for other activities not related to the sexual or aggressive drives. The id, one of the three parts of the personality, is the origin of the drives. The ego, the executive part of the personality, develops with continual contact between the id and the environment (Cervone & Lawrence, 2010). The ego helps to redirect, and in some cases, neutralize drive energy (Deci & Ryan, 1985). When the id creates the drives, the ego mediates and directs these drives; it is by this process that neutralization occurs (Cervone & Lawrence, 2010). In psychodynamic theory, a person's behavior is completely determined by their drives, thus freewill does not exist and as such, this theory was found to be too deterministic (Cervone & Lawrence, 2010).

Humanistic psychologists hypothesize that all individuals possess an actualizing tendency (Cervone & Lawrence, 2010). This tendency leads individuals to "actualize their unique potentials to become all that they are capable of and to be autonomous in their functioning" (Deci & Ryan, 1985, p. 36). As opposed to psychodynamic theories, humanistic theories believe that all humans have freewill. Humans are able to choose what they want to do and are not controlled by their drives. For example, in Maslow's hierarchy of needs, humans have differing levels of needs that need to be met in order to reach self-actualization. This hierarchy consists of five layers. The first four layers consist of the needs for esteem (e.g., confidence, achievement, self-esteem) love and belonging, safety and physical needs (e.g., food water and shelter) while the higher level needs for example, consist of morality, creativity, problem solving and acceptance of facts (Cervone & Lawrence, 2010). One of the criticisms of humanistic theories is that they assume that people will always pick the best option in a situation that will lead to the best outcome and growth, which is not always the case (Cervone & Lawrence, 2010).

Despite the popularity of theories that posit innate tendencies toward growth and integration, critics arose to contest such theories. In particular, some of the more steadfast have been operant behaviorists, who assume humans do not have inherent tendencies toward growth and integration. They suggest that we are shaped by reinforcement schedules and current contingencies that we encounter in our environment (Deci & Ryan, 2002). Similarly to psychodynamic theories, operant behaviorists believe that we are shaped by forces outside of our control.

Self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000) was developed to provide an account for the discrepant viewpoints of psychodynamic,

humanistic and behavioral theories. SDT holds the view that all individuals have innate

tendencies toward growth and that we are also conditioned and react to our environments

(Ryan & Deci, 2000). The foundation of SDT lies in the basic psychological needs of

autonomy, competence and relatedness. Situations or environments that allow satisfaction

of these three needs relate to healthy and vital human functioning (Ryan & Deci, 2000).

In SDT, competence refers to "feeling effective in one's ongoing interactions with the

social environment and experiencing opportunities to exercise and express one's

capacities" (Deci & Ryan, 2002, p. 7). Competence is not a tangible skill, but a feeling of

confidence in one's actions. Relatedness refers to being connected to others and having a

sense of belonging (Deci & Ryan, 2002). Finally, autonomy refers to acting from "one's

interest and integrated values" (Deci & Ryan, 2002, p. 8). The self-determined actions

(actions completed in order to fulfill basic psychological needs) do not necessarily need

to be interesting; but, they need be an expression of the self (Deci & Ryan, 2002). SDT

proposes that individuals are intrinsically motivated to engage in self-determined actions;

actions that allow us to be autonomous, feel competent and feel related to others. To

measure how intrinsically motivating an activity is, researchers created the Intrinsic

Motivation Inventory (IMI; Ryan, 1982).

The IMI has been used to measure levels of intrinsic motivation to engage in a

given activity. However, this instrument was only designed to measure how intrinsically

motivating an individual believed a situation to be and as such, did not measure all of the

basic psychological needs of autonomy, competence and relatedness. Additionally, this

scale did not specify a particular context (e.g., school, work, sport) in which this scale

should be used, all of the questions were very general, such as "This activity was fun to

do". Realizing the limitations of the IMI, researchers found that an instrument was needed to measure basic psychological needs that a particular context provided to individuals (e.g., work, school, sport). The Basic Needs Satisfaction at Work Scale (BNSW-S; Kasser, Davey & Ryan, 1992) was created to fill that role. This scale was adapted from the perceived-competence subscale of the IMI. The BNSW-S scale only measures the basic needs that a work environment provides its employees. Researchers found that this scale was too specific to meet the needs of researchers that worked in realms other than the workplace such as education or sports. The Basic Needs Satisfaction in General Scale (BNSG-S; Gagné, 2003) was created to fill that role. The BNSG-S was adapted from the BNSW-S in that all questions were altered to reflect a more general context as opposed to a work specific context (Johnston & Finney, 2010)

Various studies exploring the relationship between feelings of well-being and how they related to the satisfaction of basic needs proposed by SDT theorists. For example, research has shown that satisfaction of these needs relate to positive affect, vitality, and lower levels of negative affect and symptomology (Deci & Ryan, 2002). Research has also shown that the satisfaction of the needs for autonomy and relatedness in the daily lives of nursing home residents is positively correlated to their well-being and perceived health (Deci & Ryan, 2002).

Traditionally, SDT research has been used to study what factors affect intrinsic motivation. A particular focus is how autonomy affects intrinsic motivation. For example, it has been found (Deci, Koestner, & Ryan, 1999) that allowing participants to have choices in a study, giving non-controlling instructions and non-controlling feedback enhance perceived autonomy and enhance intrinsic motivation. Events that diminish a

sense of choice and control of either the means or ends of actions interfere with perceived autonomy and undermine intrinsic motivation. Controlling instructions and controlling feedback can pressure individuals toward specified outcomes and can undermine intrinsic motivation. When one feels controlled in pursuing an activity or in how the activity is accomplished, one's perceived autonomy is diminished, and in turn, their intrinsic motivation is lessened (Deci et al., 1999).

As can be seen, controlling instructions and controlling feedback have been used as a verbal manipulation of autonomy. While this has been used as a manipulation of autonomy, how can researchers then measure the inherent autonomy of a given activity? In recent years, researchers have turned to video games as a means of measuring the innate psychological needs that a given activity possesses in order to understand how these needs influence those who play them.

Autonomy in Non-Violent Video Game Play

Video games vary in the amount of perceived autonomy they provide the game player (e.g., open world vs. linear, follow a set story line vs. creating your own story). In particular, autonomy in a video game is measured as the amount of choice one has over the events that take place or the tasks in which one can participate (Rigby & Ryan, 2011). Autonomy should be enhanced in video games that provide considerable flexibility over movement, strategies, choice over tasks and goals (Bartle, 2004). Though not as extensive as other realms of research, SDT has recently been used to study how the principles of SDT (autonomy, competence and relatedness), immersion, enjoyment and intuitiveness of controls relate to video game play (Ryan et al., 2006). To examine these relationships, Ryan and colleagues (2006) created the Player Experience of Need

Satisfaction (PENS) metrics which includes a measure of autonomy (PENS: In-Game Autonomy scale). This questionnaire measures the degree to which participants feel free and perceive opportunities to engage in activities that interest them in the game environment. Competence is measured using the PENS: In-Game Competence scale. This scale measures a participants' perception that the game provides an adequate but not overwhelming challenge. The intuitiveness of game controls is measured with the PENS: Intuitive Controls scale. This scale assesses how participants experienced the interface that controls their character's actions in game. Immersion within the game environment is measured using the PENS: Physical/Emotional/Narrative Presence scale. This scale assesses the amount of immersion the participant feels in the gaming environment. Lastly, Ryan and colleagues (2006) have measured game enjoyment using an adapted form of the Intrinsic Motivation Inventory (IMI; Ryan, 1982) which includes questions that ask how well the participant enjoys playing the game (Ryan et al., 1983).

