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The INTERSTRESS project aims to design, develop and test an advanced ICT-based solution for the assessment and treatment of psychological stress.

Objectives:

- Quantitative and objective assessment of symptoms using biosensors and behavioral analysis
- Decision support for treatment planning through data fusion and detection algorithms
- Provision of warnings and motivating feedback to improve compliance and long-term outcome

To reach these goals, INTERSTRESS will use a new e-Health concept: Interreality. What is Interreality? It is the integration of assessment and treatment within a hybrid, closed-loop empowering experience, bridging physical and virtual worlds into one seamless reality.

- Behavior in the physical world will influence the virtual world experience
- Behavior in the virtual world will influence the real world experience

These goals will be achieved through:

- 3D Shared Virtual World role-playing experiences in which users interact with one another
  - Immersive in the healthcare centre
  - Non-immersive in the home setting
- Bio and Activity Sensors (from the Real to the Virtual World)
  - Tracking of emotional/health/activity status of the user and influencing the individual’s experience in the virtual world (aspect, activity, and access)
- Mobile Internet Appliances (from the Virtual to the Real world)
  - Social and individual user activity in the virtual world has a direct link with user's life through a mobile phone/PDA

Clinical use of interreality is based on a closed-loop concept that involves the use of technology for assessing, adjusting and/or modulating the emotional regulation of the patient, his/her coping skills and appraisal of the environment based upon a comparison of the individual patient's behavioural and physiological responses with a training or performance criterion. The project will provide a proof of concept of the proposed system with clinical validation.
**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 can 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 paved the way for their mainstreaming.

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 James¹, James G. Phillips¹ and Christopher Best²

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 & Rucela, 2007) and attitudes towards technology (Weisman, 1983); interest in learning (Hollander & Plummer, 1987); stress levels (Russomello, 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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Herrnstein and Murray (1994) estimated that intelligence was 80% determined by genes and as a result was largely fixed from birth.

Other researchers hold the belief that a high heritability for intelligence does not necessarily negate the influence of environment or learning (Kamin, 1977). Some of the variables that have been shown to have an effect on intelligence are social variables, biological variables and individual life experiences. Social variables may include occupation, schooling, and family environment. Biological variables include variables such as nutrition, lead exposure, alcohol and prenatal factors. A malleability of fluid intelligence is also implied by the Flynn effect (Flynn, 1984; 1987).

The Flynn effect refers to the steady worldwide rise in intelligence test scores over the years (Flynn, 1984; 1987). Some researchers have suggested that the steady increases in IQ scores seem much too large to be due simply to increased test sophistication (Flynn, 1984, 1987; Naisser et al., 1996). One possible cause could be the cultural differences between generations. Television and other media forms have exposed individuals to more information; children are expected to stay in school longer; and individuals seem to encounter new experiences almost on a daily basis. This fast-paced and information-rich environment may have resulted in changes in the mental processing of more recent generations that has improved certain psychometric abilities. One such form of media which may have the potential to alter cognitive functioning is video and computer games (Prensky, 2008). Some researchers are now interested in whether video gaming or “brain-training” may possibly be activities which improve fluid intelligence.

Exposure to Games and Cognitive Functioning
Video and computer games can be divided into a number of categories. These include games designed specifically for education (edugames or edutainment); action video games which may comprise First Person Shooter (FPS) games, Third Person Shooter (TPS) games and adventure games; and role-playing games and sports games that often involve driving or racing.

Action Video Games
The genre that seems to be the most beneficial to cognitive functioning is action video games. This is most likely due to the fast-paced and unpredictable setting which requires effective monitoring of the entire screen and fast decision making (Spence & Feng 2010). This type of game has been found to improve attentional processes. Green and Bavelier (2006b) found that people who play action video games outperform individuals who do not play action video games on a multiple-object tracking task. This task involves tracking many independently moving objects. Such findings indicate an enhanced capacity of the attentional system for those who play action video games.

In another study by Green and Bavelier (2006a), it was found that action game players outperform on the useful field of view task, in which participants must localize a quickly flashed target amongst a host of distracting objects. This demonstrates an improved ability to deploy attention over space for gamers.

An earlier study by Green and Bavelier (2003) found that action game players performed better on an attentional blink task. This task requires individuals to describe a stream of letters presented one after another at a fast pace (10 Hz). This points to faster information processing. Since spatial attention and visual working memory are closely interrelated, it is therefore possible that action video games improve spatial working memory in addition to spatial attention. In addition, Ferguson, Cruz and Rucda (2007) found that experience with action video games was associated with a superior ability for visual memory recall.

Those who play action video games may also develop superior sensory processes. Li, Polat, Maklous, and Bavelier (2009) found that training on action video games improved contrast sensitivity which is necessary for object recognition and spatial attention. In addition, another study by Green and Bavelier (2007) found that action video game players are better at a crowding task. This task comprises a centered target being flanked by objects which are designed to negatively affect the identification of the centered target. Since action video game players were better able to identify the centered target, it is likely that those individuals have higher spatial resolution of visual processing.

Players of action video games may also develop superior visuomotor coordination and speed. To perform well in action video games, the player must respond quickly (Spence & Feng, 2010). Success in these games involves a great deal of coordination between the hands and the eyes. Griffith, Voselchin, Gibb, and Bailey (1983) have shown that almost any video game that incorporates dynamic visual presentation and a fine motor control component is likely to be effective in producing improvement in visuomotor coordination. Others have shown that as players of action games become more experienced, accuracy and speed of visuomotor coordination tend to increase (Castel et al., 2005; Dye, Green & Bavelier, 2009; Yuji, 1996).

Hence, there are indications that the benefits of playing video games may transfer to other tasks. For instance, playing of action video games may also improve one’s ability to perform mental rotations (Feng, Spence & Pratt, 2007). Those who play action video games have been shown to perform well on high-level real-world tasks, for example, piloting procedures (Gapher, Weil & Barebek, 1994) and laparoscopic maneuvers (Rosser et al., 2007). Some other genres of games may have effects similar to action games.

Sport and Racing Video Games
Games that involve driving or similar activities (piloting an aircraft, commanding a ship, doing tricks on a skateboard and so on) share many characteristics with action games. For example, driving, racing or sports games require quick reflexes and split-second decision making in order for the gamer to do well.
Spence and Feng (2010) stated that these types of games require high sensory detection, and also require high levels of attentional processes, such as attention capture, attention switching and dividing attention. Spence and Feng also noted that these games rely highly on working memory and maintain a high level of cognitive arousal in players. Hence, we can expect driving, racing or sports games to require similar cognitive capacities to action games, and therefore have similar effects on cognitive processing to those that action video games have. However, as Spence and Feng indicated, driving games are slightly less extreme on a number of dimensions than the typical action game, and therefore the gains in cognitive functioning may not be as pronounced. In addition, there are games besides action, racing and sports games which may have effects on the cognitive functioning of players.

**Role-Play Games**

Role-play games (RPGs) are immersive virtual three-dimensional (3-D) fantasy worlds in which players create an avatar (character) and then cooperate and compete with other players, as well as with the computer-generated inhabitants of that particular game world (Barnett & Coulson, 2010). RPGs may be able to improve players’ cognitive functioning through the mechanisms of motivation and engagement (Hoffman & Nadelson, 2010; Kato, 2010). What seems clear is that these mechanisms are usually activated in games within the context of play. Gamberini, Barresi, Majer, and Scarpetta (2008) stated that the developmental advantages combined with the opportunity for entertainment are good reasons to encourage game playing. Role playing helps players develop their sense of empathy, understand their social world (Mead, 1982), and manage stress (Freud, 1968). Importantly, play may also be a pathway to learning (Kato, 2010). This learning may be in the form of skill learning or general learning. Skill learning is typically an improvement in perceptual, cognitive, or motor performance that comes about as a result of training. This improvement needs to persist for several weeks or months, so as to distinguish it from effects related to adaptation or other short-lived effects (Green & Bavelier, 2008). General learning refers to learning effects that not only provide high savings on the trained task but also transfer to new tasks and new contexts (Schmidt & Bjork, 1992).

It has been found that knowledge learned from computer games can in fact be transferred to real-world scenarios. For example, Greenfield, deWinstanley, Kilpatrick and Kaye (1994) found that game playing contributed to real-world learning and increased levels of visual attention, and Rieber (1996) found that game play contributed to increased critical thinking and problem solving skills. There are a number of different skills which can be learned while playing RPGs. For example, developing a character in an RPG requires completing quests to level up and acquiring new and more powerful equipment and artifacts. However, a basic understanding of the character’s abilities is also needed to ensure that the right type of equipment is chosen. A practice adopted by many players is that of “theorycrafting,” an attempt to understand the underlying (typically mathematical) basis of a character’s abilities in order to maximize, for example, damage output (Barnett & Coulson, 2010).

One reason why individuals are more susceptible to learning in RPG environments compared to other environments may be because players are more engaged while playing RPG games. Engagement has been found to correlate positively with achievement, motivation, and task persistence (Shernoff, Csikszentmihalyi, Schneider & Shernoff, 2003), meaningful processing on achievement measures (Walker, Greene, & Mansall, 2006), and is necessary for productive learning (O’Donnell, Reeves & Smith, 2009). Information is retained for a longer amount of time when cognitive engagement or psychological investment is greater (Garris, Ahlers & Driskell, 2003). In addition, a greater willingness to complete interrupted tasks ensues superior cognitive engagement (Zeigarnik, 1938). Depth of processing and the activation of problem-solving strategies are positively correlated with engagement (Bandolos et al., 2003; Corno & Mandinach, 1983; Pintrich & De Groot, 1990). Individuals who are cognitively engaged use self-regulation strategies to plan, monitor, and evaluate learning in an effort to reach their academic goals. Similarly, enhanced engagement is related to factors such as adaptive goal orientations, perceived value, and opportunity for choice (Fredricks, Blumenfeld & Paris, 2004; Higgins, 2006). Therefore, since players of RPGs are engaged in the tasks, they may develop both skills learning and general learning. There are some computer games however, which have been specifically designed to facilitate skills learning.

**Edugames and Brain Training**

Some games, called edugames (or edutainment) have been designed specifically for learning purposes or to train a skill during the process of playing (Quiroga, Herranz, Gomez-Abad, Kebir, Ruiz & Colom, 2009). A number of these companies claim that these edugames enhance cognitive functioning, but empirical evidence of these claims is not readily available (Green & Bavelier, 2003; Haier, Siegel, MacLachlan, Soderling, Lottenberg & Buschbaum, 1992; Smith, McEvoy & Gevins, 1999). The evidence that does exist highlights benefits such as quicker processing of information, improved selection of relevant material and high levels of engagement and interest (see Passey, Rogers, Machell & McHugh, 2004 for a useful overview).

An early review of the relationship between edugame use and cognitive ability was done by Randel, Morris, Wetzel and Whitehill (1992). This review examined 67 studies conducted prior to 1991, and reported mixed results. More than half showed no relationship between gaming and learning goal attainment. The area that showed the strongest relationship was mathematics. Although this research is dated, it is relevant because most of the studies in the review used independent measures of learning goal attainment as opposed to teachers’ judgments. In the current educational literature, many of the studies focus on the beliefs and attitudes of teachers, pupils, and parents (e.g., Facer, 2003; McFarlane, Sparrowhawk & Heald, 2002; Sandford, Ulicsak, Facer & Rudd, 2006). Nevertheless,
some studies show potential for brain training to have transfer effects to intelligence.

A study by Miller and Robertson (2008) investigated whether classroom use of a mental-agility game (Dr. Kawashima’s Brain Training Game) could influence children’s learning and self-perceptions. Dr. Kawashima’s Brain Training Game comprises a variety of puzzles that mainly rely on mental calculations and memorization. Both the group using Dr. Kawashima’s Brain Training on a regular basis and the no-treatment control group showed significant gains in the number of correct answers in a standardized test. However, the gains for the group using the brain training were more than twice those of the control, as reflected in a measure of effect size. In addition, the group that used the brain training showed a significant reduction in the time taken to complete the number challenge, taking less than half the time compared to the other groups.

Quiroga et al. (2009) investigated whether playing edugames requires general intelligence. The idea behind this study was that if these video games are going to improve cognitive functioning, then they must comprise some features of general intelligence. Participants who had no previous gaming experience were trained on three games from Big Brain Academy (Wii). Calculus, Backward Memory and Train. Calculus requires participants to discard numbers, as quickly as possible, so that when summing up the others, target numbers are obtained. Backward Memory requires participants to reproduce numbers, pictures or sounds in a reversed order, as quickly as possible. Train requires selecting, as quickly as possible, the correct pieces of directions to guide the train to a given destination. The results showed that Calculus does not challenge general intelligence, but Backward Memory does. Interestingly, Train requires intelligence from the very beginning and this requirement increases across the learning process. It may be the case that edugames which require players to work at their cognitive capacity limit may improve fluid intelligence. Indeed, this was found to be the case for Jaeggi, Buschkuel, Jonides and Perrig (2008).

Training Improves Fluid Intelligence
Jaeggi, Buschkuel, Jonides and Perrig (2008) used a working memory training task (the dual-n-back), similar to the sort of activity required in many edugames. They hypothesized that training on this working memory task would lead to positive transfer to fluid intelligence. It was argued that this form of training engaged executive processes, discouraged the development of task-specific strategies and encouraged automatic processes. Jaeggi et al. stated that a positive transfer effect was present as evident by the impressive learning curve for the training task. However, some caution is required, as due to methodological issues, there are some potential sources of confounds compromising this interpretation.

There are three major methodological flaws present in the work done by Jaeggi et al. (2008): 1) For the group that undertook eight training sessions, Raven’s Advanced Progressive Matrices (RAPM) was used, whereas for all the other groups the Bochumer Matrizen-Test (BOMAT) was used. This makes the results of the different groups difficult to compare. 2) The way in which the tests were administered may have affected the results. Participants are supposed to be allowed 40 minutes to complete the BOMAT or RAPM, whereas Jaeggi et al. reduced the allotted time to ten minutes. The tests are progressive in nature, which means that test items are sequentially arranged in order of increasing difficulty. Therefore, reducing that testing time to ten minutes may have made it impossible for participants to proceed to more difficult items on the test. This may have transformed the BOMAT and the RAPM from a test of fluid intelligence into a speeded test of ability to solve the easier visual analogies. 3) Jaeggi did not monitor prior experience with games, but other attentional studies have done this. Differences might reflect differential assignment of participants with varying experience to groups. The present study sought to replicate Jaeggi et al. ‘s findings that game playing increases fluid intelligence but addressed the problem of comparing two different IQ tests by using split halves of Raven’s Advanced Progressive Matrices (RAPM).

