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HOW CAN WE HELP PRESERVE MENTAL CAPITAL?

First, let me define what I mean by the concept of mental wealth or mental capital. The Foresight Project on Mental Health and Well-being says that it "encompasses a person's cognitive and emotional resources. It includes their cognitive ability, how flexible and efficient they are at learning, and their 'emotional intelligence,' such as their social skills and resilience in the face of stress. It therefore conditions how well an individual is able to contribute effectively to society, and also to experience a high personal quality of life." The study focused on the U.K., but the 20-year trends cited as affecting the mental wealth of that country are relevant to the rest of the EU, the U.S., and other parts of the world. Trends include the aging of the population (increasing dementia), changes in the global economy (rise of China and India, need for more training and work-life balance), the changing nature and expectations of society and public services (balance of responsibility), and new science and technology (equal access to their benefits).

These same themes emerge in the resulting study article, "The mental wealth of nations," by Beddington et al., which reported on the group's evaluation of the scientific evidence to produce this independent assessment involving 450 experts from 16 countries. The authors of this paper urged development of initiatives to support early diagnosis and treatment of childhood learning problems, workplace environments that promote mental health and programs that advance learning among elders to slow cognitive decline. They noted, "How a nation develops and uses its mental capital not only has a significant effect on its economic competitiveness and prosperity but is also important for mental health and well-being and social cohesion and inclusion."

Pointing to a disproportionate share of investment in mental health relative to its disease burden, the U.S. National Institute of Mental Health (NIMH) created the Grand Challenges in Global Mental Health, identifying research priorities for the next 10 years that will make a difference in people's mental health. These 25 specific challenges are grouped into broad goals that seek to:

• Identify root causes, risk and protective factors
• Advance prevention and implementation of early interventions
• Improve treatments and expand access to care
• Raise awareness of the global burden
• Build human resource capacity
• Transform health-system and policy responses

NIMH lists guiding principles for funding such research:
• Use a life-course approach to study
• Use system-wide approaches to address suffering
• Use evidence-based interventions
• Understand environmental influences

So how can we, as clinical and research professionals with specialties in, for example, psychology, physical medicine and rehabilitation, or autism, help our clients boost their mental capital?

1. Improved access to education can help: "The [Foresight] Project has identified a number of technologies … ubiquitous and mobile technologies; artificial intelligence; assessment technologies; and tools to support teachers in designing and exchanging learning activities." A virtual environment to help children with autism learn to cross the street is one example of how we can use the technologies we espouse for early intervention, the most cost-effective way to prevent mental ill health.

2. Although the mechanisms are not yet understood, a growing number of studies show that physical exercise may prevent or mitigate the effects of depression, and a Stanford University study showed that a virtual representation of one's self gaining or losing weight in proportion to the exercise completed motivated volunteers to complete more exercise.

3. While we are just beginning to debate the legal and ethical implications of using pharmacological (smart drugs) means of improving mental wealth, use of these drugs in controlled clinical trials and publication of results that show minimal side effects from long-term use will pave the way for their mainstreaming.

4. Neurocognitive activation via cognitive training is a promising area of investigation, as I reported in my recent article co-authored with Dr. Mark Wiederhold. With the aid of fMRI-safe Virtual Reality goggles, we can study the brain while a patient interacts with a virtual environment, and learn how to tailor treatments to produce the desired activations in that individual's brain.

5. Finally, I would encourage you to continue to advocate for mental health funding by governments. As the Foresight study authors noted, "… a cross-governmental approach is needed to realize the full benefits … Interventions may have long timescales before they see any returns. Implementing these recommendations will require significant changes in the nature of governance, placing mental capital and well-being at the heart of policy-making."