It was not until 2006 that an article was published on the topic of SDT and video game experience (Ryan et al., 2006). The research that has been conducted has shown that gaming enjoyment and motivation can be accounted for by the psychological needs of autonomy and competence (Ryan et al., 2006). Research has also shown that perceived in-game competence and autonomy accounted for differences in preference for future play, enjoyment and immersion, and that perceived levels of autonomy and competence predict greater enjoyment, sense of immersion, and increased preference for future play (Ryan et al., 2006). The majority of video game research has been conducted using traditional console games that use handheld controllers to manipulate in-game characters actions. These types of games have relatively steep learning curves that are directly

impacted by the usability of their controls. Learning the controls of the game may not be an easy task for many individuals if the controls they are attempting to master are not intuitive. In response to this inherent difficulty, more modern consoles on the market (Nintendo Wii, Sony Playstation and the Microsoft Xbox) incorporate some manner of motion control technology to help combat the learning curve of traditional video games. These motion control peripherals and consoles use controllers and movements that are natural (movements made by the human body, such as waving) as opposed to the unnatural actions made by traditional controllers (pressing a button or moving a joystick). Though these motion control peripherals make it possible to eliminate inhibitory learning curves, no research using SDT has utilized such technology.

Five Factor Model of Personality and Video Games

The five factor model (FFM) is considered to be the most often used personality theory in research today (Gosling & John, 1999; Marsh, Lüdtke, Muthén, Asparouhov, Morin, & Trautwein, 2010). The FFM consist of five broad domains of personality (Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness to Experience) and 30 facets, 6 facets per domain. The trait of Extraversion assesses quantity and intensity of interpersonal interaction, activity level, need for stimulation and capacity for joy. The trait of Agreeableness assesses the quality of one's interpersonal orientation along a continuum from compassion to antagonism in thoughts, feelings and actions. The trait of Conscientiousness assesses an individual's degree of organization, persistence and motivation in goal-directed behavior. The trait of Neuroticism assesses an individual's pattern of responding to negative emotional experiences. Finally, the trait of

Openness to Experience assesses proactive seeking and appreciation of experience for its own sake, and toleration for an exploration of the unfamiliar (Costa & McCrae, 19995).

The most popular instrument to measure normal personality based on the FFM is the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992). This measure is copyrighted, which can hinder its use in research. In response to this, Goldberg created the International Personality Item Pool (IPIP; Goldberg, 1999). The IPIP is a collection of questions that have been correlated to other personality inventories, such as the NEO-PI-R. Because of the IPIP, researchers have been able to make their own, free to use, personality inventories. The *M5 Questionnaire* (McCord, 2002) is a personality inventory that was created using items from the IPIP that were most highly correlated to the NEO-PI-R, and it also measures the same five domains and 30 facets (McCord, 2002). The M5-120 (Johnson, 2001) is a 120 item personality inventory that measures the five broad domains of personality as well as the underlying facets within each broad domain.

One area that personality research has been used is in the realm of video games. In this particular realm, the FFM has been used in various ways. For example, the relationship between personality and video game usage has been recently investigated in middle school students (Witt, Massman, & Jackson, 2011) as well as in college student samples (Chory & Goodboy, 2011). In regards to the middle school students, individuals with higher Openness scores reported higher levels of video game play than individuals with lower Openness scores. In regards to the college student sample, individuals who played violent video games were higher on Openness and Extroversion but lower on Neuroticism than individuals who played non-violent video games. Additionally

(Ventura, Shute, & Kim, 2012) it has been found that students who play video games for 7 or more hours per week have significantly lower levels of Conscientiousness compared to students that only play video games for 0-1 hours per week. Furthermore, students who play 7 or more different games a year have significantly higher Openness to Experience scores than students that only played 0-3 games a year.

A large body of correlational and experimental research suggests that violent video games are linked to negative behaviors and cognitions such as aggression, hostility, and aggressive thoughts (Markey & Markey, 2010). In response to these findings, research has been conducted to determine if the effects of violent video games are moderated by personality. For example, it has been found that individuals with high levels of Neuroticism, low levels of Agreeableness, and low levels of Conscientiousness are less likely to be affected by violent video games. These individuals reported lower levels of hostility and aggression after video game play. This study suggests that individuals who are affected by violent video games have preexisting dispositions to violence in general. These dispositions make them more susceptible to the negative effects of violent video games than individuals who do not share such dispositions (Markey & Markey, 2010).

Problematic video game play is becoming a worrisome issue. Studies estimate that approximately 9.4% of gamers are affected by problematic video game use (Collins, Freeman, & Chamarro-Premuzic, 2012). As this issue has received increased attention, a variety of research has been conducted in order to determine what personality traits are related to problematic video game use (Peters & Malesky, 2008). Research has shown

that problematic video game use is associated with high levels of Neuroticism, and low levels of Agreeableness, Conscientiousness and Extraversion (Peters & Malesky, 2008).

Research has also been conducted to determine the differences between those who play video games (gamers) and those who do not (non-gamers). When comparing gamers to non-gamers, it has been found that video game players report higher levels of Openness, Conscientiousness and Extraversion then those who do not play video games (Teng, 2008). These studies help to demonstrate that individuals who suffer from problematic video game use demonstrate a particular personality profile and that gamers present different personality profiles than non-gamers and also that those who play video games on a consistent basic differ in their levels of personality when compared to those who do not play video games. Though personality has been linked to video games in various manners, no research thus far has examined the relationship between personality traits and SDT principles in the context of video game tasks.

Experimental Manipulations of Autonomy

Numerous studies have provided evidence that there is a positive relationship between task autonomy and intrinsic motivation to perform a task (Przybylski et al., 2010), but few studies have manipulated autonomy experimentally, and even fewer in a game learning context. For example Deci, Eghrari, Patrick, and Leone (1994) manipulated three factors (rationale, acknowledgement, and control) in an experimental setting. In this experiment the only manipulation that was related to the participants' autonomy was the control factor. The low controllingness condition used neutral language and emphasized choice whereas the individuals in the high controllingness condition heard words like "must" and "should." Some of the statements were "You can

press" vs. "you should press." The results indicated that conveying choice (a form of autonomy) promotes intrinsic motivation. This study manipulated autonomy, but it only focused on verbal commands in order to control the participant's autonomy. The cause and effect relationship between perceived autonomy, task motivation and performance is still uncertain as few studies have examined this relationship experimentally. One exception is a study which experimentally manipulated autonomy, competence and relatedness in a game learning context (Sheldon & Filak, 2008). All participants were taught to play Boggle, a puzzle solving game, in one of eight ways. In the autonomy condition, participants were allowed to pick the color grid in which they wanted to use and were allowed to choose the order in which they received hints to complete the puzzles, while the control group was given neither of these options. The results of the study showed that satisfaction of autonomy only predicted intrinsic motivation to play the game and to recommend the experiment to others. Many of the individuals may have thought that this was standard procedure as the statements were not coercive and did not make the participants feel like they were being controlled (Sheldon & Filak, 2008).