Exposure to Games and Training Outcomes
Previous research on edugames has found that player characteristics, in particular, a player’s prior experience with video games, influence various outcomes in video game-based instructional environments. For example, research has found that frequency of video game use is predictive of future performance in video game-based environments (Alvarez, Salas & Garofano, 2004; Frey, Hartig, Ketzel, Zinkernagel & Moosbrugger, 2007; Gagnon, 1985; Orvis, Horn & Belanich, 2008; Young, Broach & Farmer, 1997). Prior video game experience has also been found to be positively related to the time spent training on edugames (Orvis, Orvis, Belanich & Mullin, 2007). It has been found that video game exposure significantly predicts several affective and motivational learning outcomes, such as training motivation, satisfaction, perceived ease in using the training game interface, and time spent engaging in an instructional game (Orvis, Horn & Belanich, 2008; Orvis, Orvis, Belanich & Mullin, 2007) and this may be the reason why those individuals with more previous video game experience train for longer. The importance of prior experience or prior knowledge has also been demonstrated in other PC-based instructional environments (e.g., Brinkerhoff & Koroghlianian, 2005; Dyck & Smithier, 1996; Patterson, 1999; Reed, Oughton, Ayersman, Ervin & Giessler, 2000; Shih, Munoz & Sanchez, 2006).

Present Study
The present study sought to replicate Jaeggi et al.’s (2008) study without confounding IQ measures to determine whether brain training influences IQ. Further, this study investigated whether prior exposure to video games relates to IQ and whether the effectiveness of training on a “brain training” type game is influenced by previous gaming exposure. Therefore, the present study comprises both a longitudinal study which investigates the effects of training, and a cross-sectional study which investigates the effects of experience. It was predicted that exposure to video games would correlate positively with cognitive functioning as measured by Raven’s Advanced Progressive Matri-
ces. In addition, it was predicted that individuals who have greater previous exposure to video or computer games may react more positively to the computerized “brain training.”

METHOD

PARTICIPANTS
Participants were 73 healthy individuals aged between 18 and 60 years of age (42 females, M=30.31, SD=13.47; 31 males, M=31.06, SD=14.48). Participants were selected from the general public. Individuals were selected for participation if they were between 18 and 60 years of age, had daily access to a computer, and appeared to have normal cognitive functioning. Over the two testing sessions there were 29 participants that completed “brain training” and 37 that received no training.

MATERIALS
A number of measures were used for this study. These included a training task, Ravens Advanced Progressive Matrices and a gaming questionnaire.

THE TRAINING TASK
The same dual n-back task that Jaeggi et al. used was utilized in this study, and can be found at http://brainworkshop.sourceforge.net/. In this task, squares at eight different locations were presented sequentially on a computer screen at a rate of 3 s (stimulus length, 500 ms; inter-stimulus interval, 2,500 ms). As the square appeared in one of the eight locations, one of eight consonants was presented. Participants were required to press the letter “A” on the keyboard if the square was in the same position as n positions back in the sequence, and to press the letter “L” if the letter matched the letter n positions back in the sequence. The value of n was the same for both streams of stimuli. All participants began with a two-back task. The value of n was then increased by one each time the participant achieved a score of 80% or more correct. The value of n was lowered by one if the participant made fewer than 50% correct judgments. The values of n remained the same if participants scored between 50% and 80% correct.

Raven’s Advanced Progressive Matrices
Set II of Raven’s Advanced Progressive Matrices (RAPM) was used. The test contains 36 nonverbal items requiring fluid reasoning ability. Each item consists of a 3×3 matrix with a missing piece to be selected. This piece is selected from a group of eight alternatives and completes the pattern. The complexity of each matrix increases with each successive item. Parallel forms were created by dividing the test into even and odd items, and participants were allowed 20 minutes to complete each of the forms. RAPM has been found to be an appropriate measure of fluid reasoning ability (Schulze, Beauducel & Brocke, 2005; Vigneau & Bors, 2005) and is regarded as being a good test of high level non-verbal ability (Anastasi & Urbina, 1997). Like other nonverbal tests, it is considered to be less culturally biased than traditional measures of intelligence (Anastasi & Urbina, 1997; Rosselli & Ardila, 2003; Vernon, 1969). In addition, RAPM are able to spread the top 20% of scores in the population (Raven et al., 1998). The re-test reliabilities of the test have been shown to be highly reliable for adults (r=.91) (Raven et al., 1998). The test also demonstrates good internal consistency, with split-half reliability coefficients varying from .83 to .87 (Jensen, Larson & Paul, 1988; Kratzmeier & Horn, 1980; Lapsley & Enright, 1979; Paul, 1985; Poortinga, 1972).

THE GAMING QUESTIONNAIRE
A gaming questionnaire was developed to specifically address self-reported computer gaming, and the personal salience of this activity. This questionnaire asked participants how often they played computer/video games, how long on average they played games for, which gaming platforms they used, and which games they played. Participants were specifically asked how often they played on games platforms (Daily, Almost daily, Weekly, fortnightly, Monthly, Less than monthly, Never) and were asked, on average, how long (in hours) they spent on a games platform on one occasion.

Griffiths (2009a; 2009b) has argued that gaming addiction should be characterized by the extent to which excessive gaming negatively impacts other areas of the gamer’s life rather than the amount of time spent playing. For this reason, questions were specifically developed to assess the level of involvement in computer games. These questions were based upon an item analysis performed by Phillips, Saling, and Blaszczynski (2008), and selected questions with good correlations with technology use. The questions in the Games Platform Salience Scale asked participants to indicate to what extent they agreed with five statements. Table 1 shows the questions asked along with their underlying constructs.

PROCEDURE
Participants were invited to participate through posters, flyers and announcements at sporting clubs. Participants could be

Table 1
Questions Asked in the Games Platform Salience Scale and Underlying Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diminished Control</td>
<td>I find myself using games platforms (e.g., PlayStation, Xbox, DS) for longer periods of time than I intended</td>
</tr>
<tr>
<td>Salience</td>
<td>I would be lost without my games platform</td>
</tr>
<tr>
<td>Problems</td>
<td>I find myself using the games platform when I should be doing other things and it causes problems</td>
</tr>
<tr>
<td>Mood Enhancement</td>
<td>The games platform makes me feel better when I am feeling down</td>
</tr>
<tr>
<td>Escapism</td>
<td>I find myself using games platforms as a way of escaping from daily stresses</td>
</tr>
</tbody>
</table>

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tested individually or in small groups. After informed consent was given at the beginning of the first testing session, participants were asked to fill in the gaming questionnaire. Participants then completed the odd items of the Raven’s Advanced Progressive Matrices (RAPM) within a time limit of 20 minutes. At the end of the first testing session, participants tossed a coin to ensure random placement in either the experimental or the control group. Participants assigned to the experimental group were provided with a link to the training task and were asked to engage in the task for 20 minutes a day for 19 days. Participants were asked to provide their mobile phone numbers if they wanted to receive text message reminders every few days. The control group was not provided with the link to the training task. Testing session two was held 19 days after the initial testing session as per Jaeggi et al. (2008). Participants in the experimental group were asked how often they did the training task (twice a day, once a day, every second day, less than once a week), and how long their training sessions were, on average (less than 1 minute, 1-3 minutes, 3-5 minutes, 5-10 minutes, 10-15 minutes, 15-20 minutes, 20-30 minutes, more than 30 minutes). All participants were then given the even items of the RAPM with a time limit of 20 minutes once again. Participants then attached the information from testing Session 2 to the information from testing Session 1.

**RESULTS**

Results were analyzed using the SPSS for Windows statistical package, version 17.0. Prior to analysis, data were screened for possible errors in coding and data entry on categorical and scale values amongst the 73 participants.

**RELIABILITY AND VALIDITY**

Preliminary analysis was conducted on the psychometric properties of the Games Platform Salience Scale. Internal consistency was ascertained using Cronbach’s Alpha. Excellent internal consistency was found, with a Cronbach’s Alpha of .90. In order to evaluate the Games Platform Salience Scale for criterion validity, Pearson correlations were conducted between the Games Platform Salience Scale and the frequency of gaming and duration of gaming. The Games Platform Salience Scale was found to be significantly correlated with self-reported Frequency of Gaming; $r=.667, n=73, p<.001$. The Games Platform Use Scale was also found to be significantly positively related to self-reported duration of gaming; $r=.672, n=72, p<.001$. Therefore, participants who had longer gaming sessions also received higher Games Platform Salience Scores. These findings support the criterion validity of the Games Platform Salience Scale, as the construct is found to relate in theoretically consistent directions.

**CLASSIFYING GAMERS AND NON-GAMERS**

The total sample comprised 73 adults. To characterize the sample, two groups were formed on the basis of their Games Platform Salience Scores. For convenience, those who scored eight or below on the Games Platform Salience Scale were classified as “non-gamers,” whereas those who scored nine or above were classified as “gamers.” Nine was chosen as the cut-off point for “non-gamers” as approximately 50% of the participants received a score of nine or below and approximately 50% of participants received a score of ten or above.

**TRAINING AND EXPERIENCE**

ANCOVA was used to control for any initial differences in IQ between groups. To ensure comparability across groups, test results from the first session were used as a covariate. The covariate was significantly related to the participant’s second score on RAPM, $F(1,61)=67.05, p<.001$, partial $\eta^2=.52$. Therefore, use of this covariate removed a significant proportion of nuisance variance in the form of between group variance.

There was no significant effect of training on the participants’ second score, $F(1,61)=-.13, p>.05$, partial $\eta^2=.00$, nor was there a training by gamer status interaction, $F(1,61)=.03, p>.05$, partial $\eta^2=.00$. Hence, the ANCOVA showed that the brain training had no effect on the scores in the second testing session once any differences in the initial testing session were controlled for. However, there was an effect of gaming status on the participants’ second score, $F(1,61)=4.260, p<.05$, partial $\eta^2=.07$. The ANCOVA showed that once the participants’ initial scores were accounted for, previous gaming experiences had a significant effect on the scores in the second testing session, with gamers ($M=10.90, SE=.44$) outperforming non-gamers ($M=9.53, SE=.47$). The assumption of homogeneity of regression slopes was otherwise met in that the interaction between training and initial RAPM scores was not significant, $F(1,59)=.42, p>.05$ and neither was the interaction between gamer and initial RAPM scores, $F(1,59)=1.17, p>.05$. This indicated that ANCOVA was an appropriate technique to be applied to these scores.

To assist in the interpretation of the observed differences in Raven’s scores between Session 1 and 2, Pearson correlations were calculated for the difference in scores, frequency of training, duration of training, the highest level achieved and the current level of participants. It was not gamer status that directly contributed to changes in RAPM scores, as the correlation with the Games Platform Salience Scale was not significant, $r=.21, n=29, p>.05$. Instead, there was a significant correlation between the difference in RAPM scores and the duration of training: $r=.38, n=29, p<.05$, implying a causal role for training. A number of factors influenced training outcomes. There was a significant correlation between the frequency of training and the top level achieved; $r=.41, n=29, p<.05$. There was also a significant correlation between the top level attained on the brain training task and the Games Platform Salience Scale; $r=.401, n=29, p<.05$. This suggests that differences in IQ scores were due to greater duration of training and perhaps the higher level attained during training by some of the gamers.

To determine whether these effects were an artifact of gender differences, a Gender x Gamer x Session x Group ANOVA was conducted to see whether gender had an effect on people’s Raven scores. Gender did not have an effect on the RAPM scores. Gaming experience was the only variable studied which accounted for higher scores.
To estimate the potential benefit from gaming experience, the unadjusted RAPM scores were considered. Independent samples t-tests indicated that Gamers (M=12.18, SE=0.49) had significantly higher RAPM scores than the Non-Gamers (M=9.39, SE=0.79) at the first testing session (t(71)=3.105, p<.01). Gamers (M=11.94, SE=0.46) had significantly higher RAPM scores than Non-Gamers (M=8.47, SE=0.73) at the second testing session (t(64)=4.102, p<.01). On these split halves of the Raven’s matrices, Gamers had scores that were 29.7-40.97% higher than Non-Gamers.

**Discussion**

Jaeggi et al. (2008) challenged the notion that fluid intelligence is immutable. Hence, the present study sought to replicate the study by Jaeggi et al. (2008) whilst improving on their methodology. In addition, this study sought to examine whether exposure to video games influences intelligence and whether the effectiveness of training on a “brain training” type game is influenced by previous gaming exposure. Differences in fluid intelligence as a function of assignment to a training group were not observed, failing to directly replicate Jaeggi et al.’s work (2008). Rather, it was exposure and involvement in computer games that appeared to positively correlate with cognitive functioning. Any observed changes in fluid intelligence as measured by the Ravens appeared to be linked to frequency/duration of training. The salience of games platforms for the individual predicted frequency and duration of their games play, and the levels attained during training, while duration of training was related to improvements in fluid intelligence (see Figure 1).

The present study does not directly support the findings of Jaeggi et al. that training on the dual-n-back leads to transfer to fluid intelligence. Jaeggi et al. (2008) were of the belief that by improving cognitive processes such as working memory, intelligence may also improve. This was hypothesized due to findings by Halford, Cowan, and Andrews (2007) which indicated that working memory and intelligence share a common capacity constraint. This capacity constraint can be expressed either by the number of items that can be held in working memory or by the number of interrelationships among elements in a reasoning task. Jaeggi et al. concluded that a demanding working memory task may be different enough from the tasks in a fluid intelligence measure to avoid mere practice effects but may instead provide a means of improving performance on these measures through an increase in this common capacity constraint. Although the present study was very similar to the Jaeggi et al. study (2008) there were some differences. Table 3 compares and contrasts the two studies. The present study found no evidence of transfer from the dual-n-back training task to intelligence when the participants were measured on the same measure (RAPM) 19 days after training. However, it was found that gamers performed better on the RAPM in the second testing session than non-gamers when the initial scores were controlled for. Upon further investigation, it was found that gamers trained for longer on the dual-n-back training task.