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EFFECT OF "BRAIN-TRAINING" AND GAMING ON FLUID INTELLIGENCE

Lara James[1], James G. Phillips[1] and Christopher Best[2]

As there are claims that computer games can improve intelligence, this study considered whether exposure to video games can lead to superior cognitive functioning as measured by Raven's Advanced Progressive Matrices. Scores on the Raven's Matrices of a group of participants (N=29) receiving 19 days of "brain training" were compared with scores of a control group (N=37). Participants' involvement in computer games was also assessed using a Games Platform Salience Scale. Participants in the experimental group were asked to train on the dual-n-back task between the two testing sessions. Those in the control group were not asked to do anything. Assignment to a training group did not affect Raven's Matrices scores. However, those who trained for a longer period of time received better scores in the second session than those who trained for shorter periods. It appears that exposure to video games may improve fluid intelligence.

Keywords: **Brain-training, Intelligence, Cognitive Functioning, Video Games, Computer Games**

Computer game researchers initially focused upon the possible negative outcomes of computer games. Outcomes considered included the potential harm associated with addiction (Griffiths & Hunt, 1995: 1998), health problems (King & Delfabbro, 2009), aggression (Griffiths, 1998), lowering of school grades, and social problems such as preference of virtual relationships over face-to-face relationships with others (Ferguson, 2010; Griffiths, 1997b; Stern, 1999). However, Griffiths (2005b) stated that there is little evidence that moderate play has serious adverse effects. Griffiths (2005b) said that when adverse effects do occur, they tend to be relatively minor and temporary, and often resolve spontaneously with decreased frequency of play. Indeed, many studies are now showing that computer games may have many positive effects for individuals. Some of these include improvements in: attentional processes (Green & Bavelier, 2003; 2006a; 2006b), perceptual-motor skills, sensory processes, visual selective attention, spatial cognition, and reaction times (Dustman, Emmerson, Steinhaus et al., 1992; Green & Bavelier, 2006a; 2009); memory (Ferguson, Cruz & Rucda, 2007) and attitudes towards technology (Weisman, 1983); interest in learning (Hollander & Plummer, 1987); stress levels (Russoniello, O'Brien & Parks, 2009); motivation and emotion (Barnett & Coulson, 2010). Furthermore, the potential to use this immensely popular media for positive purposes such as education, health, training of personnel, and for students with disabilities, is being increasingly investigated. For example, video games have been found to improve elderly people's cognitive abilities and manage psychological problems associated with illness and social isolation (see Gamberini, Alcaniz, Baresi, Fabregat, Prontu & Seraglia, 2008 for a full review). As computer gaming has been suggested to influence a variety of cognitive functions, it is important to determine whether the technology can influence core constructs such as intelligence.

Intelligence has been defined in many different ways, but in general terms can be described as an individual's capacity to comprehend complex ideas, to adjust successfully to environmental conditions, to learn from experience, to reason effectively, and to rise above obstacles through the process of thinking of all possibilities. Cattell (1941; 1943) divided intelligence into crystallized intelligence and fluid intelligence. He proposed that crystallized intelligence is related to those abilities which require skilled judgment habits that have become crystallized as a result of prior learning, for example, geography and history knowledge. On the other hand, fluid intelligence is related to the ability to reason and to solve novel problems independently of previously acquired knowledge. Fluid intelligence is considered one of the most important factors in learning and has been closely linked to professional and educational success.

Many researchers believe that fluid intelligence is fixed, and that no amount of training will have substantial long-term effects. Researchers who support this theory state that heredity studies indicate that it is genetics rather than environment which determines fluid intelligence. For example, Jensen (1969) and

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SERIOUS GAMES FOR THERAPY:
A TRAINING PERSPECTIVE

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Hugh Myrick[2], Jan Cannon-Bowers[1] and Peter Smith[1]

Researchers have suggested that many treatments used in psychology require clients to learn and employ novel skills. Consequently, the therapeutic approaches might be effectively augmented by the ability to practice these new skills in a variety of "safe" situations before they must be used in the real world. However, the opportunity to practice is absent from most therapeutic programs. In an attempt to address this problem, we have developed a simulation-based practice environment for patients undergoing treatment for alcohol abuse. In this paper, we discuss the challenges of developing a low-cost simulation environment for this population. We discuss how we addressed the challenges and offer a set of guidelines for scientists who wish to contribute to this area of study.