Statement of Purpose

Warlick (2011) has proposed that an effective educational experience should be responsive, fueled by questions, and provoke conversation, reward accomplishments, relate strongly to identity, demand personal investment, and should be guided by safely made mistakes. He posited that educators need to establish which unique aspects of video games make them engaging and apply similar techniques in the classroom to help further engage students and promote learning. Only recently have researchers begun to explore how SDT, which is related to Warlick's concept of identity by means of

autonomy, is applicable in video games. However, no research to date has been able to use SDT to help capture the specific aspects of video games that make them so appealing and engaging so that in 2010, consumers spent $25.1 billion on video games, hardware and accessories (Siwek, 2010).

Research has shown that verbal manipulations of autonomy relate to increases in intrinsic motivation (Deci et al., 1999) and that autonomy in an experimental setting relates to increases in intrinsic motivation (Deci et al., 1994; Sheldon & Filak, 2008). Autonomy has not been linked to immersion, intuitive controls, enjoyment or any other factor as most of the manipulations of autonomy that have been employed have focused on aspects that are not related to one's sense of self. Autonomy in the form of identity helps to relate autonomy to an aspect of one's self more so than it relates to one's options or choices. Past studies have demonstrated that the perception of autonomy and competence, to some degree, predict levels of motivation and satisfaction with video games (Ryan et al., 2006). But no study to date has investigated whether video game performance is affected by manipulating autonomy. Moreover, recent technological advances in video games (i.e. motion control technology) offer a novel way for researchers to investigate the principles of SDT in an environment that could useful to more domains of life than traditional video games.

Also, as personality is a pervasive and influential force in various areas of human behavior, it is important to consider this when examining SDT and video game play. The literature of SDT in relation to FFM is not very extensive; however, research involving video game play and the FFM has shown that those who play online video games report higher scores in Openness, Conscientiousness and Extraversion than non-players (Teng,

2008). Research has also shown that problematic video game use is associated with high levels of Neuroticism, and low levels of Agreeableness, Conscientiousness, and Extraversion (Peters & Malesky, 2008). Additionally, research has shown that college students who play violent video games have higher levels of Openness and Extroversion and lower levels of Neuroticism than college students who play non-violent video games (Chory & Goodboy, 2011). Though the research examining the relationship between videogames and personality is well established, the relationship between personality and the PENS metrics is still unknown.

The purpose of this study was to determine if an experimental manipulation of autonomy in the form of game character personalization (using the Kinect motion control peripheral for the Xbox 360) relates to increased performance, intrinsic motivation, and immersion. This study attempted to refine methodological shortcomings of the past by using a more salient/personal manipulation of autonomy (Deci et al., 1994; Sheldon & Filak, 2008). Finally, a measure of the FFM was employed to determine if an association exists between personality and an individual's immersion, intuitive controls and enjoyment, competence, and autonomy in a game environment.

Hypotheses and Research Questions

Hypothesis I & II: Autonomy has been manipulated in an experimental setting (Sheldon & Filak, 2008), but no effect of autonomy on performance was found. We speculate that their manipulation might not have been strong enough to affect participants. Participants were told that they could choose the order in which they received their hints and the color grid in which they wanted to use while playing the puzzle game Boggle. Many individuals may have thought that this was all a part of the

experiment and did not question their lack of choice as it did not closely relate to their own identity (Sheldon & Filak, 2008). With a manipulation of autonomy that is more related to their identity, a stronger relationship between autonomy and immersion, performance, enjoyment and perceived autonomy may appear.

As such, it was hypothesized that individuals in the personalization condition would perform better, enjoy the game more and would experience higher levels of immersion and autonomy for *Kinect Adventures*.

Additionally, it was hypothesized that individuals in the personalization condition would enjoy the game more, and experience higher levels of immersion and autonomy than individuals in the control condition for *Kinect Sports*.

Research questions I & II: Previous research has shown that personality attributes differ between video gamers and non-gamers (Teng, 2008), that there is a particular personality profile for individuals who are affected by violent video games (Markey & Markey, 2010) and that there are personality differences between college students who play violent video games as compared to students who play non-violent video games (Ventura, Shute, & Kim, 2012). Despite the varied research in this realm, no research thus far has shown that personality traits correlate with any of the PENS metrics or the Interest/Enjoyment scale (IMI).

As such, the author was interested in determining whether personality (as measured by the M5-120) and the measures of Interest/Enjoyment, autonomy, competence, immersion or intuitive control would be correlated for those who played *Kinect Adventures* and *Kinect Sports* in either autonomy or non-autonomy conditions.

Research question III: Research has shown that basic needs satisfaction relates to positive affect, vitality and lower levels of symptomology (Deci & Ryan, 2002) and that satisfaction of autonomy and relatedness is related to well-being and perceived health of nursing home residents (Deci & Ryan, 2002). Despite the various ways in which basic needs satisfaction has been studied, no research has determined the relationship between basic needs satisfaction as measured by the BNSG-S and the FFM of personality.

As such, the question of whether personality (as measured by the M5-120) would correlate to the Basic Need Satisfaction in General Scale for those who played Kinect Adventures or Kinect Sports was posed.

METHODS

This study is comprised of two separate experiments; in the first experiment, participants played the mini-game *River Rush* within *Kinect Adventures,* an adventure game in which participants rode in a raft down white water rapids; participants in the second experiment played the mini-game *Boxing* within *Kinect Sports*, a boxing simulation in which participants played against a matched gendered confederate.

Participants

Kinect adventures. There were 23 participants, of which 12 were male (52.2%) and 11 (47.8%) were female. The participants' ages ranged from 19 to 24 (*M* = 19.96, *SD* = 1.46). The majority of participants reported having no experience with the Kinect peripheral (78.3%), but the majority of participants reported that they did have experience playing video games (78.3%). The average hours per week spent playing video games ranged from 0 to 24 (*M* = 4.17, *SD* = 5.64).

Kinect sports. There were 20 participants, of which 10 were male (50%) and 10 (50%) were female, that played Kinect Sports. The participants' ages ranged from 19 to 23 (*M* = 19.70, *SD* = 1.08). The majority of participants reported having no experience with the Kinect peripheral (90%), but the majority of participants reported that they played video games (80%). The average hours per week of video game play ranged from 0 to 40 (*M* = 6.80, *SD* = 10.38).

Materials

The materials that were used in this study included the Microsoft Xbox 360 video game console and the Microsoft Kinect peripheral. The Microsoft Kinect is a motion

control camera that uses an individual's kinetic movements to complete tasks that each Kinect game requires. It engages proprioceptive and neuromuscular sensory dimensions that are commonly involved in everyday tasks, sports, and skills that are not involved in typical video games.

