



# JCR

Journal of  
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for Autism

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Motivational Differences in Problem Video Game Play

Violent Game Acceptance

Comforting Communication in an Online Epilepsy Forum



THE VIRTUAL REALITY  
MEDICAL INSTITUTE



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## EDITORIAL

Welcome to the Summer 2009 issue of the Journal of CyberTherapy & Rehabilitation (JCR). We are pleased to bring the fifth issue of our publication to readers, critics and researchers around the world. Our peer-reviewed academic journal explores the uses of advanced technologies for therapy, training, education, prevention and rehabilitation. JCR is a quarterly-published academic journal, unique in the fact that it focuses on the rapidly expanding worldwide trend of applying ground-breaking technology towards the field of healthcare. Psychiatry, psychology, physical medicine and rehabilitation, neurorehabilitation, oncology, obesity, eating disorders and autism continue to be main areas of interest studied by JCR.

Since our inaugural issue, JCR has received attention from peers, international institutions and international conferences. A common thirst for new knowledge and application of cutting-edge technologies to better the lives of others drives this diverse group of people towards a similar goal. Advanced technologies, such as robotics, adaptive displays, E-health, virtual reality (VR) and non-invasive physiological monitoring are now applied to many diverse fields of healthcare. As this body of research is added to, patients, doctors and therapists can look towards a hopeful future and new ways to treat mental and physical disorders. The content of this issue of JCR reflects our diversity, featuring such topics as VR immersions, the effects of video game playing and online forums to treat sufferers of disease.

In the first article Wang and Reid explore the application of a virtual reality-cognitive rehabilitation (VR-CR) approach in treating autism in children. In this study, virtual reality (VR) was used as an interactive, cognitive-focused treatment which allowed for greater flexibility than traditional methods for treating autism.

Next, Murray presents research based on the treatment of phantom limb pain in amputees using VR. Studies using research stemming from traditional "mirror-box" methods were conducted and Murray looks closely at three VR systems that were implemented in the treatment of phantom limb pain.

In the third article, Aime, Cotton and Bouchard take a close look at women suffering from eating disorders and implement VR as an experimental new form of treatment for these patients. VR immersions were conducted to assess whether or not treatment was successful in helping women suffering from eating disorders as well as overall concern over their weight and shape.

Bouchard, St-Jacques, Renaud and Wiederhold, in the fourth manuscript, address the side effects of immersions in VR for people

suffering from anxiety disorders. In this study, researchers used a sample group of patients suffering from anxieties of various types and measured reports of side effects before and after VR immersions to determine whether or not patients and therapists should be concerned about the lasting complications of side effects.

In the fifth paper, King and Delfabbro present findings on research detailing motivational differences in video game play. Factors that were considered include motivation to play video games, intrinsic and extrinsic motivations, and total time spent playing. These findings can be used to help video game players determine if their playing behavior points to a problematic level of involvement.

In another article addressing video game playing, Wang and Yang explore the relationships between thrill seeking, perceived risk and aggressive tendencies and how these factors relate to the acceptance of playing violent video games. Behavioral intention was also closely studied as well as differences in male and female gaming styles.

Lastly, Fullwood and Wootton examine the possibilities of computer-mediated communication (CMC) to help patients deal with emotionally-sensitive issues. To do so, an online support forum produced by the National Society of Epilepsy was used. Key factors, such as anonymity and willingness for disclosure, were studied and used to determine whether CMC meets criteria for offering support to sufferers.

Future issues of JCR will continue to explore the ways in which healthcare, in Europe and worldwide, can benefit from innovative applications of technology. I would like to sincerely thank the contributing authors for their inspiring work and dedication to this field of research. I also want to thank JCR's Associate Editors – Professor Botella, Professor Bouchard, Professor Gamberini and Professor Riva for their leadership and hard work, as well as our internationally renowned Editorial Board for their contributions. We encourage readers and subscribers to contact us with ideas and manuscripts. Thank you again for your support of JCR. We look forward to providing you with more ways in which technology is contributing to increased quality of life in citizens of the world.