Keywords: **Game, Relapse Prevention, Alcoholism, Practice, Training**

INTRODUCTION

The goal of therapy is largely to teach clients the necessary knowledge, skills, and attitudes they need to cope with problems. However, simply learning skills without practicing them may not be enough to realize beneficial changes. Results might be enhanced by merging components of therapy with well-established training practices (Bowers, Hitt, Hoeft, & Dunn, 2003). For example, training research informs us that newly acquired skills require substantial rehearsal before they can be successfully applied, especially in times of crisis (Oser, Cannon-Bowers, Salas, & Dwyer, 1999). It is also well-accepted that practicing targeted skills in a realistic context fosters transfer to the real environment (Wilson, 1993). Therefore, to foster effective therapy-based training, we must create and use contextually accurate environments that allow for learning and hands on practice.

The creation of these therapeutic training environments is not easily accomplished. An adequate practice environment must include all of the effective elements of the therapy, while at the same time, induce enough stress to force the patient to actually make use of the newly-learned skills. One way to meet these requirements is through the use of simulation. Simulations are commonly used for training purposes in many professions, including cockpit crews (Lee, 2005), military combat teams (Fletcher, 2009), surgeons and other healthcare professionals (Satava, 1999; Beaubien & Baker, 2004), medical students (Issenberg et al., 1999), and other high performance tasks (e.g., firefighting, law enforcement, nuclear power). In addition, simulations have been used in conjunction with Virtual Reality

(VR) to facilitate exposure therapy for those suffering from a myriad of mental health disorders, including phobias and Posttraumatic Stress Disorder (PTSD) (Wiederhold, 2008).

The theoretical basis for using simulations as surrogate practice environments stems from the fact that they emulate real environments in a virtual space within which a user gains synthetic experience by interacting directly with realistic cues and stimuli (Cannon-Bowers & Bowers, 2010). In fact, high-fidelity VR simulators seek to accurately recreate the target training environment through the use of haptic, visual, olfactory, auditory, and tactile cues. Low-fidelity simulators are more streamlined in their approach in that they do not represent the actual physical environment in minute detail, but aim to sustain learning via a low-fidelity, yet authentic, cognitively-engaging version of the environment (Salas & Cannon-Bowers, 2001). Most importantly, not all simulators are expansive (and expensive) systems. There are very real benefits derived from using something as seemingly simple as a computer game. For example, Jentsch and Bowers (1998) found that a low-fidelity PC-based simulation built on a gaming platform can be effectively used to train aircrew coordination skills in professional pilots. These simulations have the very important benefit of being inexpensive, which makes them feasible for use by individual practitioners.

Andrews, Joyce, and Bowers (2010) assert that, in order for true skill development to occur, a game-based environment must have the learner work through the three stages of skill acquisition (cognitive, associative, and autonomous). In a nutshell, effective serious games (i.e., games that have goals beyond

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USING VIRTUAL AND REAL, IMMERSIVE TECHNOLOGIES TO ENHANCE LEARNING IN OBESITY STUDIES

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This study aimed to enhance existing undergraduate obesity studies courses by testing multiple technological innovations in three different classes. Students enrolled in one of three courses, and completed class assignments, exams, performance assessments and attendance. Measures were compared and contrasted for students completing assignments in a real vs. virtual setting. In the course, Research in Obesity and Weight Management, wiki participation was high and strongly correlated with final class grades (p=.005), but was not significantly associated with assessment performance. In Health Promotion and Disease Prevention, Facebook participation was high for students who chose to participate, but was not significantly associated with exam performance. In The Obesity Epidemic, Facebook participation was even higher, but Second Life grades were not as high as Facebook grades. Web 2.0 technology use and other class assignments were significantly associated with exam grades (p<.001). Study findings imply that greater use of Web 2.0 technology is significantly associated with class outcomes, and increasing technological innovation and use may improve student performance and learning-related outcomes.