   Microsoft xbox 360, kinect adventures. *Kinect Adventures* is a game for the Kinect on the Microsoft Xbox 360 that contains several mini-games that utilize motion control technology. The object of each of the mini-games is to obtain the highest number of adventures pins. Adventure pins are equivalent to points in many other video games. The current study utilized the *River Rush* mini-game within *Kinect Adventures*. The object of *River Rush* was for the participant to use his or her body to navigate a raft down white water rapids, while collecting as many adventure pins as possible before he or she gets to the end of the level.

   Microsoft xbox 360, kinect sports. *Kinect Sports* is an Xbox 360 video game that uses full body motion controls to allow you to play a variety of mini-games. The object of each of the mini-games is to complete a given task, which involves defeating an opponent at a given sport. The mini-game that the participants played was *Boxing*. The object of *Boxing* for this study was to defeat a human opponent. The opponent for this study was a matched-gender confederate who played against each participant with his or her own in-game character. Since this study did not evaluate the effect of winning and losing on motivation and enjoyment, all of the confederates were instructed to lose, and as such, each participant won all of the matches in which they participated.

Measures

The following measures were utilized:

Demographics and game play questionnaire. The demographics survey asked participants their age, ethnicity, income level and state of residence; and the game play questionnaire asked participants what genres of games they normally play, if they had any prior experience with the Kinect and if they play video games.

Game performance. Game performance was only measured for participants who played *Kinect Adventures*. This was simply measured by the number of adventure pins the player collected while playing. No performance was measured for those playing *Kinect Sports* as all players were allowed to win against their competition.

The pens: In-game autonomy scale. This scale consists of three, 7-point Likert scale items that measure the degree to which participants feel free and perceive opportunities to engage in activities that interest them while in the game environment

The pens: In-game competence scale. This scale consists of three, 7-point Likert scale items that measure participant's perception that the game provided an adequate but not overwhelming challenge.

The pens: Intuitive controls scale. This scale consists of three, 7-point Likert scale items that measure how participants experience the interface that controls their character's actions in game.

The pens: Physical/emotional/narrative presence scale. This scale consists of nine, 7-point Likert scale items that measure the level of immersion the participant felt in the gaming environment.

The interest/enjoyment scale. This scale consists of seven, 7-point Likert scale items that measure game enjoyment by using an adapted form of the Intrinsic Motivation Inventory (IMI; Ryan, 1982), and includes questions that ask how well the participant enjoyed playing the game (Ryan et. al, 1983).

The basic need satisfaction in general scale. This scale consists of 13, 7-point Likert scale items that assess the degree to which the participant experiences satisfaction of the psychological needs of autonomy and competence in everyday life.

The m5-120. This scale is a measure of normal personality. The M5-120 personality measure consists of 120 items that measure the five personality traits of Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness to Experience. All of the items on the M5-120 are measured using a 5-point Likert-type scale.

The Cronbach's Alpha for all survey scale measures was (.5) or higher which indicates that these scales were able to provide reliable results. For a short scale, (a scale with less than 10 items) it is common to find lower Cronbach's values (e.g. .5) (Pallant, 2007).

Procedure

There were four components to this research. This study consisted of two survey portions and two video game sessions. Survey I consisted of the demographics survey, game play questionnaire, Basic Need Satisfaction in General scale, and the M5-120. Survey II consisted of the Interest/Enjoyment scale as well as the PENS: In-Game Autonomy, In-Game Competence, Physical/Emotional/Narrative Presence, and Intuitive Controls scales. Participants were asked to play the same game for both the first and

second video game sessions and were asked to play a practice round before the first video game session in order to learn the controls of the game. In the autonomy video game session, participants had complete control over their in-game character's customization (hair style and color, skin color, eye shape and color, mouth shape and color, eyebrow shape and color, body shape and height, as well as clothes). In the non-autonomy video game session, character customization was dictated by the experimenter, and so participants had to create the character in the manner they were told. The experimenter told the participant how to create every aspect of the character (hair style and color, skin color, eye shape and color, mouth shape and color, eyebrow shape and color, body shape and height, as well as clothes) and even told the participant to name this default character "default." Following these instructions resulted in a plain character with pale white skin, a black shirt, dark pants and plain facial characteristics (the character did not smile, the character did not have colorful eyes and the character did not have eyebrows). All participants only played one game and participated in the autonomy and non-autonomy conditions while playing in the game they were randomly assigned to play. The order of these portions was completely randomized, except for the second survey. All participants completed Survey II following completion of the first and second video game sessions.

RESULTS

Hypothesis I

Individuals in the autonomy condition will perform better, enjoy the game more and will experience higher levels of immersion and autonomy than individuals in the non-autonomy condition for *Kinect Adventures*.

Hypothesis II

Individuals in the autonomy condition will enjoy the game more, and experience higher levels of immersion and autonomy than individuals in the non-autonomy condition for *Kinect Sports*.

Paired samples t-tests were performed to evaluate the differences in immersion, autonomy and enjoyment between the autonomy condition and the non-autonomy condition for those who played *Kinect Adventures* and *Kinect Sports*, while performance was only evaluated for those who played *Kinect Adventures*. No significant differences were found between the autonomy condition and the non-autonomy condition for either *Kinect Adventures* or *Kinect Sports*.

Research Question I

Would personality correlate with Interest/Enjoyment (IMI), autonomy, competence, immersion or intuitive controls for those who played *Kinect Adventures* in either the autonomy condition or the non-autonomy condition?

The relationship between scores on the M5-120, Interest/Enjoyment (IMI), autonomy, competence, immersion and intuitive controls (as measured by the PENS metrics) in the autonomy condition was investigated using Pearson product-moment

correlation coefficients. Significant correlations were found between Agreeableness and immersion. Significant correlations were also found between autonomy, immersion and enjoyment. For a full list of correlation coefficients, see Tables 1 and 2 below

Table 1

Pearson Correlations between Personality Domains and enjoyment, autonomy, competence, immersion and intuitive controls for Kinect Adventures autonomy condition

Measures	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Autonomy	.373	.344	.336	.138	.213
Competence	.257	-.059	-.022	.165	.089
Immersion	.173	.444*	.311	-.115	.058
Intuitive Controls	.113	-.012	.136	.281	.399
Enjoyment	.159	.338	.412	-.021	-.015

n= 23 for all cells

* Indicates p < .05

** Indicates p < .0005

Table 2

Pearson Correlations between enjoyment, autonomy, competence, immersion and intuitive controls for Kinect Adventures autonomy condition

Measures	Autonomy	Competence	Immersion	Intuitive Controls	Enjoyment
Autonomy	1	.657**	.567**	.307	.690**
Competence	.657**	1	.272	.295	.407
Immersion	.567**	.272	1	.026	.570**
Intuitive Controls	.307	.295	.026	1	.272
Enjoyment	.690**	.407	.570**	.273	1

n= 23 for all cells

*Indicates p < .05

** Indicates p < .0005

The relationship between scores on the M5-120, Interest/Enjoyment (IMI), autonomy, competence, immersion and intuitive controls (as measured by the PENS metrics) in the non-autonomy condition was investigated using Pearson product-moment correlation coefficients. Significant correlations were found between Extraversion and competence, Agreeableness and enjoyment, and between Conscientiousness and autonomy. Significant correlations were found between autonomy and immersion, intuitive controls as well as enjoyment. Significant correlations were found between competence and immersion, intuitive controls as well as enjoyment. Also, intuitive controls scores were significantly correlated to enjoyment. For a full list of correlation coefficients, see Tables 3 and 4 below.