Brenda K. Wiederhold, Ph.D., MBA, BCIA  
Editor-in-Chief, *Journal of CyberTherapy & Rehabilitation*  
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# THE VIRTUAL REALITY-COGNITIVE REHABILITATION (VR-CR) APPROACH FOR CHILDREN WITH AUTISM

Michelle Wang<sup>1</sup> and Denise Reid<sup>2</sup>

Children with autism and their families lack treatment options that directly target the cognitive impairments that are characteristic of autism spectrum disorders. The objective of this paper is to present an interactive, cognitive-focused treatment approach that is suggested to complement current treatments for children with autism. We present a brief theoretical overview of the VR-CR approach, followed by a discussion of how the VR-CR approach can and has been put into practice using autism-specific teaching principles. Recommendations for future research are provided.

*Keywords:* Autism, Virtual Reality, Cognitive Rehabilitation, Cognitive Education

## INTRODUCTION

Autism or autism spectrum disorders (ASD) refer to a group of neurological disorders that are characterized, in differing degrees, by three core behavioral elements – impairments in social interaction, deficits in communication skills and the absence of imagination, as manifested in restricted repetitive and stereotypic behaviors (APA, 2000). Research in the field of autism has grown enormously in the past few decades, particularly in generating evidence for underlying cognitive impairments and establishing principles of effective practice. However, current treatments for autism have been slow to adapt and assimilate this knowledge. The majority of current interventions for autism continue to target specific problem behaviors rather than cognitive impairments and often do not adhere to evidence-based practice (Jones & Jordan, 2008).

There is a new treatment approach that has the potential to apply the recent research findings into clinical and educational practice. This approach integrates cognitive rehabilitation with virtual reality technology (Rizzo, Schultheis, Kerns & Mateer, 2004). Traditional theories and programs of cognitive rehabilitation provide the requisite knowledge and strategies to effectively address autism-specific cognitive impairments, while advances in virtual reality technology enable principles of effective practice to be incorporated into the treatment tool itself. Interventions that integrate virtual reality (VR) technology with traditional methods of cognitive rehabilitation (CR) can be considered the “VR-CR approach.”

This paper provides an overview of the key principles of the Virtual Reality-Cognitive Rehabilitation (VR-CR) approach and how these principles can be applied to develop a VR-CR application for children with autism. Although the development of a VR-CR application includes purchasing hardware and programming software, this paper will neither discuss the technical aspects of equipment nor programming. This paper focuses primarily on the theoretical and practical concepts be-

hind remediating specific cognitive impairments in children with autism.

## THE THEORETICAL FRAMEWORK OF THE VR-CR APPROACH

The Virtual Reality-Cognitive Rehabilitation (VR-CR) approach is an integration of the theoretical framework of traditional cognitive rehabilitation programs and the interactive capabilities of virtual technology (Rizzo, 1997). Traditional cognitive rehabilitation (CR) has focused primarily on retraining and improving the cognitive abilities of individuals with brain injury in areas such as attention, memory and executive functions (Sohlberg & Mateer, 1989). Although the field of cognitive rehabilitation benefited early on from the use of computers, the evolution of virtual reality technology has facilitated even greater user engagement and motivation in cognitive exercises that are typically repetitive and highly structured (Rizzo, et al., 2004).

## THE ‘VR’ OF VR-CR

Virtual Reality (VR) is defined as a simulation of the real world using computer graphics. Users are able to interact, in real-time, through multiple sensory channels including sight, sound, touch and sometimes even smell (Burdea & Coiffet, 2003; Self, Rosalind, Weheba & Crumrine, 2007). A VR system provides the user with a three-dimensional sense of immersion or “being there” within the virtual environment (Pimental & Teixeira, 1995). Many VR systems require the use of wearable equipment, such as head-mounted devices. Projected VR systems, on the other hand, are able to capture the user’s actions with specialized cameras without the burden of such equipment (Burdea & Coiffet, 2003). VR is gaining support as an effective tool in the therapy and rehabilitation sectors because of its potential to engage and motivate users while retaining its therapeutic effectiveness (Harris & Reid, 2005). Rizzo and Kim (2005) offer insight into the potential of VR and said, “[using VR] in the therapy and rehabilitation sciences ... represents more than a simple linear extension of existing computer technology for human use. VR offers the potential to create