***Keywords:* Web 2.0, Obesity, Education, Virtual Learning, Health**

INTRODUCTION

Technology focusing on Web 2.0 strategies is an inherent part of life for college students. Students play games in virtual worlds, spend hours following the activities of friends and classmates in online social network applications, and use text messaging as an alternate to telephone calls. However, traditional classroom instruction typically has not included Web 2.0 technological innovations, although many courses might increase student participation and performance with their addition. Early findings suggest that social interaction facilitates active learning through reflective processes (Wenger, 2000; Wenger, McDermott, Snyder, 2002) and immersive environments can provide students with a greater learning independence (Vygotsky, 1978). With increasing technological accessibility, university educators are using alternative methods such as virtual worlds and wiki sites, like that of Second Life, Facebook and Twitter (Hewitt, 2006; Layne, 2009; Lee, 2009; Siddiqi and Lee, 2009; Siddiqi, Mama, Lee, 2011). These technologies may engage students in a variety of innovative and interactive capacities.

Health educators in particular have developed alternative methods of instruction through the use of virtual worlds, like that of Second Life (Siddiqi and Lee, 2009). Created in 2003, Second Life is an international multi-user, free-to-use, private ownership based, collaborative and conditional environment built on a publicly accessible wide area network (Robbins, 2007). Home to approximately one million active users who are called "resident avatars," Second Life includes a significant cash-based economy with over $100 million USD in quarterly transactions (Second Life Economic Statistics, 2011). Members create a resident avatar (a graphical representation of a Second Life user), who can interact with other resident avatars (other Second Life users). Second Life presents opportunities to discover an alter ego persona, and also provides health educators access to diverse, geographically scattered and at-risk populations. Earlier findings also suggest that avatars are closely linked to actual users' personas (Messinger, 2009), therefore increasing the opportunities for student learning in Second Life (Layne, Lee, O'-Connor, Horn, & McFarlin, 2010; Lee, Layne, McFarlin, O'Connor & Sidiqqi, 2010; Siddiqi & Lee, 2010). Second Life usage data suggest significant and consistent year-to-year growth in usage, transaction volume and content (Second Life Economic Statistics, 2011).

The use of virtual world platforms such as Second Life in education and health endeavors yield many potential benefits. Second Life operates on an anonymous and confidential basis, making it more conducive for users to discuss sensitive topics dealing with health or diseases that they may not be comfortable discussing with a health professional in person or by phone. In addition, with its inclusion of health-related resources and groups, users are able to seek health information and connect

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COMPARATIVE RANDOMIZED TRIAL OF AN ONLINE COGNITIVE-BEHAVIORAL THERAPY PROGRAM AND AN ONLINE SUPPORT GROUP FOR DEPRESSION AND ANXIETY

Louise A. Ellis[1], Andrew J. Campbell[2], Suvena Sethi[2] and Bridianne M. O'Dea[2]

This study examined the effects of an online cognitive behavior therapy (CBT) program (MoodGYM) compared with an online support group (MoodGarden) in decreasing symptoms of depression and anxiety, and improving dysfunctional thoughts, online social support, and CBT literacy in young adults. Thirty-nine university students (aged 18-25) with elevated scores on the Kessler Psychological Distress Scale were allocated to either the MoodGYM, MoodGarden or control condition. Relative to the control condition, participation in the MoodGYM group significantly improved anxiety symptoms and CBT literacy. Similarly, participation in the MoodGarden group significantly improved anxiety symptoms and online social support relative to the control condition. Although it appears that these online resources are beneficial, further research is needed to determine their long-term efficacy. Furthermore, qualitative participant evaluations indicated that improvements may need to be made to MoodGYM to ensure that young adults remain engaged with the program.