The results of this study support the findings of Orvis, Orvis, Belanich, and Mullin (2007) that those participants with greater video game experience invest more time in training tasks. It also supports the findings that frequency of video game use is predictive of future performance in video game-based environments (Alvarez, Salas & Garofano, 2004; Frey, Hartig, Ketzel, Zinkernagel & Moosbrugger, 2007; Gagnon, 1985; Orvis, Horn & Belanich, 2008; Young, Broach & Farmer, 1997) as individuals with greater prior exposure to video or computer games in this sample trained for longer and as a result reached higher levels on the dual-n-back training task.

One explanation for why those with greater previous exposure to video or computer games train for longer may be that those people possess greater video game self-efficacy. Self-efficacy is one’s perception of his/her capability to successfully accomplish a goal (Bandura, 1977). Self-efficacy varies according to the activity and the context and is therefore said to be domain specific (Bandura, 1977). Orvis, Horm, and Belanich (2008) used the term video game self-efficacy to describe one’s perception of his/her capability of successfully playing video games.

| Table 2: Pearson Correlations between Training Variables, the Games Platform Salience Scale (GPSS) and Differences in Ravens Advanced Progressive Matrices Scores (N=29) |
|----------------|----------------|----------------|----------------|----------------|
|               | Frequency | Duration | Highest level | Current level | GPSS |
| IQ Change     | .29      | .38*     | .18           | .10           | .21  |
| Frequency     | .24      | .41*     | .23           | .23           |      |
| Duration      | .30      | .25      | .09           |              |      |
| Highest level |          |          | .78**         | .40*          |      |
| Current level |          |          |               | .25           |      |

Figure 1. Relationships between computer gaming and fluid intelligence.
Increased self-efficacy has been found to be related to pre-training motivation (Colquitt et al., 2000), amount of time spent practicing new skills (Bouffard-Bouchard, 1990), players’ reactions to training programs (Mathieu, Martineau & Tannenbaum, 1993), and learning and performance (Bandura & Carvone, 1986; Colquitt et al., 2000). Therefore, it would make sense that individuals with greater exposure to video games possess greater video game self-efficacy, and therefore are more motivated and invest more time in training. A study by Chumley and Griffiths (2006) supports this theory as they found that players with more experience had lower feelings of frustration. In addition, Chumley and Griffiths found a significant negative correlation between the number of hours played per week and the degree of frustration experience (r=-.40; p<.05).

Self-Determination Theory research has shown that individuals who do not have their basic needs satisfied in daily life are more likely to engage in less self-determined, more compulsive behavior (Ryan & Deci, 2000). Przybylski, Weinstein, Ryan, and Rigby (2009) found that these individuals feel more compelled to play video games, and described these individuals as having an obsessive passion for video games. For instance, Mehroof and Griffiths (2010) found self-control to be negatively correlated with video game addiction. In the present study, the individuals who scored higher on the Games Platform Salience Scale, and were therefore classified as gamers, may be playing games because their basic human needs are not being fulfilled in day-to-day life or they want to avoid aversive states in daily life, and therefore experience more of a compulsion to play video games (Przybylski, Weinstein, Ryan & Rigby, 2009).

Gamers may also seek more sensation than those who do not play video games regularly. Mehroof and Griffiths (2010) found that sensation seeking was positively correlated with video gaming addiction and hypothesized that either sensation seeking provides a coping mechanism for individuals to overcome their boredom or video games provide stimulation and rewards for sensation seekers. Griffiths and Dancaster (1995) provide some support for this hypothesis as they found that computer games can cause physiological arousal. In addition, it has been found that certain characteristics within the game which positively reinforce the player lead to persistent play (Griffith, 1997a; Wood, Griffiths, Chappell, et al., 2004). The compulsion combined with sensation seeking tendencies may have affected training practices, resulting in gamers training for longer on the “brain training” task.

Another reason why gamers engage in more training than non-gamers may be a response to perceived threat (King, Delfabbro & Griffiths, 2009). These authors found that gamers often perceived psychological research as threatening because they thought that researchers do not understand the video game culture and are only interested in pathologizing gaming behavior. For this reason, the gamers in our sample may have welcomed the opportunity to demonstrate that gamers can out-perform non-gamers on measures of intelligence and therefore trained for a longer period of time in the hope that this would have a carryover effect to their RAPM scores.

The results of the present study show that gamers tend to attain a higher level during training, but do video games provide gains to fluid intelligence in general? Gamers received higher scores on the RAPM than non-gamers, and this superiority was maintained in the second session, even after statistically adjusting for any initial differences in ability using ANCOVA. Although this aspect of the study was cross-sectional in nature it is likely that gaming experience caused the gamers to perform better on the RAPM. Duration of training was linked to improvements in RAPM scores. Indeed, prior experimental research findings have demonstrated that gaming experience results in improved cognitive functioning. Green and Bavelier (2003, 2006a, 2006b, 2007) found that playing computerized games does have a pos-

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**Table 3**

Comparison of Jaeggi, Buschkuehl, Jonides and Perrig’s (2008) Study with the Present Study

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Jaeggi et al. (2008)</th>
<th>Present study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training task</td>
<td>Dual-n-back</td>
<td>Dual-n-back</td>
</tr>
<tr>
<td>Time between testing</td>
<td>8-19 days</td>
<td>19 days</td>
</tr>
<tr>
<td>Number of participants</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>IQ measures used</td>
<td>RAPM and BOMAT</td>
<td>RAPM</td>
</tr>
<tr>
<td>Study design</td>
<td>Longitudinal</td>
<td>Longitudinal and cross-sectional</td>
</tr>
<tr>
<td>Variables investigated</td>
<td>Brain-training</td>
<td>Brain-training and playing of videogames</td>
</tr>
</tbody>
</table>

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itive influence on various aspects of cognitive functioning when employing both cross-sectional and longitudinal designs. Hence, those participants who spent more time gaming and in brain training on the dual-n-back task are likely to be demonstrating the effects of this experience in terms of higher scores on tests of fluid intelligence.

If it is the case that video games do have transfer effects to fluid intelligence, the implications are quite significant. Firstly, it would indicate that there are environmental factors which may improve fluid intelligence. This goes against the notion of hereditarians who believe that fluid intelligence is largely determined by genes and therefore fixed at birth. This does not mean that there is no genetic determination of IQ. As Jencks (1980) pointed out, no matter how high heritability is, it sets no upper limit on the proportion of variation in a trait that is determined by environmental factors. Kamin (1977) reminds us that there is no data sufficient for us to reject the hypothesis that differences in the way in which individuals respond to items posed by testers is determined by their notably different life experiences. On the contrary, the current study supports that hypothesis. Those individuals who had previous gaming experience performed better on the RAPM, and those individuals with the willingness to engage in more of the “brain training” (i.e., the gamers) did better in the second testing session than those who did less “brain training.” Hence, opportunity to engage in certain activities and the willingness to do so may also affect intelligence.

If it is the case that video games do have transfer effects to intelligence, the second significant implication invokes concerns as to a digital divide. The phrase “digital divide” was coined in the late 20th century to refer to the gap between those who had access to new information technology and those who did not (Norris, 2001). Today, the digital divide increasingly refers to the intensity of use has drastically narrowed (Jackson et al., 2001; Subrahmanyam et al., 2001; Valkenburg & Soeters, 2006). If it is the case that exposure to various technologies, including video games, assists in superior performance in IQ measures, then these measures may in fact be an unfair measure for those groups who are not exposed to technology. It has been shown in this study that regular video gamers performed better on the RAPM, a measure which purports to be culture-fair. Therefore, these “culture-fair” tests may not directly discriminate against certain groups such as racial minorities, but may indirectly discriminate against these groups as they do not have technology entrenched in their lives to the same degree as other groups.

CONCLUSION

The potential to use video or computer games for positive purposes such as in education, health, training of personnel, and for students with disabilities is being increasingly investigated. Although the present study did not directly support the finding by Jaeggi et al. (2008), it was found that gamers had higher measured levels of fluid intelligence. Gamers tended to train more often, and attained higher levels during training, and as duration of training was linked to improvements in fluid intelligence, it is likely that the superior performance of gamers was due to greater exposure to and use of computers. The present research extends the game-based training literature by demonstrating that the attributes that trainees bring to game-based training environments may influence their involvement, motivation, and learning outcomes. Ensuring that trainee differences (such as exposure to video games) are addressed in video game-based training will maximize the likelihood that this method of training is effective and able to be generalized.

REFERENCES


Annual Review of Cybertherapy and Telemedicine 2009
Advanced Technologies in the Behavioral, Social and Neurosciences
Editors: B.K. Wiederhold and G. Riva
$167.00
Cybertherapy—the provision of healthcare services using advanced technologies—can help improve the lives of many of us, both patients and health professionals, while tackling the challenges to healthcare systems.

Virtual Healers
Brenda K. Wiederhold, Ph.D., MBA, BCIA
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Virtual Reality in the Mental Health arena is barely over a decade old. Because VR is still such a young and focused field, the members of its community have come together as a tight-knit family. In Virtual Healers, Dr. Brenda K. Wiederhold, herself a pioneer of VR, sits down in casual one-on-one interviews with more than a dozen of the top researchers of this select group.

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Brenda K. Wiederhold, Ph.D., MBA, BCIA
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Along with aliens and time travel, virtual reality (VR) is often thought of as a science fiction dream. Though it was developed nearly five decades ago, the use of VR in the private sector, particularly in the field of patient care, has become a possibility only in the past decade. As programmers are creating more detailed and interactive environments, the rapid advancement of technology combined with decreasing costs has turned VR into a promising alternative to traditional therapies.

Virtual Reality Resources
By Brenda K. Wiederhold, PhD, MBA, BCIA
$19.95
We, at the Interactive Media Institute, realized early on that it was relatively difficult for professionals wanting to break into the Virtual Reality (VR) field to locate relevant information. While the material was out there, there was no clear organizational structure or database to link it. To solve this problem, we have put together Virtual Reality Resources, a relevant compilation for researchers and clinicians alike.

CyberTherapy Conference Archives 1996-2005
A Collection of all abstracts from the past 10 years of CyberTherapy
By Brenda K. Wiederhold, PhD, MBA, BCIA
$29.95
A decade ago, CyberTherapy, then still in its infancy, only existed as a specialized Virtual Reality and Behavioral Healthcare Symposium at the Medicine Meets Virtual Reality (MMVR) Conference. It is now clear that in 1996, we had only begun to realize what promise might lie ahead for both VR technology and the CyberTherapy Conference.
SERIOUS GAMES FOR THERAPY: 
A TRAINING PERSPECTIVE

Clint Bowers 1, Katelyn Procci 1, Rachel Joyce 1, Marcy Verduin 1, Steve LaRowe 2, 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...
entertainment) are those which are conceptually sound, have clearly defined and implemented learning goals, conform to a high degree of realism and immersion, are engaging through the means of a contextually-accurate storyline, and have a “fun factor” that keeps a player intrinsically motivated to complete the game (p. 257). Implementing these features into a serious game is challenging and there have been few examples of successful serious games to date, although more seem to be on the horizon (Cannon-Bowers & Bowers, 2010).

Perhaps the fundamental challenge in developing a serious therapy game is integrating the tenets of both effective training and valuable therapy with elements of an engaging game. Our approach to this challenge was to shape a “training-based, therapy-first” strategy that embodies numerous design rules for instructional, game-based training as well as integrating best-practices guidelines for training and therapy (Lieberman, 2001; Aldrich, 2005; Fisch, 2005). To illustrate our method of integrating effective therapy, training, and game design, we will describe in depth a serious game designed to provide Relapse Prevention (RP) therapy for alcoholism. RP therapy, developed by Marlatt & Gordon (1985), is based in social learning theory. Individuals are encouraged to develop adaptive means of facing their problems to correct their own maladaptive responses using self-management skills. This and similar therapies are characterized by the learning of a variety of new skills designed to help the learner avoid stressful situations, cope with them when they aren’t avoidable, and minimize the long-term effects of minor lapses. This therapy appeared to be an excellent target for augmentation with a synthetic practice environment because it requires deliberate practice of relapse prevention skills. Furthermore, it allows patients to practice their newly acquired skills and to learn from their mistakes without being exposed to the danger of a relapse in the real world.

Our attempt to create a synthetic RP practice environment resulted in a software package named Guardian Angel. Guardian Angel is a game-based therapy maintenance tool which serves as an intervention for recovering alcoholics in therapy to learn and practice relapse prevention skills. Using the development of Guardian Angel as an example, we explore the challenges of promoting effective therapy through training using serious games. We also examine the problems with using serious games to treat a non-gaming, potentially unaccepting, population. This paper describes the process that we followed to create the software and the product that resulted.

Creating Effective Games from an Integrated Therapy and Training Perspective

As presented in our introduction, games are apt mediums to support training programs. RP therapy particularly lends itself to being treated as a training problem as patients are required to learn a new set of coping skills and then deliberately practice those skills while receiving constructive feedback of their progress. To effectively treat therapy as a training problem within the framework of a serious game, two things need to happen. First, a needs and task analysis is critical. When designing a training program, it is necessary to understand the needs of your target audience. For example, you should consider age, reading level, average lifestyle, and typical history of your potential patients when designing a training program. A task analysis is also vital to ensure that the therapy program aligns correctly with the tenets of therapy itself. Interviews with subject matter experts (SMEs) about the goals of therapy will define what skills you will need to train. These will become your learning objectives. As we are treating therapy as a training problem and using a game as the practice arena, you must translate these goals of therapy and learning objectives into a serious game. This can be done with the aid of existing game design frameworks. We chose to model our work after Fisch's (2005) educational game design principles. His framework specifies that educational goals must be mapped to relevant game mechanics, that the educational content should drive all of gameplay, and that proper feedback is necessary to make educational content salient. Therefore, we found it appropriate to conduct a needs and task analysis to determine our audience and the goals of therapy, and then translate those needs and goals into design considerations and learning objectives within our game. As a result, the game was constructed to have the therapy at the core of gameplay and game mechanics, and was responsive in terms of relevant, constructive feedback.