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## A REVIEW OF THE USE OF VIRTUAL REALITY IN THE TREATMENT OF PHANTOM LIMB PAIN

Craig D. Murray<sup>1</sup>

This paper reviews the development and evidence for the efficacy of virtual reality in the treatment of phantom limb pain experienced by most people following amputation of a limb. The theoretical and empirical antecedents to this development are outlined, followed by consideration of the characteristics and empirical work of three systems which have been reported in academic literature. The paper concludes with a critique of these systems and offers suggestions for future work.

*Keywords:* Amputation, Pain, Phantom Limb Pain, Rehabilitation and Virtual Reality

### INTRODUCTION

In recent years there has been a proliferation of uses in virtual reality to treat a range of physical and mental health complaints. Virtual environments have been used to treat eating disorders and phobias, as well as alleviate various forms of pain. As part of the growth in the clinical applications of virtual systems, a small body of research has emerged in which virtual reality is advanced and empirically tested as a tool in the alleviation of phantom limb pain experienced by people post-amputation in which they feel that their amputated limb is not only still present, but is the source of a great deal of pain.

Within this paper the information presented focuses on the theoretical and empirical antecedents which have led to the advancement of virtual reality as a possible treatment for phantom limb pain. Also presented is an account of the systems which have been implemented to date along with the empirical evidence of the efficacy of these systems. The paper concludes with a critique of this work and offers suggestions for future developments.

### PHANTOM LIMB PAIN AND THE MIRROR-BOX

Phantom limb pain (PLP) is one of the most distressing consequences of amputation and affects as much as 85 percent of amputees (Sherman et al., 1984). Usually, phantom sensations and phantom pain occur soon after amputation. At this time, patients feel as if the anatomical limb is still intact, and present in its usual place (Fisher, 1999). The phantom limb is often experienced with the same position and form of the limb prior to amputation (Katz & Melzack, 1990). While burning, cramping and shooting pains are characteristic of phantom pain (Katz & Melzack, 1990), phantom sensations have been described as tingly or itchy (Sherman, 1984).

While a range of pharmaceutical, surgical and psychological interventions are used to treat PLP, the success of these approaches is often limited and short-term (Katz, 1992).

One innovative treatment technique that caused considerable interest when first implemented is the mirror-box (Ramachandran & Rogers-Ramachandran, 1996). According to Ramachandran, when a limb is intact motor commands in the brain instructing a limb to move are usually damped by error feedback, such as vision and proprioception. With a phantom limb such damping is not possible and the motor output becomes amplified which may then be experienced as painful. In order to address this, Ramachandran created the mirror-box, a low-tech device made by placing a vertical mirror inside a cardboard box with the top removed. The amputee places their remaining anatomical limb in the box and views a reflection in the visual space occupied by their phantom limb. Participants are then instructed to make various movements of their anatomical limb whilst focusing on the mirror's reflection and attempting to move their phantom limb in synchrony with the reflected image. For many people this results in a compelling illusion that they have a physical limb that can be willed to move.

In the original study the majority of patients experienced some form of transferred kinesthetic sensations into the muscles and joints of their phantom limb using this equipment. Four out of five patients who experienced involuntary clenching spasms in their phantom hand experienced relief through use of the mirror-box. Subsequently, the mirror-box has been used with lower-limb amputees with similar success. Viewing a reflection of an anatomical limb in the phenomenal space of a phantom limb resulted in amputees reporting a significantly greater number of movements of their phantom limb than with attempted movement alone (Brodie et al., 2003). MacLachlan et al. (2004) have also presented a case study in which the mirror-box reduced PLP in a lower-limb amputee.