Keywords: Mental Health, Web-based Resources, Cognitive Behavior Therapy (CBT), Online Support Groups

Mental health disorders are the leading contributor to the overall burden of disease and injury among Australian adolescents and young adults, accounting for nearly 50% of life-years lost due to disability (Australian Institute of Health and Welfare, 2007). In Australia, one in four young adults aged 16–24 experience an anxiety, depressive or substance abuse disorder each year (Slade et al., 2009). Mental health problems often lead to further complications, such as self-medication with alcohol and drugs, as well as the inability to thrive socially, academically and vocationally (Hickie et al., 2001).

A major problem in addressing the mental health needs of young Australians is their lack of access to and uptake of mental health services. Only 13% of males and 31% of females aged 16-24 with a mental health problem access a clinical service (Slade et al., 2009). Previous research has also identified deficits in young Australians' knowledge and belief about mental health problems. Wright et al. (2005) found that, among young people aged 12-25, only half were able to correctly identify symptoms of depression and only a quarter nominated seeing a counselor or psychologist as the best source of help. Instead of seeking help, many young people try to manage emotional problems alone, stating concerns relating to confidentiality, a fear that no person or service could help, and the feeling that the problem is too personal (Gould et al., 2002). Additional barriers may especially apply to young people in rural communities including financial costs, a shortage of skilled professionals, and long waiting lists (National Institute of Mental Health, 1999).

Utilization of Web-based resources may be crucial as the cost and availability of face-to-face service delivery is high at a national and individual level. With its ease of access, 24-hour accessibility at a relatively low monetary cost, and anonymity (Gray et al., 2005), the Internet reaches young adults who embrace a culture of self-reliance. It also defies geographical barriers, a significant advantage for rural and remote communities, which typically have the least access to mental health services (Griffiths & Christensen, 2007).

A number of research studies have examined specific resources to decrease depression; however, some have demonstrated limited success. For example, Clark et al. (2002) examined the effectiveness of Overcoming Depression on the Internet (ODIN), a self-directed cognitive behavioral therapy (CBT) program. Participants completed a scale measuring symptoms of depression at enrollment, and at 4-, 8-, 16-, and 32-week intervals while progressing through the program. However, the authors were unable to detect a treatment effect, though post hoc analyses revealed a modest benefit for participants with lower baseline levels of depression. It was suggested that the negative

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SERIOUS GAMES AS ADDITIONAL PSYCHOLOGICAL SUPPORT: A REVIEW OF THE LITERATURE

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During recent years a new wave of video games, "serious games," has been developed and implemented as a psychotherapeutical complement in various treatments. The objective of our study was to systematically assess the literature on "serious games" and their effectiveness when employed as a complement or psychological support in the treatment of several illnesses. We searched electronic databases and reviewed studies published up until October 2010. The games included in the review were Re-Mission, Personal Investigator, Treasure Hunt, Play Attention and an unnamed video game. Two of the nine articles were descriptive; in the remaining seven studies a favorable outcome was obtained. The reported improvements included: elevated self-esteem, higher self-efficacy, increased knowledge, awareness of the illness, adherence to treatment and problem solving skills, and enhanced outcome on cognitive and behavioral aspects of aggression. In conclusion, well-produced serious games might lead to potential behavioral improvements for patients suffering from a range of medical illnesses.

Keywords: Video Games, Serious Games, Psychotherapy, Support, Medical, Psychological, Illness, Review

INTRODUCTION

Technological advancements have been affecting the ways in which people live, communicate, relate, and interpret the world. Gradually more and more health professionals are becoming interested in innovative (Shepherd et al., 2006) and cost-effective (Bodden et al., 2008) treatment opportunities. For this reason new technologies for the treatment and therapeutic support of various medical illnesses are commonly applied (M. K. Coyle, Duffy, & Martin, 2007), with the aim of extending the availability and accessibility (Ribo & Alvarez-Sabin, 2008) of support and treatment programs, especially in rural areas.