When considering an audience’s needs analysis, there is a challenge inherent to the design of serious games. Some gameplay aspects may render a game ineffective in a target population. For example, Smith and Sawyer (2008) warn that serious games follow specific expectations of its players’ demographics. It is vital, then, to identify potential pitfalls and subsequently address them during the game design process, including the player’s amount of experience with computers, experience with games, and level of reading comprehension. Therefore, while designing Guardian Angel, it was critical that the development team was aware of the end users’ demographics. The team was briefed that they were designing for a group of adult patients at the Ralph H. Johnson Veterans Affairs Medical Center (VAMC), and that they would be the end-users for the Guardian Angel intervention study being conducted 2009-2010. The development team had knowledge that the potential patients were veterans of military service spanning from the Vietnam War to the current conflicts in Iraq and Afghanistan. Also, all patients were currently enrolled in treatment for a substance abuse problem. The last important characteristic is that players had, on average, a sixth-grade reading level, limited computer skills, and most likely very little experience with computer games. Also, the team had to take into consideration that the ability to use a computer might have been affected by alcohol abuse-related motor disorders. Educated in the audience’s demographics, the design of Guardian Angel was ready to be shaped by standards of games and standards of learning. To do this, we paid close attention to both the narrative and game play aspects of the game. Considering that many modern functions of games, both commercial and serious, would most likely create confusion and frustration among our targeted demographic, the development team and therapists spent time crafting an in-game narrative as
a major design element of immersion as well as re-tooling the game play to better fit the capabilities and expectations of the patients turned players to provide a quality, accessible training space for therapy.

We focused on the narrative of the Guardian Angel game as well as the narrative for each of the available in-game characters. Following Lieberman’s (2001) model of having the player manage the player-character’s health in the game, the Guardian Angel narrative puts our patient in a similar role as an angel guiding the in-game character to health and wellness from afar. Establishing the narrative in this way, the players have the opportunity to experience success and failure with RP therapy in a safe environment. However, it is important to foster transfer-of-training from game play decisions to real-world behaviors. To address this transfer, each of the four characters presented in the game in need of guidance from a Guardian Angel were created to almost identically reflect the population of patients who will be participating in the study of this intervention. Biographies were edited and re-edited internally and were also influenced from focus group feedback conducted in January 2009 at the VAMC. A sampling of comments used in final re-tooling of the character biographies are as follows:

• “Michael Jones might need PTSD. Also, you don’t enlist to become a pilot. As he became a pilot, he must also be an officer.”

• “Add more drug and alcohol history in the narratives. For example, arrests, type of substance abused, etc. As is, their addictions aren’t believable.”

• “Susan Reinhart should have experienced military sexual trauma disorder. This is a major problem for female veterans.”

• “Lifelong friends to be some people in the game – people whom they have drank with for many years. More persistent in getting them (in-game characters) to try to drink and the hardest to refuse.”

Guardian Angel core game play is very simple and presented at an eighth-grade reading level. The point-and-click interface was designed for those with little computer and game experience, also addressing the potential motor defects from which our players might suffer. We found it important to instill a sense of realism in the game. Lawrence (1986) suggests that if games are not realistic enough to instill empathy in the player, their use might not result in any transference of skills (as cited in Goh, Ang, & Tan, 2007). Some have even gone as far as to stay away from the label of “game,” instead referring to their serious games as “desktop simulators, synthetic environments, or immersive interactive experiences” (Prensky, 2003, p. 4). It also might be important to have strong face validity so that the player feels like they’re directly receiving whatever skill or therapy that they know they should be receiving. If the player does not believe that the game is a “real” therapy, even if is a perfectly valid one, there is a chance that they will not integrate the skills because they did not bother to take the time to try, seeing it as a frivolous exercise. All of these aspects need to be considered to attempt to quell any developing misconceptions the target audience may have about the use of serious games.

As for game play in Guardian Angel, each day is one round of play during which the player gets to choose one activity. They can browse activities by selecting one of the top two icons on the right menu bar. The first icon is “Do Something Alone” and the second icon is “Do Something in a Group.” Choosing either of these options will launch simple, easy to play minigames. The core training environment to practice RP-related skills is established within the minigames.

Viewing therapy through the training lens, developing Guardian Angel as a suite of life-management skills (Ward & Hudson, 1996) was a three-prong effort of the lab development team, SMEs, and end user population focus groups. First, the SMEs isolated which relapse prevention skills and positive behaviors for practice they wanted to see in the serious game intervention, then they educated the game designers about correct and incorrect implementations of RP skills in recovering alcoholics’ lives. Next, brainstorming was conducted among lead game designers, SMEs, and leading psychologists to flesh out what type or types of game play would be appropriate and fun for RP therapy end users. The main ideas from the brainstorming meetings fed the initial alpha versions of Guardian Angel. The alpha versions then went through software usability testing at the University of Central Florida, followed by focus groups, to gain valuable feedback on authenticity, usability, fun, and immersion. Multiple design iterations followed, monitored closely by SMEs who often provided minor and major edits. These iterations yielded the beta version. The beta version then went through a second round of focus groups before the final module was developed and turned over to the Ralph H. Johnson VAMC in South Carolina for its rigorous, ten-month study that is currently underway. The final major components of the game sought to combine theories of effective training with major RP therapy principles. In the next section, we have outlined how we have applied training principles to principles of RP therapy within Guardian Angel.

Guardian Angel Game Description

As noted, we conceptualized RP as learning a set of discrete coping skills. The skills we chose to teach in the game include Manage Craving/Urge Surfing, Stimulus Control, Drink Refusal/Addictive Voice, Temptation Avoidance, and Cultivate Individual Resources. The first of these, Manage Craving/Urge Surfing is an overarching skill that is instantiated in the overall game design.

RP Skill: Manage Craving/Urge Surfing

Managing cravings and the overall prevention of a relapse are not just about abstaining from alcohol. Not drinking alcohol in conjunction with learning how to manage everyday emotions and situations combine to create the overall urge to resist abusing alcohol. We learned the following five emotions are a focus
of self-management: bad mood, boredom, loneliness, stress, and tiredness. By having all in-game activity feed an algorithm that reflects the state of these five emotions, we can effectively communicate why everyday choices affect sobriety.

Game play of Guardian Angel involves the player choosing activities to participate in during the day. Selecting “Do Something in a Group” will always launch the Going Out minigame, consistently putting the player in social situations to practice drink refusal skills. Two of the “Alone” activity options will launch minigames. Choosing “Clean the House” will launch the “Clean House” minigame, and “Go to Therapy” will launch the “Balance Out” minigame. The final minigame, “Route Planner,” launches after any activity that requires the player to leave their house or immediate neighborhood, challenging the player with the task of navigating back home without passing establishments that serve or sell alcohol. The other “Alone” activity choices are text-based, and the player decides what to do based on their available finances and the emotional outcomes of each activity. These activities were designed to provide context and relevance to the game that the player will be able to generalize to their own life.

At the close of each activity, or one round of game play, the alarm clock on the bottom right of the screen sounds. The day’s results screen launches, re-iterating to the player what was achieved. From a training perspective, providing such feedback is beneficial to inform the player of their progress and outline opportunities for improvement. For example, if the player “Went to Therapy,” launching the Balance Out minigame, the end of day results will report, “Today you went to Therapy. Your Cravings Meter is at 20 and you earned your first AA chip for your first day of sobriety.”

The five emotions that dictate success and failure in the game are: loneliness, tiredness, boredom, bad mood, and stress. These five emotional values of each activity all inform the overall Cravings Meter, and managing these five emotions are a major focus in treatment. The Cravings Meter is the visual representation of the choices the player makes, or their emotional outcomes in relation to managing cravings to drink alcohol. When the Cravings Meter hits “80” for the first time, the end-of-day results will reveal to the player they have encountered their first slip. This is a common occurrence for recovering alcoholics. They will drink, or have a slip, but not fully relapse into the addiction lifestyle. In the results screen they will be warned that they are now on their way to a relapse if they aren’t careful. The second slip, or second time the Cravings Meter reaches “80,” the player is warned that if they slip again, a full-blown relapse is on the horizon. If a player has three slips and relapses, the consequences are meant to reflect the reality of alcoholics in treatment whom relapse. They will lose their job, their driver’s license, and attend AA classes and therapy. To “win” the game, players have to guide the in-game characters to 365 days (rounds) of sobriety without a relapse. If they accomplish this, the player will then be granted the title of Guardian Angel in addition to having developed a skill set to assist them with lifelong sobriety. Again, providing this opportunity within a contextually-correct safe space for deliberate practice as well as providing feedback is vital for an effective therapy-based training environment.

Figure 1. Sample Guardian Angel screenshot.

RP SKILL: STIMULUS CONTROL
An important facet of RP therapy is stimulus control. The individual must avoid alcohol and situations where alcohol might be present. An example of stimulus control is removing all alcohol-related items from their home, including alcoholic beverages, mouthwash, and cough medicine. Another example is the removal of items that remind the players of alcohol such as art containing alcohol, clothing with beer logos, or a shot glass collection. Players are given a chance to practice this skill in the “Clean House” minigame. Players have four minutes to locate all alcohol-related items hidden in their home and throw them out. Players must navigate in and around four rooms all randomly loaded with clickable objects, some of which are not alcohol-related. Players select items with their mouse and drag them to the trashcan. Feedback is provided by both pop-up messages and reflected in the Craving Meter. If the player attempts to throw away an object not related to alcohol, such as a basketball, a warning message pops up that says “You need that! Don’t throw it out.” and the player is not allowed to drop it into the trashcan. Touching alcohol-related objects increases the Cravings Meter temporarily, but discarding the item decreases it. At the end of the minigame, a final screen pops up that lists the number of objects thrown out and displays the Craving Meter.

RP SKILL: DRINK REFUSAL/ADDICTIVE VOICE
This skill addresses the issue of correctly refusing drinks in social situations. The goal is to train players to always give short, clear, and simple responses when they are offered an alcoholic
drink. If a passive refusal is selected, the player will become weaker in-game and have a drink when offered a second time. Additionally, it is important to practice investigating the environment when invited to attend a social situation to see if alcohol will be served there. The player is able to practice this skill by playing the “Going Out” minigame, which launches each time the player chooses to “Do Something in a Group” and each time they accept a randomly-generated invitation from a friend. Players are presented with a proposal to drink from one of their friends and are provided different responses to refuse the drink as well as the choice to accept the drink as well. The answers provided use different drink refusal skills in addition to incorrect drink refusal responses. The quality of the answers depend on how much training the player has received in Guardian Angel as reflected in their Cravings Meter. This Cravings Meter also increases or decreases in real-time as the player interacts with the virtual character based on how they respond to questions. For example, while our player is out playing board games with the character Alessandra, she suggests, “Let’s go grab a couple of glasses of beer while they set up the games.” By selecting the passive response (“I promised myself I wouldn’t drink again”), a warning sound plays and the Cravings Meter increases, leading to a slip. Selecting the resolve response (“No, I don’t want to drink any alcohol tonight”) results in a pop-up screen that reads, “Congratulations, you easily declined drinking with your friend.” Using this method, the player receives direct feedback as to the best ways to refuse drinks. Not only does this provide an accurate context to train within, this real-time movement of the Cravings Meter based on conversation choice also provides valuable feedback to the player as to how their choices affect their resolve to stay sober.

**RP Skill: Temptation Avoidance**

A relapse is often cued by visiting a location associated with earlier drinking behaviors. By playing the Route Planner minigame, the player is able to practice planning routes to and from locations, such as their home, and learn to avoid passing by local bars, bowling alleys, and other locations the player may associate with drinking. The player can safely learn about avoiding temptation. This minigame launches when the in-game character completes an activity that requires them to travel from their home. Route Planner plays very similarly to any tile-based directional game. The player must lay out a route on an overhead map of the city. The route is comprised of arrows for up, down, left, and right. The number of arrows the player can place are limited and should only be used as appropriate. The objective is to get home while keeping as far away from temptation as possible. Higher levels expose the player to increasingly complex maps. The city has bars, bowling alleys, liquor stores, and other potentially tempting places throughout, which are outlined in red. The player is given a time- and money-pressurized scenario within which they must plan a practical route. The idea is to create a route that has the least amount of tempting stops along the way. Each ascending game level will increase the size of the map; as the map increases, so does the number of tempting places. If the route planned has the player driving past a tempting area such as a liquor store, the warning tone sounds and the Cravings Meter jumps into the red area. If the route they have planned takes them to these dangerous temptation areas too often, the game will end. The player is then forced to try the minigame again until they are able to navigate home without passing by temptation.

**RP Skill: Cultivate Individual Resources**

Stress is defined as an adaptational relationship between an individual and a situational demand, also known as a stressor (Lazarus, 1988). Accordingly, the conceptual framework that we adopt views stress as resulting from an imbalance between environmental demands and an individual’s resources. “Coping” is an attempt to meet the demands in a way that restores balance or equilibrium. If the individual does not have adequate coping skills in their repertoire to meet the demand, alcohol use may be an attempt to restore a perception of equilibrium. As such, the goal of the Balance Out minigame is to provide players with the training and the resources to help cope with stressful situations that may lead to alcohol abuse as well as an environment in which to practice those skills. This minigame launches each time the player chooses “Go to Therapy” as their activity. For each session, the player will spin the Wheel of Balance to select an individual resource scenario (IRS). The therapist will describe the IRS and then set up a scenario that will challenge the player’s social, cognitive, and developmental skills by having them select a response to the given scenario based on what they just learned during their IRS session. The player will be awarded one of the three types of coins available in the minigame, ranging from bronze, silver, and gold, with gold being the most valuable. After three rounds of sessions, the coins are transferred to the “balance scale” in an effort to create equilibrium inside the player. An inability to balance out the scale will result in a failed session. This minigame attempts to teach the player different ways to cope with environmental demands more effectively.

**Other Design Considerations**

Obviously, a game like Guardian Angel exists within a larger therapeutic milieu. Therefore, it is important to develop the game in a manner that allows its appropriate use in the therapeutic environment. One important consideration, for example, is cost. Most hospitals and individual therapists do not have a large budget. Furthermore, many treatment facilities do not have access to computers designed for gaming. To address both of these issues, we chose to develop the game as a two-dimensional, Flash-based game. Flash allows rapid, inexpensive game development. Furthermore, games developed in Flash can be run on relatively low levels of technology.

It is also important that patients are able to use the game without assistance. Treatment facilities do not have the luxury of providing technical support for therapeutic games. As such, we did extensive play testing to ensure that the game was accessible and intuitive.

We also considered that all doctors do not deliver therapy in the same manner. As such, we designed the therapeutic content of
the game so that it could be altered easily using a spreadsheet program. In this fashion, the therapist can alter the game without the assistance of a game programmer.

**Guidelines for Future Serious Games Development**

Based upon our experience developing Guardian Angel, we offer the following guidelines to be used by any clinician interested in developing a serious game to be used as a training tool for therapy:

- **Develop with your patient in mind.** Game play must be on the patient’s level. Take into consideration reading level, computer comfort, experience with games, and physical abilities when outlining the game play and game content.