While this work indicates that the mirror-box may be an effective treatment for painful and paralyzed phantom limb experience, there are no controlled studies which have explored the number and lengths of mirror-box sessions necessary to effect change,

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## REACTIVITY TO VIRTUAL REALITY IMMERSIONS IN A SUBCLINICAL SAMPLE OF WOMEN CONCERNED WITH THEIR WEIGHT AND SHAPE

Annie Aimé<sup>1</sup>, Karine Cotton<sup>1</sup> and Stéphane Bouchard<sup>1</sup>

Although virtual reality (VR) is a promising exposure technique for people suffering from an eating disorder, it had not been used with women who show significant but subclinical concerns with their weight and shape. Twenty-seven women took part in three immersions in VR (10 concerned and 17 non-concerned). Measures of anxiety were taken before, during and after the immersions. Weight, shape and food concerns, drive for thinness and body dissatisfactions were measured immediately after the immersions. Compared to the neutral environment, the buffet and pool immersions caused a significantly higher level of anxiety and weight preoccupations among the women who were concerned than among those who weren't. The study conclude VR is effective through the continuum of eating disorders. Not only does it arouse reactions within people suffering from an eating disorder, but also among women concerned by their weight and shape.

*Keywords:* Virtual Reality, Weight, Shape and Food Concerns, Anxiety

Body image is a multi-dimensional construct that refers to a person's cognitive, affective, behavioral and perceptual dimensions (Farrell, Shafran & Lee, 2006). Any distortion of the body image can be defined as a dysfunction within one of these dimensions. Cash (2002) suggests two basic elements of body image – evaluation and investment. On the one hand, the evaluation element refers to the judgment a person places on their appearance. On the other hand, the investment element refers to their body schema, created in relation to beliefs or assumptions about the importance, meaning, and influence of appearance in one's life (Cash, 2002; Cash, Melnyk & Hrabosky, 2004). The body schema can be considered as the result of comparisons and integration at the cortical level of past sensory experiences with current sensation (Riva, 1998). Taken together, these comparisons and integrations often lead to great concerns regarding weight and shape, especially in women (Hoek & Van Hoeken, 2003). The greater the gap between the real weight and the ideal weight, the higher the likelihood is of developing high levels of body dissatisfaction (Cuadrado, Carbajal & Moneiras, 2000). When young girls perceive their body to be too big and therefore, deviate significantly from the model of fashionable thinness, they become more at-risk to be negatively affected by this model, develop body dissatisfactions, diet or practice unhealthy behaviors towards food (Davison, Markey & Birth, 2003).

For individuals with an eating disorder (ED), the two aspects of body image, evaluation and investment, are affected because these people frequently over-estimate their size and weight. Their body dissatisfaction is also high and constant (Thompson, 1990). Concerns among women suffering from ED are characterised by a predominance of negative thoughts regarding eating, food, fat, weight and shape (Sassaroli, Bertelli, Decoppi, Crosina, Milos &

Ruggiero, 2005). Furthermore, among these women, cognitions concerning weight, shape, food, social comparison and others' perceptions are related to negative thoughts and negative emotions such as anxiety (Sassaroli, et al., 2005).

Up to this day, only a few studies have used virtual reality (VR) with ED patients (Perpiñá, Botella, Baños, Marco, Alcañiz & Quero, 1999; Perpiñá, Botella & Baños, 2003; Riva, Bacchetta, Baruffi, Rinaldi & Molinari, 1999; Riva, Bacchetta, Cesa, Conti & Molinari, 2004; Gutierrez-Maldonado, Ferrer-Garcia, Caqueo-Urizar & Letosa-Porta, 2006). Thus, available results stand exclusively on clinical samples. Studies using VR with ED patients have showed that, when added to traditional psychotherapy, in virtual exposure helps patients to reduce body dissatisfaction, negative thoughts and attitudes towards the body and to improve one's psychopathology in general. Symptoms relating to ED were improved, shown in such variables specifically related to body image, motivation and compliance with treatment (Perpiñá, et al., 1999; Riva, et al., 1999; Riva, et al., 2004).