THE CURRENT USE OF VIDEO GAMES

The 2009 annual Entertainment Software Association report (ESA, 2009) has indicated that playing video games is a common activity, with about 65% of American households possessing a computer or a video game console. The population playing video games is also changing. In 2004, ESA reported the average age of video game players in the U.S. to be 30 years old. By 2009, this age had increased to 35 years. Forty percent of players were female and 60% were male.

Similarly, the Interactive Software Federation of Europe (ISFE), in its annual report in 2008 (ISFE, 2008), indicated that in Great Britain 37% of the population aged between 16 and 49 described themselves as "active gamers" (defined as having purchased at least one legitimate video game in the last six months). In Spain and Finland this percentage (about 28%) was a little lower for the same age group. These three countries were chosen for the study to represent a range of European countries and stages of market penetration. The main motivation behind playing included having fun and the possibility to relax while playing. Playing video games on a daily basis is becoming more relevant in our culture, gaining ground over other entertainment activities such as watching television or going to the cinema (ISFE, 2008).

SERIOUS GAMES AND PSYCHOTHERAPY

Video games, a special form of new technology, were initially conceived for entertainment purposes. However, during the last few years the use of serious games for educational purposes (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005; Gee, 2003; Kafai, 1995; Rieber, 1996; Squire, 2003) and training, especially military training (Bergeron, 2008), has become more frequent. Even though these games have existed for decades, the term "se-

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EXPLORING ONLINE SUPPORT: INFORMAL CAREGIVERS' USAGE OF A MENTAL HEALTH DISCUSSION BOARD

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Around six million adults in the United Kingdom take on the role of an informal caregiver to friends or relatives who have mental health issues. Accessing support can be difficult because of both the demands of the caring role and the social stigma attached to mental ill health. However, the Internet offers opportunities to access peer support in a more immediate and protective way. This study explored the use of an online mental health discussion board by informal caregivers. An interpretative phenomenological analysis was conducted using 487 postings from 82 users. A superordinate theme of "gaining a different perspective" emerged which consisted of three subordinate themes, specifically, "insights into mental ill health," "an insider viewpoint" and "rediscovering hope." Findings suggested that use of the board brought positive benefits not only from the sharing of experiences with other caregivers but more importantly from those who experienced mental ill health themselves.

Keywords: **Peer Support, Caregivers, Shared Experience, Online Forums, Mental Health**

INTRODUCTION

Unpaid care constitutes the backbone of the United Kingdom's community care. According to the Department of Health (2001), around six million adults nationwide act as informal caregivers, often providing the primary source of support. Continuous caregiving is arduous work, straining individuals' physical, emotional and intellectual resources (Williams, 2002). When the caregiving is focused on mental health issues, additional psychological distress can ensue (Saunders, 2003). Historically, there has been scant support for caregivers (Perron, 2002), however there are now numerous forms of support both on and offline with online forms including self-help groups, health education, E-mail counseling, and discussion boards (Coulson, 2005). The latter frequently focus on specific health-related issues such as AIDS (Frank, Newcomb & Beckman, 1996) and cancer (Sullivan, 2003), having the afflicted individuals as their explicit focus with only a small area available for friends and family (White & Dorman, 2001).

Online support provides many of the same benefits as offline support (Salem, Bogar & Reid, 1997), but also has additional advantages. These include anonymity (Davidson, Pennebaker & Dickerson, 2000), instant access, and the receipt of support within one's own home (Coulson, 2005). Additionally, Coulson (2007) highlighted the advantage of being able to carefully craft messages before posting. Offline groups can also be difficult to access because of the time constraints created by caregiving itself or because some communities, particularly in remote locations, may not have support groups. Studies considering online

support for caregivers suggest that sharing both stressful and rewarding experiences lead to successful support (Sabir, Pillemer & Suitor, 2003).