Table 3

Pearson Correlations between Personality Domains and enjoyment, autonomy, competence, immersion and intuitive controls for Kinect Adventures non-autonomy condition

Measures	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Autonomy	.326	.495*	.425*	-.039	.038
Competence	.435*	.161	.090	-.062	-.037
Immersion	.286	.373	.232	-.212	.094
Intuitive Controls	.252	.222	.377	.134	-.010
Enjoyment	.289	.428[*]	.248	-.074	.192

n= 23 for all cells

*Indicates p < .05

** Indicates p < .0005

Table 4

Pearson Correlations between enjoyment, autonomy, competence, immersion and

intuitive controls for Kinect Adventures non-autonomy condition

Measures	Autonomy	Competence	Immersion	Intuitive Controls	Enjoyment
Autonomy	1	.684**	.742**	.575**	.824**
Competence	.684**	1	.515*	.546**	.503*
Immersion	.742**	.515*	1	.335	.736**
Intuitive Controls	.575**	.546**	.335	1	.610**
Enjoyment	.824**	.503*	.736**	.610**	1

n= 23 for all cells

*Indicates p < .05

** Indicates p < .0005

Research Question II

Would personality correlate to Interest/Enjoyment (IMI), autonomy, competence,

immersion or intuitive controls for those who played *Kinect Sports* in either the

autonomy condition or the non-autonomy condition?

The relationship between scores on the M5-120, Interest/Enjoyment, autonomy,

competence, immersion and intuitive controls (as measured by the PENS metrics) in the

autonomy condition was investigated using Pearson product-moment correlation

coefficients. Significant correlations were found between competence and autonomy,

autonomy and immersion as well as autonomy and enjoyment. Significant correlations

were also found between competence and intuitive controls and immersion was

significantly correlated to enjoyment. For a full list of correlation coefficients, see Tables

5 and 6 below.

Table 5

Pearson Correlations between Personality Domains and enjoyment, autonomy,

competence, immersion and intuitive controls for Kinect Sports autonomy condition

Measures	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Autonomy	.158	-.124	.514*	-.254	.058
Competence	-.042	.342	.295	-.289	.092
Immersion	.035	-.273	.382	-.036	-.290
Intuitive Controls	.111	.129	.368	-.273	-.269
Enjoyment	.227	-.075	.383	-.181	.019

n= 20 for all cells

* Indicates p < .05

** Indicates p < .0005

Table 6

Pearson Correlations between enjoyment, autonomy, competence, immersion and intuitive controls for Kinect Sports autonomy condition

Measures	Autonomy	Competence	Immersion	Intuitive Controls	Enjoyment
Autonomy	1	.637**	.479*	.317	.684 **
Competence	.637**	1	.526*	.677**	.694**
Immersion	.479*	.526*	1	.307	.600**
Intuitive Controls	.317	.677**	.307	1	.437
Enjoyment	.684**	.694**	.600**	.437	1

n= 20 for all cells

*Indicates p < .05

** Indicates p < .0005

The relationship between scores on the M5-120, Interest/Enjoyment (IMI), autonomy, competence, immersion and intuitive controls (as measured by the PENS metrics) in the non-autonomy condition was investigated using Pearson product-moment correlation coefficients. Significant correlations were found between autonomy, immersion and enjoyment, competence, immersion, intuitive controls and enjoyment and immersion was positively correlated to enjoyment. For a full list of correlation coefficients, see Tables 7 and 8 below.

Table 7

Pearson Correlations between Personality Domains and enjoyment, autonomy,

competence, immersion and intuitive controls for Kinect Sports non-autonomy condition

Measures	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Autonomy	.019	.375	.438	-.093	-.050
Competence	-.082	.169	.415	-.285	-.034
Immersion	-.087	-.186	.365	-.008	-.311
Intuitive Controls	.269	.011	.093	-.384	.011
Enjoyment	.039	.031	.363	-.137	-.044

n= 20 for all cells

* Indicates p < .05

** Indicates p < .0005

Table 8

Pearson Correlations between enjoyment, autonomy, competence, immersion and

intuitive controls for Kinect Sports non-autonomy condition

Measures	Autonomy	Competence	Immersion	Intuitive Controls	Enjoyment
Autonomy	1	.677**	.591**	.276	.717**
Competence	.677**	1	.391	.487*	.391
Immersion	.591**	.391	1	.160	.614**
Intuitive Controls	.276	.487*	.160	1	.045
Enjoyment	.717**	.391	.614**	.045	1

n= 20 for all cells

*Indicates p < .05

** Indicates p < .0005

Research Question III

Would personality scores correlate to the Basic Need Satisfaction scale for those who

played Kinect Adventures and Kinect Sports?

The relationship between the subscales of the Basic Need Satisfaction scale

(autonomy and competence) and scores on the M5-120 was investigated using Pearson

product-moment correlation coefficients for those who played *Kinect Adventures*.

Significant correlations were found between Agreeableness and competence and between

Conscientiousness and competence. For a full list of correlation coefficients, see Table 9

below.

Table 9

Pearson Correlations between Personality Domains and the subscales of the Basic Needs

Satisfaction scale (autonomy and competence) for Kinect Adventures participants

Domains	Autonomy	Competence
Extraversion	.201	.304
Agreeableness	.324	.769**
Conscientiousness	.081	.549**
Neuroticism	-.117	-.302
Openness	.375	.102

n= 23 for all cells

* Indicates p < .05

** Indicates p < .0005

The relationship between the subscales of the Basic Need Satisfaction scale
(autonomy and competence) and scores on the M5-120 were investigated using Pearson
product-moment correlation coefficients for those who played *Kinect Sports*. Significant
correlations were found between Extraversion, autonomy and competence as well as
between Neuroticism, autonomy and competence. For a full list of correlation
coefficients, see Table 10 below.

Table 10

Pearson Correlations between Personality Domains and the subscales of the Basic Needs

Satisfaction scale (autonomy and competence) for Kinect Sports participants

Domains	Autonomy	Competence
Extraversion	.787**	.667**
Agreeableness	-.282	-.372
Conscientiousness	-.036	.322
Neuroticism	-.745**	-.712**
Openness	.135	-.019

n= 20 for all cells

* Indicates p < .05

** Indicates p < .0005

DISCUSSION

Hypotheses I & II

The hypothesized outcomes were not found. Participants did not significantly

differ on performance, immersion, enjoyment or autonomy between autonomy and non-

autonomy conditions for either *Kinect Adventures* or *Kinect Sports*. As 78% of those who

played *Kinect Adventures* and 90% of those who played *Kinect Sports* had no prior

experience with the Kinect peripheral, these results are not surprising. This was a novel

experience for the majority of participants. The novel experience of the Kinect games

may have overshadowed the manipulation of autonomy so that participants focused more

on the new experience than on their in-game character.