- **Capture the context.** Characters and game play should relate to the patient. Characters should be realistically fleshed out and be placed into believable situations to which they respond accurately as if they were in the real world. Also keep in mind that your patient group may be averse to playing games. Designing the game to be realistic may combat any negative expectations players might have about the overall face validity of the game.

- **Game design and play should be conceptually sound,** in terms of best practices for both therapy and training. The actual game play should relate directly to the therapy. The game should demonstrate the knowledge, skills, and abilities within a practice environment with which the patient can directly engage to acquire the desired coping skill set. Feedback regarding progress and errors should be provided.

- **Game play must be motivating.** Motivation often derives from enjoyment, therefore, games should be interesting, engaging, and fun to play, all while remaining relevant.

- **The design process should be iterative.** It is vital to meet repeatedly with subject matter experts and player focus groups. They provide valuable feedback and insight into improving your game in terms of usability, realism, relevance, and validity.

**Conclusion**

As we developed Guardian Angel, we had to address all of the guidelines presented here. We took into careful consideration the needs, abilities, and expectations of the player. We incorporated actual game elements infused with training principles to best teach our players relapse prevention skills. We found that in the mental health setting, it is vital to develop the game with the target population’s demographics and expectations in mind. We also found that we had to carefully design our game to avoid alienating our target population. It was important to cater to our population about what they think constitutes a believable game. This made our game more acceptable to a potentially rejecting population. We also had to consider that our target population did not have much game experience. However, the fact that our players may be lacking in gaming skills does not mean that they will not be able to play the game and reap the therapeutic benefits. With this in mind, we had to develop our game in respect to game play mechanics, mode of control, level of difficulty, and learning curve. We found that even novice adult players were able to navigate the game using our simple point-and-click interface. A key point we kept in mind was that, as a game, a sense of fun would lend to overall effectiveness.

It is important to recognize that effective serious game design requires creativity and in some ways is as much art as (learning) science. Even considering our therapy-driven training model and deriving the bulk of the game from theory, overall quality game design was crucial to our success. Therapy-relevance and superior game design are two sides of the same coin and both must be considered; developers need to strike a harmonic balance between these two very important aspects. Finding this perfect equilibrium is an ongoing process advanced with each new paper submitted to the growing body of serious games literature.

**References**


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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

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### 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 & Siddiqi, 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...
with other users with similar issues, creating a support group system that enables users to gain help from additional sources (Annang, Muilenburg & Strasser, 2010; Childress & Braswell, 2006).

With this additional access to health information, users can become more informed and knowledgeable about their particular cases and health in general. Modules of specific health topics were found to have a long-term effect on users, in terms of the information that was disseminated and the unique method in which it was presented (Beard, Wilson, Morra & Keelan, 2009). It has also been found that the avatars created by users are sometimes used to represent the character of the user itself, rather than just a fictionalized, unrealistic form. Through the use of Second Life, users are able to smoke, drink, or engage in promiscuous behavior just as in real-life, but can view these behaviors with the perspective of an outsider. In this virtual world, social and cultural dimensions are broken down, which can serve as an educational experience to the user if approved health practices are presented. In other words, if the virtual world members engage in approved health behavior, the hope is that it will transfer to the real world (Warburton, 2009; Annang, Muilenburg & Strasser, 2010).

The networking and learning opportunities of Second Life, along with its gaming characteristics, have attracted a broad array of health educators from varying institutional backgrounds (Layne, 2009; Lee, 2009; Siddiqi and Lee, 2009; Siddiqi, Mama and Lee, 2011). Institutions using Second Life specifically for health education include Indiana University, Ohio University, University of Houston, the National Institutes of Health, and FasterCures, and hundreds of similar institutions also have in-world campuses which often offer virtual classes. In addition to improving quality of instruction, five modes of education have been identified in Second Life, including demonstration, experiential, diagnostic, role play and constructive (Richter, 2007). Further, virtual communities can provide the same sense of community as real-life communities, like the classroom, fostering a sense of membership and learning opportunities (Boulos, 2007).

Social networking and hand-held communication devices have also emerged as another prime domain for health education. Portable electronic devices have become a staple in the "don't leave home without it" generation. It is not uncommon for professors to lecture to a sea of students madly punching keys on various gadgets. Inquiries with students as to what they are doing on their devices yield responses like, "texting," "updating my Facebook page," and the ubiquitous deer-in-the-headlights type of stare. One of the most popular social networking communities is Facebook. Facebook is free to users and not as resource heavy as other social networking sites, relying solely on plain text – making it simple to navigate and use. Since Facebook grew out of the university setting, it is very popular and widely adopted by members of the university community. On Facebook, people can link with other friends, post pictures, join groups and networks, E-mail each other, and play games and applications with other users. The University of Houston (UH) network has over 35,000 users (Facebook, 2010). The Facebook application can also be easily downloaded and used on virtually any computer or hand-held communication device. Further, data suggest that Facebook plays an important role in the process by which students form and maintain social capital and well-being (Ellison, 2007). Ellison et al. also found that bonding social capital was associated with high self-esteem, satisfaction with university life, and intense Facebook use (Ellison, 2007). It is an obvious choice to employ this type of already adopted easy-to-use, resource efficient, technological innovation to health education settings.

As part of the UH Department of Health and Human Performance’s (HHP) current mission “to enhance instruction through the use of innovative technology,” our HHP Obesity Studies faculty sought innovative ways of reaching university students using technologically advanced Web 2.0 strategies. The purpose of this study was to use a multimedia approach to adapt real-life instruction in Obesity Studies into the virtual world of Second Life while integrating widely adopted social networking software (Facebook and Twitter) into virtual instruction. We expected that students who were enrolled in the Second Life virtual classroom and used Facebook more frequently would have higher grades and participation in the course compared to those who did not. As well, we expected that students who were enrolled in the Second Life virtual classroom would perform better both in terms of speed and grade on the virtual field experience, since they would be more familiar with the virtual technology.

**Method**

Participants were recruited from HHP undergraduate students enrolled in three Obesity Studies classes: Research in Obesity and Weight Management; Health Promotion and Disease Prevention; and The Obesity Epidemic. Before participating in the project, students signed an informed consent approved by the University of Houston’s Institutional Review Board.

This study focused on testing three types of virtual instruction separately and together, in three distinct courses: Research in Obesity and Weight Management; Health Promotion and Disease Prevention; and The Obesity Epidemic. All courses were undergraduate courses that were taken in different semesters and as core or strongly suggested elective courses by students in the Bachelor of Nutrition program in HHP.

Research in Obesity and Weight Management focused on contributing factors in obesity, analysis of current research in obesity and weight management, and reviewed dietary approaches to weight control. A social network wiki application was created for this class, allowing for the creation and editing of collaborative and interlinked course related Web pages, information and individual comments. Students were expected to help construct their own learning by applying new technological skills to the course environment. This social network wiki application was hosted on HHP servers and was only available to students.
in the class and for the purpose of discussing material in the class. The wiki application was also used to communicate more effectively among groups and to work on the wiki assignments. For example, as part of their group assignments, students were assigned to create wikis about different fad diets. Each group researched their assigned fad diet and presented their findings in a wiki format. The use of a wiki also made it easier to keep track of the amount of work put in by each member of the group. Students were graded on the amount and quality of posts for each wiki assignment.

Health Promotion and Disease Prevention provided an overview of theories and strategies in health education for the prevention and control of common diseases, and promoted health topics fundamental to obesity control and prevention. Students voluntarily joined Facebook to provide more learning and social networking opportunities within the class. Relevant and recent health articles were posted for students to review at a variety of times, randomly selected two or three times a week. The material posted was chosen to stimulate student thought about the class and for students to review and comment on, bringing something new to the article’s Facebook post conversation. Students were given extra credit points for posting ten times throughout the semester and overall.

The Obesity Epidemic covered public health, policies and obesogenic environmental factors related to obesity. Students were divided into two groups. Because it would be perceived as unfair (and therefore not feasible) to divide students randomly, students self-selected either virtual classroom or usual classroom. Although students were divided into two groups, all students experienced the same content that included lectures, readings, real world field experiences, virtual world field experiences, group membership and activities, and text-based information delivery and response. Students who received usual classroom lectures attended classes as usual and received their lecture material in the traditional format. Students who selected virtual classrooms received their lecture material in a virtual classroom in Second Life. Lectures were prerecorded and students were able to revisit the lectures and review them, if they chose, at their own convenience in Second Life. The instructor's or teaching assistant’s avatar was also present at an arranged time to answer questions to provide the same level of possible interaction that traditional students would have. All students were required to complete an assignment in Second Life. For this project, students created an avatar, explored different domains and took course related assessments in Second Life. Students were able to revisit the lectures and review them, if they chose, at their own convenience in Second Life. The instructor’s or teaching assistant’s avatar was also present at an arranged time to answer questions to provide the same level of possible interaction that traditional students would have. All students were required to complete an assignment in Second Life. For this project, students created an avatar, explored different domains and took course related assessments in Second Life. Students were graded on their accuracy and completion of tasks and assessments.

All students, regardless of classroom selection, were given access to readings and assignments that were posted in the typical fashion on the course Web CT site, as had been done previously. Real world field experiences were conducted in the real world, as had been done previously as well, and virtual world field experiences were done in Second Life. All students completed all of these assignments, regardless of lecture format selection. All students were strongly encouraged to join the Facebook group for the class, to provide additional membership and social networking opportunities within the class. Group notices were posted for students to review, and students were encouraged to work together to learn the material.

Information was collected on students to evaluate participation and performance. Participation was defined in terms of class attendance, percentage of completed assignments involving the technology and response to questions, and performance was defined as grades on assignments, exams and overall class average.

**Analyses**

Appropriate descriptive analyses were performed to examine distributional characteristics among all class and survey data, and bivariate analyses were conducted for class and survey variables. To determine whether Web 2.0 technology use was associated with exam or assessment performance for each of the three classes, sum scores were calculated for the following variables: exams/assessments; class attendance/participation; Web 2.0 technology assignments and other; and non-Web 2.0 class assignments. Other class assignments included all non-Web 2.0 technology, and written assignments. All independent variables (class attendance/participation, Web 2.0 technology use and other class assignments) were initially entered into regression models with exams/assessments as the outcome. All criteria for regression assumptions were met. Factors were systematically removed (p<.05) using the backward method to create the final model for each class.

Small sample sizes limited some of our analyses. Since only a small amount of students volunteered for the virtual classroom setting in The Obesity Epidemic class, we were not able to make valid comparisons between the virtual and traditional classroom settings.

**Results**

Web 2.0 technology use scores and final grades for each class are presented in Table 1. In Research in Obesity and Weight Management, a social network wiki application was available to students in the class for the purpose of discussing material in the class. Overall, wiki participation was high (M=47.2 points/50 points maximum, SD=3.2) and was strongly and positively correlated with final class grades (R=.490, p=.005), but was not significantly associated with assessment performance.

In Health Promotion and Disease Prevention, students voluntarily joined Facebook to provide more learning and social networking opportunities within the class. Students were rewarded with extra points on their final grade for posting 10 times throughout the semester and overall, and participation was high for students who chose to take part (M=7.21 posts/10 posts maximum, SD=5.82). Facebook use was not a significant predictor of exam performance, but attendance and other assignments were significant predictors of exam performance (F (2, 49) =234.3, p=.000), accounting for 90% of the variance.
In The Obesity Epidemic, students self-selected either virtual classroom or usual classroom, though only two students self-selected a virtual classroom setting. All students received the same material; however, delivery of lectures depended on student selection. All students joined Facebook for the class, to provide additional membership and social networking opportunities within the class. Group notices were posted for students to review, and students were encouraged to work together to learn the material. Overall, Facebook participation was high (M=9.07 points/10 points maximum, SD=2.29) and significantly associated with overall class grade (p<.01). Overall grades were not as high as Facebook grades (M=7.71 points/10 points maximum, SD=24.25), but like Facebook, Second Life project grades were significantly correlated with overall class grades (p<.01). Web 2.0 technology and other assignments positively predicted exam performance (R²=.64, F(2,39)=334.0, p<.000). Regression coefficients for The Obesity Epidemic Web 2.0 technology use are presented in Table 2.

### Table 1

**Web 2.0 Technology Use and Final Grades**

<table>
<thead>
<tr>
<th>Class</th>
<th>Web 2.0 Technology/ Final Grade %</th>
<th>N</th>
<th>M Performance</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research in Obesity and Weight Management</td>
<td>Wiki Final Grade %</td>
<td>31</td>
<td>94.04</td>
<td>3.20</td>
</tr>
<tr>
<td></td>
<td>Final Grade %</td>
<td>31</td>
<td>47.16</td>
<td>5.49</td>
</tr>
<tr>
<td>Obesity Epidemic</td>
<td>Facebook Responses Final Grade %</td>
<td>43</td>
<td>9.07</td>
<td>2.29</td>
</tr>
<tr>
<td></td>
<td>Second Life Project Final Grade %</td>
<td>45</td>
<td>7.71</td>
<td>3.83</td>
</tr>
<tr>
<td>Health Promotion and Disease Prevention</td>
<td>Facebook Responses Final Grade %</td>
<td>29</td>
<td>7.21</td>
<td>5.82</td>
</tr>
<tr>
<td></td>
<td>Final Grade %</td>
<td>45</td>
<td>87.76</td>
<td>8.91</td>
</tr>
</tbody>
</table>

| Second Life project grades were significantly correlated with overall class grades (p<.01). Web 2.0 technology and other assignments positively predicted exam performance (R²=.64, F(2,39)=334.0, p<.000). Regression coefficients for The Obesity Epidemic Web 2.0 technology use are presented in Table 2.

### DISCUSSION

In obesity studies courses, Web 2.0 technology and online social community use was significantly associated with an improved learning experience, consistent with other fields of study (Boulus, 2007; Mazer, 2007; O’Sullivan, 2004). In general, greater use of Web 2.0 technology was associated with better performance on assignments, exams, assessments and final grades. In particular, performance on assignments using social networking sites like Facebook and Second Life was positively associated with exam performance. Facebook participation was higher than Second Life participation and performance, suggesting that Facebook might be more easily adopted than Second Life for enhancing class participation and performance. Because the Facebook assignments required student cooperation toward an educational topic, adopting Facebook in the classroom could also facilitate communities of learners and produce a higher quality learning experience (Boulus, 2007).