Although promising, such results do not allow definite conclusions in the effectiveness of the immersions in virtual. Before concluding so, it is essential to make sure that immersions in virtual can evoke feelings of anxiety in presence of significant stimuli (Cottraux, 2004). So far, only one group of researchers (Gutierrez-Maldonado, et al., 2006) has addressed this question and again, only people with ED were evaluated. In that study, thirty women suffering from ED were exposed to six virtual environments – a living room representing a neutral environment, a kitchen and a restaurant containing high-calorie food, a kitchen and a restaurant containing low-calorie food and a swimming pool. The results show that VR can simulate problematic situations, experienced on a daily basis,

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## SIDE EFFECTS OF IMMERSIONS IN VIRTUAL REALITY FOR PEOPLE SUFFERING FROM ANXIETY DISORDERS

Stéphane Bouchard<sup>1</sup>, Julie St-Jacques<sup>1</sup>, Patrice Renaud<sup>1</sup> and Brenda K. Wiederhold<sup>2</sup>

Side effects caused by immersions in virtual reality (VR) have been documented in experimental studies and with healthy people. With the growing interest of VR applications to assess and treat mental disorders, empirical information on side effects in clinical populations is needed. Three studies were conducted to: (a) describe symptoms and scores on the Simulator Sickness Questionnaire (SSQ) in a sample of 157 adults immersed in VR to treat their phobias, (b) compare exposure treatments involving more or less actions and motions (N = 34); and (c) document the usefulness of assessing symptoms prior to the immersion in VR and following up 26 phobic patients 24 hours post-immersion. Overall, results show that most participants experienced slight side effects, symptoms were strong even before immersion in VR and there are no reasons to be generally concerned with health and safety issues within 24 hours after therapy sessions. Exposure in VR to treat fear of flying was associated with fewer side effects than for other anxiety disorders. The scores on the SSQ were much higher than in studies conducted with non-clinical samples, raising several research questions. Side effects should not be a source of worries but they must be closely monitored and systematically reported in outcome studies.

*Keywords:* Simulator Sickness, Cybersickness, Adverse Events, Virtual Reality, Phobias

### INTRODUCTION

In the last decade, the use of virtual reality (VR) has been of great interest to clinicians and researchers because it enables patients to be placed in a standardized and replicable situation in order to elicit emotions, cognitions or behaviors. It is now used in several clinical settings (for illustrations, see Gaggioli, Keshner, Weiss & Riva, 2009; Wiederhold & Riva, 2009).

Although VR offers several advantages, issues concerning the health and safety implications of this technology remain poorly studied in clinical settings. This constitutes a frequent concern raised by research ethics boards and committees. For example, there are warnings against the use of VR within clinical populations such as people suffering from claustrophobia, substance abuse or schizophrenia (Stanney, Kennedy & Kingdon, 2002). Virtual environments have been designed for use with these populations, but testing these applications or implementing them in private practice settings means ethical questions may be raised. There is a lack of data available to address these questions. Worries sometimes associated with VR come from the induction of unwanted side effects such as nausea or eyestrain. Virtual reality-induced side effects, also commonly referred to as cybersickness (McCauley & Sharkey, 1992), may include symptoms such as discomfort, vertigo, nausea, eyestrain, headaches, dizziness, epigastric awareness, cold sweats, hot flashes, increased salivation, burping, drowsiness, vomiting, etc. (Kennedy, Lane, Berbaum & Lilienthal, 1993; Lawson, Graeber, Mead & Muth, 2002).

Cobb et al. (1999) and Wilson (1997) conducted a systematic analysis of the symptoms and effects of VR immersions. The technology they used is over a decade old, therefore, some of their results may not apply to the more efficient VR systems. Yet, they found that 20 percent of their participants did not notice any side effects and five percent of their sample experienced side effects severe enough to stop the immersion. Side effects are monitored in an increasing number of studies, including anxiety (Jang et al., 2002), schizophrenia (Fornells-Ambrojo et al., 2008) and substance abuse (Girard, Turcotte, Bouchard & Girard, In press). Unfortunately, in most studies conducted with clinical populations, VR-induced side effects are not systematically reported. Only the number of participants excluded due to strong side effects, also known as adverse events in the pharmacological industry, is mentioned and the scoring procedures are unclear.