Research Questions I, II, & III

As can be seen in Tables 1, 3, 5 and 7, significant correlations were found

between the personality domains of Extraversion, Agreeableness and Conscientiousness,

and the PENS measures of autonomy, competence, immersion, intuitive controls as well

as enjoyment. No significant correlations were found for either Neuroticism or Openness

in either *Kinect Adventures*, *River Rush* or *Kinect Sports, Boxing* in the autonomy

condition or the non-autonomy condition. It is possible that the personality traits of

Neuroticism and Openness do not play as much of a role in the games that were used in

this study as Extraversion, Agreeableness and Conscientiousness. Both Kinect

Adventures and Kinect Sports are linear (you are only able to perform a specific number

of actions in each game) and so curiosity and variety of the experience (as measured by

Openness) might not play as much of a role in these games as it would in games that

would offer more of an expansive experience. As Agreeableness plays more of a role in how one interacts with others, it might not play as much of a role in the games employed in the current study as these games did not include interaction with other individuals. Perceiving autonomy (in the game environment) while playing Kinect Adventures was positively correlated to Agreeableness while participating in the non-autonomy condition. Even while being forced to use a default, gender appropriate character, the participants were able to feel a sense of autonomy while in the in-game environment. It is also not surprising that individuals high in Conscientiousness also had high levels of autonomy when in the non-autonomy condition for Kinect Adventures and the autonomy condition for Kinect Sports. Higher scores in Conscientiousness often indicate that an individual pays more attention to detail and so in Kinect Adventures, participants may have paid more attention to choices in their environment and paid little attention to being denied choice in character customization. In Kinect Sports, participants could have been able to pay more attention to their characters identity than those with lower levels of Conscientiousness (much of the participant's character was covered in protective boxing equipment and so it may have been hard to pay attention to a characters identity). This could explain why these scores are correlated. In some ways, Extraversion and competence go hand-in-hand. While playing as a default character, participants may have been more confident in their ability to play the game and were focused more on the game than they were on their in-game character. Their competence could also be related to their energy levels (a facet of Extraversion) as increased energy levels will increase performance in both Kinect Adventures and Kinect Sports as they are controlled by human bodily movements. Of those who played *Kinect Sports*, it is also not surprising

that Conscientiousness was positively correlated to autonomy while in the autonomy condition. As previously mentioned, higher scores in Conscientiousness often indicate that someone pays close attention to detail. These individuals may have paid closer attention to their choices and options in their environment than those with lower levels of Conscientiousness.

As can be seen in Tables 2, 4, 6 and 8, significant correlations between the PENS measures of autonomy, competence, immersion, intuitive controls and the Interest/Enjoyment scale were found. This suggests that a greater sense of perceived autonomy relates to being more immersed in the game environment, which leads to greater enjoyment while playing as a customized or default in-game character. A higher sense of autonomy also relates to the usability of game controls. Those who have high levels of competence may have felt more comfortable in the game environment and as such reported the controls as being intuitive and enjoyed playing the game more even when playing as a default character.

General Limitations

A number of notable limitations to this research include the participants, recruitment method, instrumentation, materials, and methods.

Participants. The sample composition for the current study was not representative of the general population. The vast majority was Caucasian and was 19 years old. It should also be noted that every participant purposely participated in the study. They were able to choose which study they wanted to participate in based on descriptions given by the primary investigator. It is very possible that many individuals in the current study chose to participate in this study because they had an interest in video

games and or personality research as the title that each participant saw before signing up to participate was "Video Games and Personality." The small sample size is also a limitation.

Instrumentation. As the current study employed the Kinect peripheral for the Xbox 360, each of the games used in this study were not traditional (i.e. story line and controller controlled), which is problematic since the PENS metrics were developed to study traditional video games. In particular, the PENS: In-Game Autonomy scale was a measure that did not and will not work well when used with games on the Kinect. This is because many of these games are simple and somewhat linear; the participant can only engage in one activity at a time and would need to choose another game or mini-game in order to engage in another activity. The PENS: In-Game Autonomy scale focuses on real-time choice and freedom, which these games do not allow since they limit players to one type of real-time activity.

Materials. This study used a newer form of video game technology that has yet to be studied in the research using SDT and is also scarce in many households. Since motion control technology in video games is relatively new, nearly no one in this study had experience using the Kinect. Since this was a novel experience for nearly every participant, it is possible that no effects of autonomy in the form of game character personalization could be seen as nearly all participants were interested and engaged in the games they played. In essence, it is possible that they were paying more attention to the technology and how interesting it was and were not able to focus on the finer details of the game (i.e. playing as a customized character). This study also used two Kinect games

to measure the effect of the autonomy manipulation. The relationship between traditional games and more naturally engaging motion control games was not evaluated.

Methods. In this study, all participants participated in the autonomy as well as non-autonomy condition. Keen participants likely figured out what was being studied and may have answered in an acquiescent manner. All participants had to complete the PENS metrics as well as an Interest/Enjoyment scale twice. It is possible that some participants may have gotten bored of answering the same scales numerous times and rushed through them when they were asked to fill them out for the second time.

Implications and Future Directions

Though not immediately applicable to a "real-world" setting, this study has shown that the relationship between personality, self-determination theory and video games needs to be further evaluated in experimental settings. This study found interesting correlations between the FFM and the PENS metrics, and sheds light on research that needs to be conducted using personality and video games. In particular, the relationship between the FFM and the PENS metrics need to be explored in experiments that contain larger sample sizes. Also, this study adds to the sparse literature concerning SDT, the FFM and video games simultaneously. This research helps to make the case this is an interesting realm of research that should be examined more closely given the correlations found between the FFM and the PENS metrics. Further research could determine if a certain personality profile is related to feeling more autonomous, competent or feeling a greater sense of relatedness when playing a given genre of video game.

The current study also shows that current measures of SDT in video game research are not suitable for games on the Xbox 360 that primarily utilize motion control

technology. Altered versions of the PENS measures need to be created for use with motion controlled games as the current measures are primarily meant for traditional controller based games. This would help to ensure that future research using the PENS metrics for motion control games will be measuring aspects that are specific to those motion controlled games rather than traditional video games.

Future research should also examine the relationship between in-game character customization and how it relates to intrinsic motivation, performance and immersion using the previously mentioned customized measures based on motion control gaming to determine if autonomy truly affects a user's experience. Additionally, research should be conducted in order to determine how engaging and motivating a traditional video game can be when compared to a similar, motion controlled video game.

Conclusion

Though this study was unable to find any effect of autonomy on immersion, intrinsic motivation and performance; this study has demonstrated that personality relates to autonomy, immersion and competence in an experimental setting. Also, if future experiments are able to incorporate some of the changes mentioned above, further research using SDT, personality and video games may reveal a link between autonomy (through in-game personalization) and identity. If the inherently engaging aspects of video games could be identified and harnessed, then it may be possible to apply these factors to other areas of life. Ultimately, finding ways to increase intrinsic motivation for specific tasks could lead to drastic improvements in various areas of our lives, including: our education system, work force, and social responsibilities.