Although Web 2.0 technology participation, including Facebook use, was associated with higher performance on exams, online social networking should be used with caution by instructors. One study found that some surveyed students did not believe university faculty should be present on Facebook although Facebook had no impact on students’ rating of their professors (Hewitt, 2006). Further, Mazer and colleagues found that students were highly concerned with how the teacher would be perceived as a professional and suggest that scholars should explore forms of self-disclosure that students may deem appropriate or inappropriate via the social network used (Mazer, 2007). For the current projects, the professors created “fakebook” pages on Facebook that did not include any personal information, and were solely used for the class. At the end of the semester, links to students were disabled, and all posts by students were deleted.

To the best of our knowledge, no other study has measured and compared educational outcomes across such a breadth of Web 2.0 technologies (e.g., Second Life, wiki site, Facebook). Because traditional classroom instruction typically has not included these technological innovations, social networking and virtual community educational research is lacking compared to traditional pedagogical methods. Our findings contribute to a limited evidence base in need of more study, particularly for health education instructional opportunities to enhance learning. Further, because Web 2.0 technologies have been shown to increase student participation and learning outcomes, this study has significant implications for enhancing higher education public health instruction, with relatively low additional burden for instructors.

Some Web 2.0 technologies may be too elaborate and advanced for the average college student. For example, only two students volunteered for a virtual classroom setting in The Obesity Epidemic technologies.

### Table 2

**Multivariate Linear Regression Coefficients for OE Web 2.0 Technology Use**

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Beta</th>
<th>T-Test</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web 2.0 Technology Usage</td>
<td>.887</td>
<td>.590</td>
<td>4.064</td>
<td>.000</td>
</tr>
<tr>
<td>Other Assignments</td>
<td>.258</td>
<td>.253</td>
<td>1.746</td>
<td>.089</td>
</tr>
<tr>
<td>Constant</td>
<td>7.432</td>
<td>2.191</td>
<td>.034</td>
<td></td>
</tr>
</tbody>
</table>

R²=.64, F(2,39)=334.0, p<.000
ademic class, and we were not able to make valid comparisons between the virtual and traditional classroom settings. Investigators should attempt to adequately compare class outcomes for students in a face-to-face setting versus students in a virtual classroom by providing strategies to familiarize students with the more advanced Web 2.0 technologies before using them in classrooms. Specific modes of instruction may be possible in virtual environments like Second Life (i.e., demonstration, experiential, diagnostic, role play and constructive) (Richter, 2007), and future studies could also measure and assess the utility of these online educational tools. Although we did not intend to measure social capital and well-being, university enrollment and intensive Facebook use could be promoting these qualities (Ellison, 2007) and be associated with higher student performance, particularly for those using mobile technologies. Future studies could measure these and student demographic variables, and associate them with specific educational outcomes shown to promote higher quality education experiences. More research comparing and investigating the effects of Web 2.0 technology, social networking, gaming systems and demographic characteristics on learning and class outcomes is needed, particularly among students from diverse backgrounds who may have less experience with computers and Web 2.0 technology. Course instruction that includes these technologies may not only improve learning outcomes for more advanced students, but may also help to reduce the “digital divide” among minority and recent immigrant student populations.

Conclusion

Web 2.0 technology continues to play a major role in students’ lives. Virtual worlds, online social networking sites and electronic communication can be used to enhance learning outcomes with a focus on curriculums centered on these platforms. Although traditional classroom instruction has not typically included these technological advancements, our findings suggest that their use might increase participation and overall class performance. In addition, these virtual platforms can serve to revolutionize various fields of research, through the study of avatar personas as reflections of their real world users, and in healthcare, with innovative methods to distribute information. There is considerable potential for using these established, feasible, and inexpensive technological innovations in classroom settings, particularly for the emerging and timely field of obesity studies.

Acknowledgement

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References


Comparative Randomized Trial of an Online Cognitive-Behavioral Therapy Program and an Online Support Group for Depression and Anxiety

Louise A. Ellis1, Andrew J. Campbell2, Suvena Sethi2 and Bridianne M. O’Dea2

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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results may have been due to the infrequent use of the site and/or inclusion of participants who were more severely depressed than the program was intended to serve.

Since then, clinicians have developed programs such as MoodGYM and BluePages that provide highly structured CBT modules and psychoeducation for depression, respectively. Christensen, Griffiths and Jorm (2004) evaluated these interventions against a control condition. Both MoodGYM and BluePages were found to be effective in reducing symptoms of depression. MoodGYM significantly improved dysfunctional thinking compared to the control condition. While both of these resources appear to be beneficial for those suffering from depression, they require large amounts of reading without any interaction with other people and thus, may be limited in engaging young people (Coyle, Sharry, Nisbet & Matthews, 2003; Oblinger & Oblinger, 2005).

In comparison, online support groups enable people in distress to find others with similar needs and problems, to share feelings and information, provide advice, and develop a sense of community (Barak & Dolev-Cohen, 2006), and they appear to be highly popular avenues for young people seeking assistance. For example, an American survey found that 28% of Internet users accessed or participated in an online self-help group, seeking support for a medical condition or a personal problem (Pew Internet & American Life Project, 2001). However, to date, there is relatively little empirical research on their efficacy. One available study by Houston, Cooper and Ford (2002) examined adult use of an online depression support group in predicting change in depression scores. They found that heavy users of the support groups were more likely to show improvements in depression scores than less frequent users. Similarly, Barak and Dolev-Cohen (2006) demonstrated that higher levels of involvement in a message forum predicted lower levels of emotional distress among adolescents over three months.

In summary, research conducted to date indicates that Internet-based interventions may be a viable avenue in affording positive outcomes for mental health challenges. Internet resources include peer-to-peer interaction using computer-mediated communication as evidenced by online support groups, or text-based information and/or structured CBT modules without peer-to-peer interaction as evidenced by current psychoeducation and CBT programs. To date, there is a dearth of research looking at the comparative effectiveness of different types of online resources and research in the area generally suffers from methodological limitations including sample biases and lack of adequate control group measures.

The purpose of this investigation aimed at assessing the efficacy of a brief online CBT intervention (MoodGYM) compared with an online support group (MoodGarden) in decreasing symptoms of depression and anxiety, and improving dysfunctional thoughts, social support, and CBT literacy in young adults. It was hypothesized that participation in either the online support group or online CBT would decrease depression and anxiety scores, in comparison to the control condition. It was further hypothesized that participation in online CBT would lead to a reduction in dysfunctional thoughts and an increase in CBT literacy, in comparison to either the support group or the control condition. Finally, it was predicted that participation in the online support group would result in increased perceived social support compared to either online CBT or the control condition. An auxiliary aim was to examine participant evaluations of the interventions.

**Method**

**Participants**
Participants were undergraduate students recruited from the Department of Psychology and Faculty of Health Sciences at The University of Sydney. Participants were identified using the Kessler Psychological Distress Scale (K10) as a preliminary screening measure to identify those suffering from low-to-moderate levels of psychological distress. Potential participants were excluded if they did not meet the age criteria for the study (i.e., aged 18-25), or if they were receiving mental health treatment elsewhere. In addition, those suffering from extreme levels of depression and/or anxiety (i.e., a K10 score ≥ 30) were excluded from the study and were referred to appropriate mental health services.

**Design**
Participants were randomly allocated to either a control intervention, or to one of the two experimental groups: online CBT via MoodGym or online peer support via MoodGarden. Each participant in the experimental group(s) attended five individual sessions over three weeks, with the first and the last session being spent answering questionnaires. Each session was an hour in duration, and a researcher was present to provide guidance and encouragement for the completion of the required tasks. The control group received no treatment, but they completed the questionnaires in the first and fifth session after three weeks.

**Interventions**

**Online CBT**
The MoodGYM intervention (http://www.moodgym.anu.edu.au) is a freely available self-help resource developed and produced by researchers at the Centre for Mental Health Research at the Australian National University. The program comprises five modules that cover: introduction to CBT; reducing dysfunctional thinking; overcoming negative feelings of anxiety and depression; identifying stress and relaxation; and strategies for problem solving and enhancing relationships. Participants in this condition were directed to work through the five modules over three sessions (60 minutes each). The software is designed such that modules are undertaken sequentially, and all compulsory core assessments are completed.

**Online Peer Support**
The MoodGarden intervention (http://www.moodgarden.com) is an online mental health resource offering peer-based support and information on various treatments and tools for self-man-
agement for people with anxiety, depression and related disorders. MoodGarden is based in the U.S. and operates on a non-profit basis. The Web site is run voluntarily by people who have experienced a mood disorder and currently has 6,700 members from the U.S., Canada, U.K., Australia, The Netherlands, Italy, India, Finland and the Philippines. The Web site incorporates a message board (forum with blogs and mood chart), providing the opportunity for individuals to share experiences and receive support and encouragement in coping with their problem. The forum is mediated by people who have experienced and overcome a mental health problem, and incorporates bulletins concerning lifestyle management, discussion of various effective and state-of-the-art treatments, and tools for self-management. Participants in this condition were directed to use the message board in three 60-minute sessions and to post a minimum of two messages per session by starting a new thread or replying to an existing one.

MEASURES

Kessler Psychological Distress Scale
This 10-item scale, which has been validated on an Australian population (Andrews & Slade, 2001), was used to screen for psychological distress. The scale is scored from 0 to 40, with higher scores indicating greater psychological distress.

Depression, Anxiety and Stress Scale
Changes in depression and anxiety were assessed using the DASS-21 (Lovibond & Lovibond, 1995). Respondents indicate the extent to which they experience each of the symptoms depicted in the items during the previous week on a 4-point scale (0 = Did not apply to me at all to 3 = Applied to me very much, or most of the time).

Automatic Thoughts Questionnaire
The ATQ (Hollon & Kendall, 1980) is a 30-item self-report measure examining the frequency of automatic negative thoughts associated with depression. Respondents are asked to rate each item on a 5-point scale according to how frequently each thought has occurred to them during the past week (1 = Not at all to 5 = All the time). Scores are then summed to create a total score ranging from 30 to 150, with higher scores indicating greater frequency of negative thoughts.

Cognitive Behavioral Therapy Literacy Scale
The CBT-Lit Scale, a 10-item measure based on a longer scale developed by Griffiths, Christensen, Jorm, Evans and Groves (2004), assesses the knowledge of key principles of CBT. The first two items utilize a 5- and 4-point response scale, while the remaining items have a true, false, or don’t know response option. Higher scores indicate greater CBT literacy.

Online Social Support Scale
The Online Social Support Scale (Winzelberg et al., 2000) is a four-item measure designed to assess perceived support from online support groups. Responses are made on a 7-point scale (1 = Very strongly disagree to 7 = Very strongly agree). Scores are then summed to create a total score ranging from 4 to 28, with higher scores indicating greater perceived online social support.

Participant Evaluation of the Interventions
A four-item measure was devised to identify participants’ perceptions of helpfulness and enjoyment derived from the assigned site, as well as whether participants would recommend it to others, or use it in the future. Responses were made on a 5-point agreement scale (1 = Strongly disagree to 5 = Strongly agree). Two open-ended questions were also given at post-test asking participants to evaluate the best and the worst aspects of the interventions.

Data Analysis
First, one-way analysis of variance (ANOVA) was used to compare the three groups (control vs. online CBT vs. online support) on baseline measures. The data were analyzed to determine whether the randomization procedure was effective and whether baseline differences existed between the groups. Second, analysis of covariance (ANCOVA), with each baseline assessment of the independent variable of interest as a covariate, was used to compare the three groups. We added the covariate to remove the variance in outcome that is explained by baseline scores and to detect the level of variance that is attributable to group. All effects were tested at the p < .05 level. For the two open-ended questions, responses were fairly minimal (with a maximum of 13 participants per experimental group) and as such were not formally analyzed. The statements made by participants and the broad themes identified are used in an illustrative role to support and enrich the understanding and interpretation of the quantitative findings.

Ethics Approval
This study had institutional ethics committee approval from the University of Sydney Human Research Ethics Committee. Students were given course credit for participation. Participants were advised that they could cease participation at any time and that their responses were confidential and not identifiable.

Results
A total of 39 students (mean age = 19.67; SD = 1.66) participated in the study, with 77% of the sample being female. The MoodGYM condition (11 females, two males), MoodGarden condition (11 females, two males) and control condition (nine females, five males) each consisted of 13 students. There were no significant differences between the three conditions at baseline [K10 scores: F(2,36)=.78, p=.47; DASS anxiety scores: F(2,36)=.68, p=.51; DASS depression scores: F(2,36)=1.17, p=.32; ATQ-30 scores: F(2,36)=.07, p=.94; CBT-Lit scores: F(2,36)=.92, p=.41; online social support scores: F(2,36)=2.69, p=.08]. Means and standard deviations for the three groups are presented in Table 1. As part of the ANCOVA analyses, contrasts were calculated to test for differences between the three conditions. Both online CBT and online peer support were effective in reducing anxiety compared with the control condition (online CBT versus control: t=-2.26, p=.03; online peer support versus control: t=-2.64, p=.01). CBT-Lit was improved in the
Online CBT group compared to control (t=2.35, p=.02). Online social support significantly improved for the online peer support group compared with both online CBT and control (online peer support versus control: t=2.31, p=.03; online peer support versus online CBT: t=3.62, p=.00). No other significant differences between the three groups were detected.

PARTICIPANT EVALUATIONS
Evaluations of both interventions were generally positive (see Table 2). Almost half of participants in the online CBT condition indicated that MoodGYM was helpful (46% “agree”) and that they would use this resource in the future (46% “agree” to “strongly agree”). Furthermore, almost 70% reported that they would recommend MoodGYM to others (69% “agree” to “strongly agree”). However, only about one-third of participants indicated that they enjoyed using MoodGYM (39% “agree”). In comparison, almost two-thirds of participants in the online peer support group reported that MoodGarden helped them (62% “agree” to “strongly agree”), that they enjoyed using it (62% “agree” to “strongly agree”), and would recommend it to others (62% “agree” to “strongly agree”). Comparatively, a fewer number of participants indicated they would use MoodGarden in the future (39% “agree” to “strongly agree”), with another 39% of participants being “unsure.”

From the open-ended responses, the strongest positive theme that emerged for the CBT condition was that MoodGYM allowed for the identification of negative thoughts and how to control or challenge them:

“It was a reminder that I should control my thoughts – that many of them were negative and I haven’t even realized!”