Research into caregivers' uses of mental health discussion boards is rare (Perron, 2002). Those few studies that do consider this phenomenon focus on discussion boards designed especially for caregivers only (Perron, 2002) and concentrate on particular caregiving relationships, for example parent-child (Scharer, 2005). However, a wider consideration is needed given the diversity of caregivers and that most posts are likely to occur on the "friends and family" threads of broader focused sites. These enable both caregivers and those who receive the care to post, and a consideration of these interrelated posts is likely to be useful in adding to contextual understandings. Previous studies have tended to use methods such as content or thematic analysis, which although illuminate the ways in which boards are used, fail to provide an in-depth conceptualization of experiences of online peer support (White & Dorman, 2001). To fully understand caregivers' experiences and the nature of support they receive from online forums, a fine grained contextual analysis is needed and an interpretative phenomenological analysis offers this (Bramley & Eatough, 2005).

METHOD

A discussion board was accessed through a leading mental health Web site. The site encouraged participation from all those affected by mental health issues, whether directly or indirectly. There is an ongoing discussion regarding the ethics of online

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AN ENVIRONMENTAL SAFETY AWARENESS PROGRAM FOR COMMUNITY-DWELLING ELDERS: A COMPUTER-BASED TECHNICAL APPROACH

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Aging is becoming an important health issue. In order to promote a successful aging process, health education could be conducted using different strategies like computer- or Web-based technology, or other new technologies, instead of traditional health talks. In our study, an Environmental Safety Awareness Program (ESAP) was introduced to improve safety awareness and knowledge among older persons. A total of 66 elderly participants were allocated to either the experimental group (40) or the control group (26). There were no significant differences among their demographic parameters, pain locations and fall history. However, the experimental group experienced a significant increase in their knowledge of home and community safety (p< 0.05) and awareness of home and community safety (p< 0.05) after attending the ESAP.

INTRODUCTION

In this rapidly aging world, it is important to age successfully. People who age successfully are older persons with a "low probability of disease and disease-related disability, high cognitive and physical functional capacity and active engagement with life" (Rowe & Kahn, 1997). It is noted that older adults who were trained to use the Internet reported high levels of social connectivity, high levels of perceived social support, and generally, more positive attitudes towards aging (Shima, Mathews, Pourghase et al., 2008). In order to make aging a successful process, health education could be conducted using computer- or Web-based technology, or other information technologies like digital cameras to make education more interactive.

Home incidents have become a leading cause of death and morbidity of older adults in developed countries and cities like the U.K., Australia, the U.S. and Hong Kong (Carter et al., 1997; Lee, Wong & Lau, 1999; Keall, Baker, Howden-Chapman & Cunningham, 2008). The causes of home accidents in the elderly are varied and complex (Day, Viene, & Hewitt, 1994). Most are related to increasing age and environmental hazards (Simpson, Darwin & Marsh, 2003). As a result, those involved in home injuries sustain mild or soft tissue injuries including bruises, abrasions and hematomas, as well as serious injuries such as fractures and subdural hematomas (Chu, Chi, & Chiu, 2005). In 2007, the Hospital Authority reported that 656 patients aged 65 and over died because of external causes in Hong Kong (Hospital Authority, 2010).

Falling is the most common cause of injuries among older adults, followed by fire and water scalding (Stone, Ahmed, & Evans, 2000; Zhang, Lee, Lee, & Clinton, 2006). In Taiwan, 60.4% of community-dwelling older adults' homes had environmental hazards (Huang, 2005), while 80% of older persons' homes in Australia had environmental hazards (Carter, Campbell, Sanson-Fisher et al., 1997). Falling remains one of the main causes of injuries, and the home remains an essential site for injuries among older adults (Keall, Baker, Howden-Chapman, & Cunningham, 2008). It is noted that older adults who have a tendency to stumble, poor awareness of their own health status and a fear of falling were significantly more likely to sustain home and environmental injuries and/or hazards (Huang, 2005). Like other developed countries, Hong Kong has a rapidly growing aging population. Small nuclear families have replaced the traditional large family in Chinese communities. Older adults may have to take up responsibilities as carers or caregivers in the family. Therefore, safety measures are crucial to maintain their own safety, as well as that of the whole family, as older adults may fail to recognize or modify potential environmental hazards. Literature suggests that education can increase awareness, identify risks and modify accommodation and related environmental situations (Plautz, Beck, Selmar et al., 1996; Close, Ellis, Hooper et al., 1999; Cumming, Thomas, Szonyi et al., 1999; Steven, Holman, & Bennett, 2001; Nikolaus, & Bach, 2003). Thus, an Environmental Safety Awareness Program (ESAP) was used in this study, its teaching and learning strategies tapping into computer-based technical resources to enable the elderly participants to enjoy, and therefore to learn, from the program.