VR-induced side effects may be caused by a variety of factors (Harm, 2002; Lawson et al., 2002; Sharples, Cobb, Moody & Wilson, 2008; Viirre & Bush, 2002), including individual susceptibility to motion sickness, update lag of the computer, technologies used for the immersion, mode of interaction, weight and characteristics of the head mounted display, field of view, content of the visual display, or characteristics of the tasks performed by the user, such as significant motion.

Some measures have been published to assess VR-induced side effects. For example, some instruments specifically measure ocular symptoms (Ames, Wolffsohn & McBrien, 2005), others

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## MOTIVATIONAL DIFFERENCES IN PROBLEM VIDEO GAME PLAY

Daniel King<sup>1</sup> and Paul Delfabbro<sup>1</sup>

Self-determination theory states that motivation plays an important role in initiating, developing and maintaining involvement within an activity. The present study applied this theory to video game playing and surveyed 399 video game players, 82 percent of which were male with a mean age of 20.3 years old, on measures of video game playing involvement, motivation to play video games and problem video game play. Participants were obtained from various video game retail outlets, Internet cafes, and LAN gaming businesses. The results showed that extrinsic motivations to play video games, such as tension release, social approval and external regulation by in-game rewards, and amotivation, or playing without a sense of purpose about the activity, were significant predictors of problem video game playing. The results were discussed in terms of their application to identifying and assisting young people with potentially problematic levels of video game playing.

*Keywords:* Motivation, Video Game Play, Behavioral Addiction, Self-Determination, Problem Involvement

### INTRODUCTION

The notion that excessive video game playing may represent a problematic activity in its own right has received increased academic attention (Griffiths, 2008; Griffiths & Davies, 2005; Salguero & Moran, 2002). In the last decade, researchers have identified a subgroup of players, particularly players of online role-playing games like World of Warcraft, who report playing over 50 hours per week (Griffiths, Davies & Chappell, 2003). Numerous other studies have identified high use of video games, although the methods used to classify heavy or excessive use have varied greatly (Charlton & Danforth, 2007; Christakis, Ebel, Rivara & Zimmerman, 2004; Chui, Lee & Huang, 2004; Fisher, 1994; Fleming & Kraut, 2007; Ladouceur & Dube, 1995; Ng & Wiemer-Hastings, 2005; Phillips, Rolls, Rouse & Griffiths, 1995; Salguero & Moran, 2002; Yee, 2006). Nevertheless, it is generally agreed by a number of researchers that such high levels of involvement are likely to have deleterious effects on individuals if they are maintained over time. In addition to having impacts on a person's psychological and physical functioning, shown in lack of sleep and exercise or limited mobility, excessive playing may also compromise work and study commitments and decrease opportunities for other social activities. However, the more controversial element of this area of research is whether or not excessive playing should be treated similarly to recognized behavioral addictions such as pathological or problem gambling (Griffiths, 2008a).

In a number of papers, Griffiths advances the view that video game playing is a form of addictive behaviour because it shows similarities to gambling (Griffiths, 1991a; Griffiths, 2008a; Griffiths, 2008b; Griffiths & Wood, 2000). As with gamblers, video game players find it difficult to resist the urge to participate, find it difficult to cease the behavior, become preoccupied with playing, and, as indicated above, can experience psychological, physiological and social harm if they participate excessively. However, this view has been

challenged on a number of grounds by several authors. For example, Jaffe (1990) has argued that the application of the term "addiction" to non-chemical repetitive behaviors may be indiscriminate, which may de-emphasize the importance of identifying specific mechanisms which maintain certain problem behaviors. Similarly, Blaszczynski (2006) has argued that researchers must avoid the trap of accepting self-reported accounts of addiction from computer-users as a basis for the validity of technological addictions, and suggested that the field needs empirical evidence of neuro-adaptive changes in addition to psychological dependency and lack of control before these appetitive behaviors may be accepted as bona-fide addictions. Schaffer, Hall & van de Bilt (2000) and Wood's (2007) reviews of the literature on computer and video game "addiction" have each concluded that there is insufficient evidence to suggest that so-called computer-based "addictions" exist as a singular, primary disorder, and they posit that excessive involvement may instead reflect an underlying psychopathological condition. Warden, Phillips and Ogloff (2004) also warned of the various legal consequences of formally recognizing technological addictions such as Internet addiction, particularly with regard to how these technologies could be subject to various legislative controls, and the greater admissibility of technological addictions as a valid form of psychological evidence in the legal system.