Another recurring theme was a fondness of the multimedia characters presented, which were found to be helpful in explaining concepts and mood states with humor and a personal touch:

“I like the characters that were introduced as they helped explain things well.”

However, participants complained about the perceived monotony and redundancy of the resource and the length of the material. One respondent summarized it well:

“It was tedious and repetitive … got a bit hard to stay focused.”

Two equally strong positive themes that emerged for participants in the online peer support condition were the anonymity of MoodGarden and being able to relate to others with similar experiences:

“The best thing about this resource was the fact that no one knew who I was, so I didn’t have to be embarrassed by the fact that I have certain problems that I may need help for.”

“There were lots of people out there who had the same sort of problems or worse as me and they were able to relate to me in a way that no one else could. It was comforting …”

However, a number of participants complained about the lateness of responses from forum members.

“Responses from others sometimes came in a day later which means the affected party had to wait for the next day to feel better from the advice or comments from others.”

DISCUSSION
This study aimed to examine the relative efficacy of brief online CBT intervention (MoodGYM) and an online support group (MoodGarden) in decreasing symptoms of depression and anxiety, and improving dysfunctional thoughts, social support, and CBT literacy in young adults. As predicted, participation in the online CBT intervention significantly improved symptoms of anxiety and CBT literacy. While the results were not significant for depression or dysfunctional thinking, there were positive direc-
tional changes in both of these domains for the online CBT group compared to the control group. Furthermore, the open-ended responses indicated that MoodGYM helped participants identify and control negative thoughts, suggesting that the intervention may have had a positive impact on dysfunctional thinking. With regards to the online peer support intervention, as predicted, the intervention had a significant positive impact on symptoms of anxiety and online social support. Although the results were not significant for depression, the results did show positive directional change in depression levels for the online peer support group in comparison to the control group. Furthermore, the results may have reached statistical significance in all anticipated domains if there were more participants in the study and if the timeframe of the intervention was longer. For example, “real-life” face-to-face CBT treatment usually spans twelve sessions, in comparison to this study, which only had three intervention sessions over a three-week period.

While the results for the MoodGYM condition are positive, the results from the participant evaluations suggest that we do need to take a closer look at how the content is delivered and whether its style and form of delivery encumbers the user to pursue it voluntarily to its completion. For example, more than half of participants in the online CBT condition indicated that they didn’t enjoy using MoodGYM. Indeed, previous research has reported attrition rates for MoodGYM as high as 80% and the site developers themselves have stated that they need to address the attractiveness and difficulty of the site material (Christensen, Griffiths, Mackinnon & Brittcliffe, 2006; O’Kearney, Gibson, Christensen & Griffiths, 2006). Input from focus groups may be a helpful way to move forward in making such modifications.

On the other hand, most participants indicated that they enjoyed using MoodGarden, which is consistent with current trends where people are now using the Internet predominantly to connect with other people with similar interests and experiences (Burns et al., 2010). Our findings, in conjunction with those of Houston et al. (2002), further suggest that online peer support groups may impact positively on mental health by increasing social support, thereby breaking down social isolation. A notable advantage of online support groups in comparison to face-to-face support groups is their anonymity. Individuals with embarrassing or stigmatizing conditions may find that the relative anonymity of the Internet gives them the freedom to discuss their concerns more openly (Andersson et al., 2005). One noted criticism with MoodGarden in the present study was the time delay in responses. However, live chat groups would presumably shorten the delay in responses and overcome this problem.

This study suffers from several notable limitations. Firstly, participants were undergraduate university students and thus, more highly educated than the general population. Therefore, it is uncertain whether the results of this study can be generalized to the population at large. Secondly, although a researcher was present during intervention sessions to provide guidance and encouragement for the completion of the required tasks, we were unable to record the actual number of MoodGYM modules completed or the number of MoodGarden posts made due to ethical reasons. Two other limitations noted previously, were the small sample size and the short timeframe of the study.

Despite these limitations, findings from the present research suggest that young adults with mental health problems can benefit from Internet interventions. The potential of online therapy is enormous and it may be possible to reach people who might otherwise never receive treatment. However, the findings of this study highlight several important challenges for self-directed Internet interventions in general, including how to ensure enough of the intervention is received, that users enjoy and re-

### Table 2

**Frequency and Percentage of Participants’ Responses to the Evaluation Questionnaire**

<table>
<thead>
<tr>
<th>Item</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Online CBT condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. The resource I used helped me</td>
<td>1 (7.7)</td>
<td>5 (38.5)</td>
<td>1 (7.7)</td>
<td>4 (46.2)</td>
<td>0 (0.0)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>2. I enjoyed using this resource</td>
<td>4 (30.8)</td>
<td>3 (23.1)</td>
<td>1 (7.7)</td>
<td>5 (38.5)</td>
<td>0 (0.0)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>3. I would recommend using this resource to others</td>
<td>0 (0.0)</td>
<td>2 (15.4)</td>
<td>2 (15.4)</td>
<td>7 (53.8)</td>
<td>2 (15.4)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>4. I would use this resource in the future</td>
<td>0 (0.0)</td>
<td>1 (7.7)</td>
<td>3 (23.1)</td>
<td>3 (23.1)</td>
<td>1 (7.7)</td>
<td>13 (100)</td>
</tr>
<tr>
<td><strong>Online peer support condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. The resource I used helped me</td>
<td>0 (0.0)</td>
<td>1 (7.7)</td>
<td>4 (30.8)</td>
<td>7 (53.8)</td>
<td>1 (7.7)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>2. I enjoyed using this resource</td>
<td>0 (0.0)</td>
<td>1 (7.7)</td>
<td>4 (30.8)</td>
<td>6 (46.2)</td>
<td>2 (15.4)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>3. I would recommend using this resource to others</td>
<td>0 (0.0)</td>
<td>3 (23.1)</td>
<td>2 (15.4)</td>
<td>5 (38.5)</td>
<td>1 (7.7)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>4. I would use this resource in the future</td>
<td>1 (7.7)</td>
<td>2 (15.4)</td>
<td>5 (38.5)</td>
<td>3 (23.1)</td>
<td>1 (7.7)</td>
<td>13 (100)</td>
</tr>
</tbody>
</table>

Note: Percentages are given in parentheses.
main engaged with the intervention, as well as how to enhance the sustainability of any benefits. Greater focus should be placed on providing online programs and services that are relevant and meet young peoples needs (Macdonald, 2006; Smith, Braunack-Mayer, Wittert & Warin, 2008; Burns, et al., 2010), and they should be informed and guided by young people themselves (Rickwood, et al., 2007). Further research on existing online interventions needs to be conducted over a longer timeframe (longer than three sessions), with the inclusion of a long-term follow-up to assess the sustainability of any effects.

**REFERENCES**


program on depression, vulnerability to depression and stigma in adolescent males: A school-based controlled trial. *Cognitive Behaviour Therapy, 35*(1), 43-54.


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

Juan José Santamaría1,2, Antonio Soto1, Fernando Fernandez-Aranda1,2,3, Isabel Krug2,4, Laura Forcado1, Katarina Gunnard1, Elias Kalapanidas1, Tony Lam1, Thierry Raguin1, Costas Davarakis5, Jose Manuel Menchón1,3,7 and Susana Jiménez-Murcia1,2

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-
rious games” has only recently appeared through the Serious Games Initiative in 2002. Serious game players are not just listening or watching concepts, they are actively learning (Garris, Ahlers, & Driskell, 2002), which allows them to better understand complex subject matters (Ricci, Salas, & Cannon-Bowers, 1996) and to engage more intensely in the game (Rieber, 1996). A detailed search in serious game community Web sites, general Web sites and scientific search engines revealed that at present there are 11 video games designed as a complement to psychotherapy or as psychosocial support for various illnesses. Table 1 provides a more detailed description of these video games.

Despite the recent interest in serious games, only a scarce amount of scientific publications have systematically assessed the effectiveness of video games as a new therapeutic tool. The aim of the present review, therefore, is to systematically assess the literature on serious games and their effectiveness when employed as a complementary or psychological support in the treatment of medical or psychological illnesses.

**METHOD**

We searched in scientific databases, specifically, PSYCINFO, MEDLINE, SICENCEDIRECT and BIOMEDCENTRAL, for all the scientific papers written in English or Spanish which were published in peer-reviewed journals up until October 2010. The list of search terms included: video games, serious games, psychological, treatment, health support, and psychosomatics, as well as the combinations of these terms. In each of the two databases we searched using more than 36 combinations of

<table>
<thead>
<tr>
<th>Game</th>
<th>Topic/Aim</th>
<th>Goal</th>
<th>Techniques</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free Dive</td>
<td>To distract children who undergo frequent and often painful medical procedures and to bring joy to chronically ill children.</td>
<td>Relaxation Pain management</td>
<td>Distraction techniques</td>
<td></td>
</tr>
<tr>
<td>Personal Investigator</td>
<td>To help adolescents with mental health problems (e.g., depression, anxiety and poor social skills) to overcome such difficulties.</td>
<td>Learn social skills Problem solving Facilitate interaction between therapist and adolescent</td>
<td>Problem solving Solution-focused therapy</td>
<td><a href="https://www.cs.tcd.ie/David.Coyle/personalInvestigator.htm">https://www.cs.tcd.ie/ David.Coyle/personalInvestigator.htm</a></td>
</tr>
<tr>
<td>Treasure Hunt</td>
<td>Designed for 8 to 12-year-old children who are in cognitive-behavioral treatment for various disorders.</td>
<td>Increase motivation for homework trough electronic homework psychoeducation</td>
<td>Based on principles of cognitive behavior modification</td>
<td><a href="http://www.treasurehunt.uzh.ch/">http://www.treasurehunt.uzh.ch/</a></td>
</tr>
<tr>
<td>unnamed video game</td>
<td>Designed to deal with highly aggressive students.</td>
<td>Reduce aggressive behaviors</td>
<td>Includes attribution re-training core theoretical principles as the sole intervention</td>
<td>-------</td>
</tr>
</tbody>
</table>
words. Furthermore, we also performed manual searches of the references cited in the selected papers.

**Selection of Studies**

A total of 35 papers were eligible for inclusion. Papers were selected if: (a) they included the terms “serious game” or “video game” to describe their software, and (b) they were designed with the goal to complement or support treatments of patients with physical or psychological illnesses. The papers that were excluded were: (a) written in languages other than English and Spanish, (b) not published in peer-reviewed journals, (c) used multimedia programs that were not video games, (d) employed video games that were not targeted or designed to complement or support treatments, and (e) utilized Virtual Reality (VR). No restrictions were made regarding the gender and age of the participants, the type of sample, or the kind of measures used. We systematically reviewed the papers to determine whether they fit the inclusion criteria and assigned reasons for exclusion. Only a total of nine papers, all of which were written in English, fulfilled all the inclusion criteria and were included in the final systematic review.

The games assessed in the nine studies were: Re-Mission, used in three studies (Beale, Kato, Marin-Bowling, Guthrie, & Cole, 2007; Kato & Beale, 2006; Kato, Cole, Bradlyn, & Pollock, 2008); Personal Investigator in three studies (D. Coyle, Doherty, & Sharry, 2009; D. Coyle & Matthews, 2004; D. Coyle, Matthews, Sharry, Nisbet, & Doherty, 2005); Treasure Hunt in one study (Brezinka, 2008); Play Attention in one study (Walker & Bardos, 2008); and an unnamed video game in one study (Hobbs & Yan, 2008). Table 2 outlines these studies in more detail. The experimental studies used these games, which were designed to target aggressive adolescents. The descriptive study used the Play Attention platform.

**Re-Mission**

Three studies used the Re-Mission game, which is described in more detail in Table 2. This game was first described in the literature by Kato and colleagues in 2006 (Kato & Beale, 2006), who studied the acceptability of an action video game as a tool for learning about cancer and self-care during treatment in a sample of 43 adolescent and young adult oncology patients. The study found that a high percentage of these patients viewed the game as an acceptable psychotherapeutic tool. The study demonstrated that video games could be a useful tool in helping cancer patients to improve their knowledge about the illness. However, it should be noted that in this first study the author tried to measure the acceptability of a hypothetical cancer-related video game in adolescent and young adult cancer patients. Re-Mission was not directly tested.

A year later a multi-site, randomized, controlled study (Beale et al., 2007) assessed 375 adolescent and young adult cancer patients. The purpose of the study was to investigate how a video game, Re-Mission, involves young patients in their own treatment. During the experimental trials players played a small part of the Re-Mission game. The authors found that the information and experience gained from playing Re-Mission significantly improved the patients’ self-esteem, and knowledge of cancer. The effectiveness was measured in terms of cancer-related knowledge. Those who played the Re-Mission game during the experimental trials (Re-Mission group) gained more knowledge than those who didn’t play the video game (control group).

In the last study Kato and colleagues (Kato et al., 2008) assessed a population of 375 male and female cancer patients. They tried to determine the effectiveness of a video game intervention for improving adherence to treatment, self-efficacy and knowledge about illnesses of adolescents and young adults with malignancies including lymphoma and/or leukemia. The authors confirmed that patients who played Re-Mission improved adherence to treatment, self-efficacy and knowledge about cancer more than the control group, who had played a commercial video game.

**Personal Investigator**

As reflected in Table 2, Coyle has tested the Personal Investigator game in three studies (D. Coyle et al., 2009; D. Coyle & Matthews, 2004; D. Coyle et al., 2005). The aim of Personal Investigator is to involve children and the therapist in a more comfortable and structured therapeutic session. In Personal Investigator children play the role of a detective who has to solve different situations in the game related to different mental problems such as depression, anxiety or problems with social skills. The first paper (D. Coyle & Matthews, 2004), is a descriptive study. In this paper the authors describe the initial applications of the video game, highlighting the potential of video games to engage children in new methods of treatment that combine traditional psychotherapy and new technologies. Initial testing, including therapists’ and gamers’ feedback, has indicated that 3-D video games are useful because they allow teenagers to attend to therapeutic sessions aimed at preventing distraction and boredom. However, taking into account that it is a descriptive paper, it is hard to make any firm conclusions.

In the second study, Coyle and his colleagues present a pilot trial where Personal Investigator (D. Coyle et al., 2005) has been found to help four adolescent patients with anxiety and behavior problems, attempted suicide, and social skills difficulties to engage in therapy and to help therapists to develop their therapeutic relationship with these clients. The patients showed improvements in their self-esteem and problem solving skills. Furthermore, the adolescents benefited from the 3-D environment, in that they had a sense of control and empowerment during the game. A case study, where a patient found that the video game helped her to reach her goals, is also presented. The open structure of the game (players can go to any part of the game in the order they choose) allowed the players to pace their investigation and to control the different therapeutic tasks. Consequently, better communication between the therapist and the adolescent was reported.