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GAMERS' VERSUS NON-GAMERS' EMOTIONAL RESPONSE IN VIRTUAL REALITY

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Few studies have examined the impact of prior video gaming experience on the stress experienced while immersed in a virtual environment. Our hypothesis was that prior experience with immersive video games could reduce the stressful impact of a virtual environment. We compared emotions in gamers and non-gamers after an immersion in a 3-D environment designed to induce fear. Our results show that the level of fear in people who consider themselves as non-gamers is higher than in gamers. The conclusion addresses the role of presence as a contributing factor.

Keywords: **Emotions, Virtual Environment, Video Game, Video Gamer, Head Mounted Display (HMD), Presence, Controlled Attention**

INTRODUCTION

Understanding emotional reactions is crucial for researchers working on topics such as Virtual Reality (VR), presence or cybertherapy (Bouchard et al., 2006; Freeman, 2008; Mair, 2007; Slater, 2009). The relationship between emotions and presence has been less extensively studied. Given the increased availability and popularity of high fidelity 3-D video games, it seems important to document the impact of regularly playing video games on the sensitivity to environments designed to induce emotions.

CONTEXT

Our understanding of human emotions is rapidly changing due to the rapid progress of science.

Emotions have been categorized and even reduced to basic ones, with classification systems such as the one by Ekman (Ekman, 2003) including fear, joy, surprise, disgust, sadness and anger, or Russell including arousal, excitement, pleasure, contentment, sleepiness, depression, misery, and distress (Russell, 1980).

Many other theories and definitions of emotions persist in the twentieth century, whether they were originally theories of reflective and peripheral emotions (James, 1884), central physiology (Cannon, 1927), or behavioral theories (Pavlov, 1963; Skinner, 1968). They led to more recent models rooted in neurology, cognition and behavioral sciences (LeDoux, 1999). It is now accepted that emotions arise from continuous appraisal and information processing of situations (Lazarus, 1999; LeDoux, 1999). Appraisals are the ongoing assessments of state of emergency and valence, as a hedonic point of view

(Fridja, 2000). Contemporary cognitive models introduce the idea of two parallel models of information processing (Smith, 1985). The first model is schematic, fast and uses memory associations handled by the central nervous system including the amygdala and hippocampus. The second is conceptual, takes longer to process and uses complex rational analyses performed by the neocortex (LeDoux, 1999).

Emotions play a significant role in the sense of presence in VR. For example, studies show that whatever the valence of the emotions induced, presence significantly increases (Bouchard, 2010; Riva, Mantovani et al., 2007). However, measures of the correlation between the level of experience of video games and Virtual Environments (VEs) suggest that previous experiences have an impact in virtual worlds (Smith & Du'Mont, 2009). It suggests that more experience with games is associated with decreases in spatial presence. Smith and Du'Mont (2009) also found a significant correlation between the level of activity in first person shooter (FPS) video games and performance in the navigation task based on VE time. However, the study did not show how the authors came to the conclusion that more game experience results in a greater decrease in spatial presence.

Our experiment aims to highlight the impact of past experience with video games on the emotional experience during immersion.

METHOD

DEVICE

One hundred forty-one adults of both sexes participated in our experiment (81 people defining themselves as playing FPS

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