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APPENDIX A

Informed Consent Form
Project Title: Perception of Autonomy and Its Effects on Intrinsic Motivation,
Immersion, and Performance

What is the purpose of this research?
        The purpose of this research is to determine if autonomy in the form of game
character personalization effects performance and enjoyment in the Microsoft Kinect
game Kinect Adventures.

What will be expected of me?
        You will be asked to play two mini-games on differing difficulty levels within the
Microsoft Kinect game Kinect Adventures or play against another individual in Kinect
Sports. You will also be asked to give some demographic information, complete a
personality questionnaire, game play behavior information, as well as the PENS game
experience questionnaire.

How long will the research take?
        The questionnaires should take approximately 20-25 minutes to complete and the
video game portion will take approximately 30 minutes.

Will my answers be anonymous?
        Yes. No personal, identifying information will be collected during the course of
the study

Will Confidentiality Ever Be Broken?
        No, your confidentiality will never be broken.

Can I withdraw from the study if I decide to?
        Yes, you may withdraw from this study at any time, for any reason.

Is there any harm that I might experience from taking part in the study?
        There is no inherent risk of harm when participating in this study.

How will I benefit from taking part in the research?
        You will receive will receive extra credit in your respective Psychology 150 class.

Who should I contact if I have questions or concerns about the research?
        Contact me (Trevor Dennie) via email at tmdennie1@catamount.wcu.edu . You
can also contact the Western Carolina University IRB Chair at (828) 227-7212.

_____ Yes, I agree to participate in the above study and I understand that my participation

is voluntary. I understand that I will be able to stop taking this survey at any point in time. I also understand that there will be no consequences for not completing the survey.

_____ No, I do not agree to participate in the above study

APPENDIX B

Demographics and Game Play Questionnaire

1. Do you play video games? (yes/no)

2. If so, how many hours per week do you play?

3. How many years of experience do you have playing video games?

4. What genre of video games do you play? (Check all that apply)

5. Do you have any experience with the Kinect camera for the Microsoft Xbox 360?

    (yes/no)

6. Do you have any experience with Kinect Adventures? (yes/no)

7. In general, how would you rate your enjoyment with video games? (1-7)

8. In what year were you born?

9. What is your gender (Male, Female, or Transgender) ?

10. Are you a student?

11. If you are a student, what is your major?

12. What state do you consider to be your permanent residence?

13. What is your income level?

APPENDIX C

PENS: In-Game Autonomy

Reflect on your play experiences and rate your agreement with the following statements:

1. The game provides me with interesting options and choices

2. The game lets you do interesting things

3. I experienced a lot of freedom in the game

APPENDIX D

Basic Need Satisfaction in General Scale
Feelings I Have

Please read each of the following items carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond:

1	2	3	4	5	6	7
not at all			somewhat			very
true			true			true

1. I feel like I am free to decide for myself how to live my life.

2. Often, I do not feel very competent.

3. I feel pressured in my life.

4. People I know tell me I am good at what I do.

5. I generally feel free to express my ideas and opinions.

6. I have been able to learn interesting new skills recently.

7. In my daily life, I frequently have to do what I am told.

8. Most days I feel a sense of accomplishment from what I do.

9. People I interact with on a daily basis tend to take my feelings into consideration.

10. In my life I do not get much of a chance to show how capable I am.

11. I feel like I can pretty much be myself in my daily situations.

12. I often do not feel very capable.

13. There is not much opportunity for me to decide for myself how to do things in my daily life.

Scoring information. Form three subscale scores, one for the degree to which the person experiences satisfaction of each of the three needs. To do that, you must first reverse score all items that are worded in a negative way (i.e., the items shown below

with (R) following the items number). To reverse score an item, simply subtract the item response from 8. Thus, for example, a 2 would be converted to a 6. Once you have reverse scored the items, simply average the items on the relevant subscale. They are:

Autonomy: 1, 4(R), 8, 11(R), 14, 17, 20(R)
Competence: 3(R), 5, 10, 13, 15(R), 19(R)

APPENDIX E

PENS: In-Game Competence

Reflect on your play experiences and rate your agreement with the following statements:

1. I feel competent at the game.

2. I feel very capable and effective when playing.

3. My ability to play the game is well matched with the game's challenges.

APPENDIX F

PENS: Physical/Emotional/Narrative Presence Scale

1. When playing the game, I feel transported to another time and place.

2. Exploring the game world feels like taking an actual trip to a new place.

3. When moving through the game world I feel as if I am actually there.

4. I am not impacted emotionally by events in the game (-).

5. The game was emotionally engaging.

6. I experience feelings as deeply in the game as I have in real life.

7. When playing the game I feel as if I was part of the story.

8. When I accomplished something in the game I experienced genuine pride.

9. I had reactions to events and characters in the game as if they were real.

APPENDIX G

PENS: Intuitive Controls

1. Learning the game controls was easy.

2. The game controls are intuitive.

3. When I wanted to do something in the game, it was easy to remember the

corresponding control.

APPENDIX H

The Post Experimental Intrinsic Motivation Inventory: Interest/Enjoyment

1. I enjoyed doing this activity very much

2. This activity was fun to do.

3. I thought this was a boring activity.   (R)

4. This activity did not hold my attention at all. (R)

5. I would describe this activity as very interesting.

6. I thought this activity was quite enjoyable.

7. While I was doing this activity, I was thinking about how much I enjoyed it.

APPENDIX I

M5-120

M5-120 Questionnaire
David M. McCord, Ph.D., Western Carolina University

Name: _____   **Age:** _____

Gender: _____   **Date:** _____

Email: _____   **Ethnic identity**: _____

This is a personality questionnaire, which should take about 10-15 minutes. There are no right or wrong answers to these questions; you simply respond with the choice that describes you best.

If you feel that you cannot see the pages appropriately because of sight difficulties, cannot use a pencil well because of hand-motor problems, or know of any other physical, emotional, or environmental issues which would affect your performance on this test, please notify the testing administrator now.

If you feel extremely nervous about this testing process and feel that your nervousness will affect your performance, please notify the testing administrator so that they can answer any questions about this process

The *M5 Questionnaire* is used primarily for research purposes, though in certain cases individual results may be shared with the test-taker through a professional consultation. In general, results are treated anonymously and are combined with other data in order to develop norms, establish psychometric properties of these scales and items, and to study various theoretical and practical issues within the field of personality psychology.

By proceeding with the process and responding to these questionnaire items, you are expressing your understanding of these terms and your consent for your data to be used for research purposes. You are also agreeing to release and forever discharge *Western Carolina University* and *David M. McCord, Ph.D.,* from any and all claims of any kind or nature whatsoever arising from the assessment process.

- Without spending too much time dwelling on any one item, just give the first reaction that comes to mind.
- In order to score this test accurately, it is very important that you answer *every* item, without skipping any. You may change an answer if you wish.
- It is ultimately in your best interest to respond as honestly as possible. Mark the response that best shows how you really feel or see yourself, not responses that you think might be desirable or ideal.