Despite the controversies concerning the term "addiction" when applied to video games, most researchers, including critics, are nonetheless willing to accept that excessive video game playing can have deleterious consequences and is therefore a topic worthy of research. For this reason, it is likely that useful advances in this area might be best served by an approach that examines excessive VG play, not as an identifiable diagnostic category, but as an endpoint of a continuum of playing that has an extensive normal range, but a potential to become problematic or for harm to develop. Accordingly, to understand the phenomena requires the

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## VIOLENT GAME ACCEPTANCE: THE INFLUENCES OF AGGRESSION TENDENCY, THRILL SEEKING, AND PERCEIVED RISK

Chih-Chien Wang<sup>1</sup> and Ming-Ju Yang<sup>1</sup>

This study examines the relationship between physical aggression, thrill seeking, perceived risk, and behavioral intention of playing violent video games. This study collected data from 619 participants using an online survey, and analyzed the data through structural equation modeling. The results of this study suggest that physical aggression, thrill seeking, and perceived risk affect the behavioral intention of playing violent video games. Physical aggression and thrill seeking are positively related with behavioral intention, while perceived risk is negatively related. Results show that males exhibit higher levels of physical aggression and thrill seeking than females, and lower levels of perceived risk than females. Males also prefer to play violent video games more than females.

*Keywords:* Violent Video Games; Physical Aggression, Thrill Seeking, Perceived Risk, Behavioral Intention

### INTRODUCTION

Game consoles and computer games have become increasingly popular in recent years. According to a U.S market survey, game sales in 2007 surpassed 18 billion US dollars, representing an increase of 43 percent from 2006 (NPD Group, 2008). Playing video games is now one of the most popular entertainment activities (Gentile & Anderson, 2003) and during times of leisure many people spend a large amount of time playing video games. A study by Gentile, Lynch, Linder and Walsh (2004), points out that children spend about nine hours per week playing video games.

Studies on the psychological effects of playing computer games provide inconsistent results. Some researchers suggest that playing video games leads to positive results while others argue that there are adverse effects. The findings of some studies suggest that playing violent video games will cause players to adopt aggressive behavior. According to Dill, Gentile, Richter and Dill (2005), many video games containing violent material are extremely popular among adolescents. A previous study indicates that more than 80 percent of video games on the market include violent content (Dietz, 1998; Smith, Lachlan & Tamborini, 2003). According to these researchers, there is a high probability of exposure to violence when playing video games.

Previous research indicates that people who spend a lot of time playing violent video games adopt aggressive behavior. According to Bensley and van Eenwyk's (2001) review, previous empirical studies provide evidence that playing violent video games leads to an increase in aggression and that aggression and violent behavior are connected to people who are repeatedly exposed to violent video games. Other researchers found long-term exposure to violent games can lead to aggressive behavior (Anderson &

Bushman, 2001; Anderson, 2004; Gentile et al., 2004; Wei, 2007). In addition, Anderson and Dill (2000) revealed that college students who play non-violent video games exhibit lower levels of aggressive behavior than those who play violent video games.

Anderson and Bushman (2002) proposed the General Aggression Model (GAM) to determine the relationship between violent video games and aggression. The GAM is composed of the cognitive neoassociation theory, social learning theory, script theory, excitation transfer theory and social interaction theory. The GAM integrates these theories to provide a clear framework for researchers to examine the relationship between violent video games and aggression.

The GAM uses two input variables – personality variables, like aggression traits and acceptance levels of aggression, and situational variables, such as the effects of real-life violence or virtual violence. When these two variables interact, they affect an individual's internal state and their external behaviors. According to the GAM, not everyone who plays violent video games is affected the same way due to different personality traits. After playing violent video games, some players become very aggressive while others experience decreased levels of aggression.

Recent studies discuss the relationship between violent video games and aggression. Most of these studies focus on the impact of violent video games on aggressive behavior rather than the reasons why people choose to play violent video games. Sanger, Willson, Davies and Whittaker (1997) pointed out that children enjoy playing violent video games and that their personalities are major factors in the desire to play violent video games. This study shows that people who prefer violent video games may

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## COMFORTING COMMUNICATION IN AN ONLINE EPILEPSY FORUM

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There is a tendency to think that face-to-face communication, particularly with respect to emotionally-sensitive issues, is a superior means of offering support compared to computer-mediated communication (CMC). However, there may be situations in which the reduced intimacy of CMC is beneficial to providing support. The current study investigated whether conditions necessary for effective supportive communication as outlined by Burleson and Goldsmith (1998), including anonymity, self-disclosure, discussion of thoughts and feelings and suggestion of change, were present in an online support forum produced by The National Society of Epilepsy. A content analysis was completed on 120 posts and results suggest that all conditions necessary for effective supportive communication were met within the forum. Furthermore, anonymity seems to be a key factor in allowing posters to discuss their thoughts and feelings. It may be the case that the stigma often associated with Epilepsy has a smaller impact with CMC.

*Keywords:* Online Behavior, Comforting Communication, Forum, Cybertherapy, Epilepsy

### INTRODUCTION

Computer-mediated communication (CMC) may seem to be a useful and efficient medium but there are a number of potential drawbacks that need to be addressed. For example, the removal of nonverbal cues and a lack of direct physical contact may impinge upon our ability to communicate successfully with others, particularly with regards to the communication of emotional and relational information. Furthermore, online groups are often fleeting or irregular, meaning that when contact is desired it may not always be possible (Caplan & Turner, 2007). This study therefore examines the value of CMC in an online Epilepsy forum.

Although CMC is often associated with a number of shortcomings, for example interactions are more likely to be anonymous, many of these factors may actually provide a more comfortable environment for emotional communication to take place (White & Dorman, 2001), and this would be particularly pertinent when considering online social support groups, such as forums. White and Dorman (2001) offered a number of suggestions for the manner in which forums could facilitate social support, for example by enhancing quality of life, increasing survival time for chronic disease and improving decision-making. They further postulated additional benefits pertaining to online support including continuous accessibility, meaning that support could be enabled at an individual's convenience. A lack of synchronicity should allow one to post more considered and developed responses over time and at one's own speed as immediate responses are not necessarily required in an online forum context. Online support also appears instrumental in allowing sufferers of stigmatized conditions a more welcoming venue to discuss sensitive issues, therefore encouraging self-disclosure (White & Dorman, 2001).

Supportive communication, which appears to be a predominant requirement and outcome of engaging with online medical support groups (Zrebiec & Jacobson 2001), is suggested by Burleson and Goldsmith (1998) to be a sub-category of comforting communication, which helps to alleviate emotional distress. Drawing from Lazarus' cognitive appraisal theory (1991), Burleson and Goldsmith (1998) proposed effective comforting communication enables cognitive reappraisal of an upsetting experience, which may in turn reduce emotional distress. Burleson and Goldsmith (1998) put forward three conditions required for effective comforting – self-disclosure, discussion concerning thoughts and feelings and discussion considering reappraisals. Furthermore, participants are more likely to engage in adaptive reappraisal if they feel secure and safe in the environment in which they are communicating. Caplan and Turner (2007) argue that each of these conditions is adequately represented by CMC.

Many of the unique properties of online communication are actually said to promote effective comforting. For example, anonymous interactions may help participants to overcome the self-presentational dilemma often associated with talking about sensitive issues face-to-face. In Zrebiec and Jacobson's (2001) evaluation of educational and emotional support for sufferers of diabetes and their supporters, they found that 79 percent of respondents rated online participation positively in terms of aiding them to cope more effectively with the symptoms of diabetes. The researchers also argued that patients and their supporters were able to deal more effectively with their problems by building self-management skills and obtaining readily available support, a direct consequence of engaging with the Internet discussion groups.

The results from the diabetes online support is encouraging and suggests that similar positive results may be found for other

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