M5-120 Questionnaire					Page 2
	Innacurate	Moderately Innacurate	Neither	Moderately Accurate	Accurate
1 Worry about things.	O	O	O	O	O
2 Make friends easily.	O	O	O	O	O
3 Have a vivid imagination.	O	O	O	O	O
4 Trust others.	O	O	O	O	O
5 Complete tasks successfully.	O	O	O	O	O
6 Get angry easily.	O	O	O	O	O
7 Love large parties.	O	O	O	O	O
8 Believe in the importance of art.	O	O	O	O	O
9 Use others for my own ends.	O	O	O	O	O
10 Like to tidy up.	O	O	O	O	O
11 Often feel blue.	O	O	O	O	O
12 Take charge.	O	O	O	O	O
13 Experience my emotions intensely.	O	O	O	O	O
14 Love to help others.	O	O	O	O	O
15 Keep my promises.	O	O	O	O	O
16 Find it difficult to approach others.	O	O	O	O	O
17 Am always busy.	O	O	O	O	O
18 Prefer variety to routine.	O	O	O	O	O
19 Love a good fight.	O	O	O	O	O
20 Work hard.	O	O	O	O	O
21 Go on binges.	O	O	O	O	O
22 Love excitement.	O	O	O	O	O
23 Love to read challenging material.	O	O	O	O	O
24 Believe that I am better than others.	O	O	O	O	O
25 Am always prepared.	O	O	O	O	O
26 Panic easily.	O	O	O	O	O
27 Radiate joy.	O	O	O	O	O
28 Tend to vote for liberal political candidates.	O	O	O	O	O
29 Sympathize with the homeless.	O	O	O	O	O
30 Jump into things without thinking.	O	O	O	O	O
31 Fear for the worst.	O	O	O	O	O
32 Feel comfortable around people.	O	O	O	O	O
33 Enjoy wild flights of fantasy.	O	O	O	O	O
34 Believe that others have good intentions.	O	O	O	O	O
35 Excel in what I do.	O	O	O	O	O
36 Get irritated easily.	O	O	O	O	O
37 Talk to a lot of different people at parties.	O	O	O	O	O
38 See beauty in things that others might not notice.	O	O	O	O	O
39 Cheat to get ahead.	O	O	O	O	O
40 Often forget to put things back in their proper place.	O	O	O	O	O
	Innacurate	Moderately Innacurate	Neither	Moderately Accurate	Accurate

M5-120 Questionnaire					Page 3
		Moderately Innacurate	Neither	Moderately Accurate	Accurate
		Innacurate			
41	Dislike myself.	O	O	O	O	O
42	Try to lead others.	O	O	O	O	O
43	Feel others' emotions.	O	O	O	O	O
44	Am concerned about others.	O	O	O	O	O
45	Tell the truth.	O	O	O	O	O
46	Am afraid to draw attention to myself.	O	O	O	O	O
47	Am always on the go.	O	O	O	O	O
48	Prefer to stick with things that I know.	O	O	O	O	O
49	Yell at people.	O	O	O	O	O
50	Do more than what's expected of me.	O	O	O	O	O
51	Rarely overindulge.	O	O	O	O	O
52	Seek adventure.	O	O	O	O	O
53	Avoid philosophical discussions.	O	O	O	O	O
54	Think highly of myself.	O	O	O	O	O
55	Carry out my plans.	O	O	O	O	O
56	Become overwhelmed by events.	O	O	O	O	O
57	Have a lot of fun.	O	O	O	O	O
58	Believe that there is no absolute right or wrong.	O	O	O	O	O
59	Feel sympathy for those who are worse off than myself.	O	O	O	O	O
60	Make rash decisions.	O	O	O	O	O
61	Am afraid of many things.	O	O	O	O	O
62	Avoid contacts with others.	O	O	O	O	O
63	Love to daydream.	O	O	O	O	O
64	Trust what people say.	O	O	O	O	O
65	Handle tasks smoothly.	O	O	O	O	O
66	Lose my temper.	O	O	O	O	O
67	Prefer to be alone.	O	O	O	O	O
68	Do not like poetry.	O	O	O	O	O
69	Take advantage of others.	O	O	O	O	O
70	Leave a mess in my room.	O	O	O	O	O
71	Am often down in the dumps.	O	O	O	O	O
72	Take control of things.	O	O	O	O	O
73	Rarely notice my emotional reactions.	O	O	O	O	O
74	Am indifferent to the feelings of others.	O	O	O	O	O
75	Break rules.	O	O	O	O	O
76	Only feel comfortable with friends.	O	O	O	O	O
77	Do a lot in my spare time.	O	O	O	O	O
78	Dislike changes.	O	O	O	O	O
79	Insult people.	O	O	O	O	O
80	Do just enough work to get by.	O	O	O	O	O
		Innacurate	Moderately Innacurate	Neither	Moderately Accurate	Accurate

M5-120 Questionnaire					Page 4
	Innacurate	Moderately Innacurate	Neither	Moderately Accurate	Accurate
81 Easily resist temptations.	O	O	O	O	O
82 Enjoy being reckless.	O	O	O	O	O
83 Have difficulty understanding abstract ideas.	O	O	O	O	O
84 Have a high opinion of myself.	O	O	O	O	O
85 Waste my time.	O	O	O	O	O
86 Feel that I'm unable to deal with things.	O	O	O	O	O
87 Love life.	O	O	O	O	O
88 Tend to vote for conservative political candidates.	O	O	O	O	O
89 Am not interested in other people's problems.	O	O	O	O	O
90 Rush into things.	O	O	O	O	O
91 Get stressed out easily.	O	O	O	O	O
92 Keep others at a distance.	O	O	O	O	O
93 Like to get lost in thought.	O	O	O	O	O
94 Distrust people.	O	O	O	O	O
95 Know how to get things done.	O	O	O	O	O
96 Am not easily annoyed.	O	O	O	O	O
97 Avoid crowds.	O	O	O	O	O
98 Do not enjoy going to art museums.	O	O	O	O	O
99 Obstruct others' plans.	O	O	O	O	O
100 Leave my belongings around.	O	O	O	O	O
101 Feel comfortable with myself.	O	O	O	O	O
102 Wait for others to lead the way.	O	O	O	O	O
103 Don't understand people who get emotional.	O	O	O	O	O
104 Take no time for others.	O	O	O	O	O
105 Break my promises.	O	O	O	O	O
106 Am not bothered by difficult social situations.	O	O	O	O	O
107 Like to take it easy.	O	O	O	O	O
108 Am attached to conventional ways.	O	O	O	O	O
109 Get back at others.	O	O	O	O	O
110 Put little time and effort into my work.	O	O	O	O	O
111 Am able to control my cravings.	O	O	O	O	O
112 Act wild and crazy.	O	O	O	O	O
113 Am not interested in theoretical discussions.	O	O	O	O	O
114 Boast about my virtues.	O	O	O	O	O
115 Have difficulty starting tasks.	O	O	O	O	O
116 Remain calm under pressure.	O	O	O	O	O
117 Look at the bright side of life.	O	O	O	O	O
118 Believe that we should be tough on crime.	O	O	O	O	O
119 Try not to think about the needy.	O	O	O	O	O
120 Act without thinking.	O	O	O	O	O
	Innacurate	Moderately Innacurate	Neither	Moderately Accurate	Accurate