In the third study (D. Coyle et al., 2009), the authors describe
the results of a larger study where eight therapists give their feedback on Personal Investigator after it had been tested on 22 patients. The results are similar to the previous study (D. Coyle et al., 2005). The feedback from the therapists, in the form of questionnaires and the diverse case studies, show that Personal Investigator can serve as a useful icebreaker in assisting with the client–therapist relationship. Furthermore, it also helps to structure sessions and offers the potential to assist in engaging adolescent clients in therapy.

**Treasure Hunt**

In one study, Brezinska (2008) has presented another serious game, Treasure Hunt. This video game is designed to support the cognitive-behavioral treatment (CBT) of children and adolescents of divorced parents. The objective of the study was to test the acceptability and the playability of this cognitive-behavioral based video game. In a pilot version of the Treasure Hunt video game, therapists used the game to support therapy for different disorders such as anxiety disorders, depression or behavioral disorders. Results revealed a positive reaction of the patients playing this game. Children have found to appreciate the game and its diverse tasks. Furthermore, the game can also help less experienced therapists to structure sessions and to explain important cognitive-behavioral concepts. The author emphasizes that these initial findings are interesting but clarifies that it is premature to draw conclusions about the effectiveness of this video game, since the game is a pilot version and there is a need to test it in a greater sample.

**Unnamed Video Game**

An unnamed video game has been designed to deal with highly aggressive students. In the paper outlined in Table 2 (Hobbs & Yan, 2008), the authors examined the impact of a video game-based intervention on children’s cognitive, emotional and behavioral aspects of aggression. Three students, who were randomly chosen from a pool of 10 elementary school students and who were identified as being highly aggressive towards peers, participated in the study. The game-based intervention was composed of three phases: a baseline phase, intervention phase and return-to-baseline phase. The results of the study showed that, while there were substantial individual differences, the intervention especially affected the cognitive and behavioral aspects of aggression among the three aggressive students. The researchers expected that a longer period of intervention could decrease aggressive behaviors, highlighting the potential of game-based interventions. The results are promising but more studies are needed to clarify the effectiveness of an aggressive intervention game.

**Play Attention**

The study by Walker and Bardos (2008), detailed in Table 2, describing the Play Attention System, designed an attention training system to help young users with attention disorders. A variety of different games were designed to display attentive state in real time. Users control the flow of play using their brain waves, a mouse and a keyboard. The images on the screen provide feedback to the users about their attentive state. For Play Attention to be effective, the presence of a coach is needed to motivate the user to stay on task. There are no final conclusions about Play Attention because it hasn’t yet been tested in experimental trials. Even though the system should be supported by scientific studies, Walker and Bardos (2008) summarize that Play Attention has great potential for therapeutic use.

**Discussion and Conclusions**

Although the results of the published articles emphasized that video games can be a useful tool to support treatments of patients with physical or psychological illnesses, several internal methodological and development related shortcomings limited their conclusions.

**Effectiveness of Serious Games for Therapy**

Although there is a lack of controlled trials in the literature, the first findings of the reviewed studies showed positive results and that the inclusion of an additional serious games strategy was beneficial for the general treatment outcome. All the serious games included in the review affected players in different ways. Based on the existing literature, serious games seem to be helpful for children, adolescents and young adults to improve: (a) specific positive attitudes (namely self-esteem, problem solving skills, and emotional regulation); (b) knowledge about different illnesses; and (c) adherence to treatment. In general terms, authors highlight the great potential of using video games, specifically if they have been designed to target specific needs of patients and clients (D. Coyle et al., 2009; D. Coyle et al., 2005). However, firm conclusions are premature because the field of serious games is relatively new and the contribution of further studies is therefore needed to enhance the knowledge of video games and the mechanisms through which they improve the outcome of patients suffering from various illnesses.

**Development of Useful Video Games for Psychological Support**

Up until now, one important limitation was that the type of programming language used only allowed developers to create graphically and technically simplistic serious games (D. Coyle, 2008). Another limitation is the medium to low resolution of artistic assets, simplicity of the game mechanics and overall play experience compared with mainstream video game products. Creating more complex and technically advanced serious games will become expensive and beyond the reach of most researchers. Furthermore, most of the video games, except Re-Mission, have been developed with simplistic graphic 2-D or 3-D rendering engines, which allowed the games to capture only a few emotional and attitudinal vulnerabilities. When compared with less realistic games, it is expected that more advanced and realistic 3-D environments may produce a higher degree of player involvement and higher emotional responses, and therefore, more adherence to therapy (Gorini, Griez, Petrova, & Riva, 2010). In our opinion it is therefore necessary to develop new serious production forms to reduce time and production costs. When designing and creating serious video games for health, multidisciplinary teams (technicians, health professionals and industry) should be involved in developing video games to ter-
<table>
<thead>
<tr>
<th>Study</th>
<th>Video Game Name</th>
<th>Sample</th>
<th>Measures</th>
<th>Result</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brezinka (2008)</td>
<td>Treasure Hunt</td>
<td>---</td>
<td>---</td>
<td>* Several therapists reported using the game as reinforcement.</td>
<td>* Video games have the potential to enhance child compliance, offer attractive homework assignments, structure therapy sessions and support treatment. Some cognitive behavior techniques could be incorporated into a video game. A video game about cancer is acceptable to the majority of adolescent and young adult cancer patients. A video game might be a useful tool for pediatric oncology to improve understanding and use of self-care during treatment.</td>
</tr>
<tr>
<td>Kato and Beale (2006)</td>
<td>Re-Mission</td>
<td>N= 43 males/females Age Range: 13-25</td>
<td>* Demographic and medical questionnaire * The short form of WAI * NEO-FFI * Purpose-designed questionnaire on patients' use of video games and the acceptability of a game on cancer in particular</td>
<td>* No association between willingness to play or interest level and relevant personality variables.</td>
<td>* A behaviorally targeted video game intervention can enhance adherence to treatment. A video game-based intervention can have a positive impact on treatment-relevant behaviors and outcomes in a patient population with a serious life threatening illness. A carefully designed video game can have a positive impact on health behavior in young people with chronic illness.</td>
</tr>
<tr>
<td>Kato et al. (2008)</td>
<td>Re-Mission</td>
<td>N= 375 males/females Age Range: 13-29</td>
<td>* Adherence to treatment was greater in the intervention group. * Self-efficacy and knowledge also increased in the intervention group. * The intervention did not affect self-report measures of adherence, stress, control, or quality of life.</td>
<td>* A behaviorally targeted video game intervention can enhance adherence to treatment.</td>
<td>* Personal Investigator confirmed improvements in engagement and motivation of the patient, an increase in enjoyment of the sessions and a more rapid development of a therapeutic relationship.</td>
</tr>
<tr>
<td>Coyle et al. (2004)</td>
<td>Personal Investigator</td>
<td>3 therapist feedback 4 young patients feedback 1 case study Age: 13 years</td>
<td>* Feedback</td>
<td>* Heightened engagement, motivation of the client using computer games in therapy. Increased enjoyment in the sessions and a more rapid development of a therapeutic relationship.</td>
<td>* Video games improve the patient-therapist relationship, help in structuring sessions and serve as a useful ice-breaker.</td>
</tr>
<tr>
<td>Coyle et al. (2009)</td>
<td>Personal Investigator</td>
<td>8 therapist feedback 22 patients 2 case studies Age Range: 10 - 16</td>
<td>* Purpose-designed questionnaire about helpfulness of the video game in the therapy and about feedback of the therapists</td>
<td>* Therapist agreed that Personal Investigator had a positive impact in the sessions. * No negative ratings were given on any scale.</td>
<td>* Video games improve the patient-therapist relationship, help in structuring sessions and serve as a useful ice-breaker.</td>
</tr>
<tr>
<td>Walker and Bardos (2008)</td>
<td>Play Attention</td>
<td>---</td>
<td>---</td>
<td>* No empirically-based articles available to support any of the claims. * The interactive nature and appeal overcome the first negative impressions of Play Attention. *The system may be far too expensive for schools and programs with a tight budget.</td>
<td>* There is no scientific evidence but Play Attention seems to be a product with great potential.</td>
</tr>
<tr>
<td>Hobbs and Yan (2007)</td>
<td>unnamed game</td>
<td>---</td>
<td>* Purpose-designed questionnaire</td>
<td>* There are individual differences in responses. * Improvement on the aggressive students' prosocial attribution. * Not much change in aggressive emotion and aggressive behavior.</td>
<td>* A video game improved the aggressive students' prosocial attribution but did not change aggressive emotion and aggressive behavior much.</td>
</tr>
</tbody>
</table>
get the specific needs of patients and clients, while considering their specific clinical and personality traits. When dealing with patients, negative side effects have special relevance and must be taken into account (e.g., previous suicidal tendencies, vulnerabilities to addictive behaviors, depressive symptomatology), therefore the characteristics of the most suitable setting have to be carefully analyzed before designing a serious video game (e.g., outpatient vs. inpatient, hospital setting vs. at home, individual vs. multiple-player) (Wilhelm & Grossman, 2010).

Increasingly, more research is being conducted to develop more cost-effective serious games for health. Projects like Playmancer (Conconi et al., 2008; Jimenez-Murcia et al., 2009; Kalapanidas et al., 2009), for example, are trying to solve these problems, while creating a platform capable of helping patients manage their reactions and emotional states, through recognition using body motion capture, and high-level fusion-based emotion recognition from bio-signals, speech signal processing and facial expression recognition, as suggested in recent studies (Wilhelm & Grossman, 2010). The researchers involved in Playmancer, involving therapists and game developers working together, are working to conduct a complete development process (design, program and test) and empirical evaluation of a serious game for health. The purpose of this project is to analyze the efficiency and effectiveness of using a new generation of 3-D serious video games as an additional therapy tool for treating severe mental disorders (namely eating disorders and impulse control disorders), addressed to self-control and emotional regulation skills (Jimenez-Murcia et al., 2009).

Playmancer games are based on a CBT model (Butler, Chapman, Forman, & Beck, 2006), which usually takes into account attitudinal, behavioral, cognitive and emotional processes in individuals who are interacting with the environment (several Islands scenarios). In this project the purpose of knowing the attitude and motivation of individual’s actions is crucial. Therefore, when selecting and designing the specific scenarios, personality, attitudinal and motivational processes were taken into account (e.g., generating emotional states, such as frustration, anger, physiological activation, and relaxed states).

Although controversial in the literature (Wilhelm & Grossman, 2010), in our case, to maintain the patient’s security and facilitate the assessment of user requirements, Playmancer is conducted in the hospital setting where therapists supervise and control the patient’s performance (e.g., time of gaming, organization of sessions and leading players to achieve the treatment goals). Newly developed serious video games created to address complex mental disorders, as in our case, should include the role of the therapist in order for the game to become a new tool to implement classical treatment. The therapists’ aim should be to provide motivation and a well-oriented treatment, as well as to decide on the best setting and conditions in order to avoid additional side effects.

**LIMITATIONS OF EXISTING LITERATURE**

Even though serious games have been found to improve patient knowledge and facilitate behavioral improvements for patients with diverse mental and medical problems, it should be acknowledged that the literature on the effectiveness of these type of games is scarce and suffered from several limitations including: (a) methodological shortcomings (including small sample sizes, inappropriate or no control groups, an overrepresentation of male participants, perhaps because video games appeal more to men than women, and a lack of more objective evaluation measures in addition to questionnaires to capture changes, such as physiological reactions); (b) most studies did not control for influencing factors (such as anxiety, depression or other psychological factors frequently associated with the majority of illnesses assessed in the diverse studies) and it is therefore likely that...
these factors could have mediated intervention effects on the outcomes; (c) in the development of the video game’s clinical and psychopathological features of end users were rarely considered, when defining duration of the games used, usability, assessment, etc.; and (d) there is a lack of existing literature about how serious games affect adult clinical populations. Most of the papers published in the scientific literature about the use of video games are related to children and adolescent populations, indicating a significant research gap in the development of serious games for adults, especially since the average age of video game players, and therefore their therapeutic potentiality, has increased during the last years (ESA, 2009; ISFE, 2008).

In conclusion, this review has shown that specific video games motivate children, adolescents and young adults to learn more about their illnesses, to adhere to treatment and/or to enhance specific individual attitudes and behaviors. Additional controlled research is needed to define the specific psychological mechanisms involved in the improvement processes of patients and to learn more about how a game-based approach affects health behaviors. Therapists and game designers should work together to create a complex and technically advanced core of serious games supported by scientific studies that confirm the usefulness of this tool as a new wave of treatment or support of classical psychological therapies.

Acknowledgements
Financial support was received from Fondo de Investigación Sanitaria - FIS (PI081573) and AGAUR (2009SGR1554). It was also partially supported by the European Commission under the Seventh Framework Program (FP7-ICT-215839-2007- Playmancer project) and IK was supported by a Marie Curie Intra European Fellowship within the 7th European Community Framework Programme (2009-254774). CIBER Fisiopatología de la Obesidad y Nutrición (CIBERobn) and CIBER Salud Mental (CIBERsam), are an initiative of ISCIII. This work is part of the PhD dissertation of Juanjo Santamaría at the School of Psychology, University of Barcelona, Spain. We want to thanks the support from EU Playmancer consortium and MobiHealth B.V. (Enschede, The Netherlands).

REFERENCES


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

Jemma Darcy1, Viv Brunsden1 and Rowena Hill1

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

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research (Brownlow & O’Dell, 2002; Eysenbach & Till, 2001; Pittenger, 2003). The present study adhered to guidelines proposed by Eysenbach and Till (2001) which have been widely utilized (Fleischmann, 2005; Mulveen & Hepworth, 2006; Poon, Ho, Wong & Wong, 2005). A purposeful sampling strategy was undertaken to obtain information-rich data of relevance for the research question (Patton, 2002). Data was collected for 95 days and all threads initiated by a friend or family member during this time were retained in their entirety for analysis – a sampling strategy based on work by Suzuki and Calzo (2004). This resulted in 52 threads which contained 487 postings from 82 users, all of which were included in the interpretative phenomenological analysis, conducted in accordance with Smith (1999).

**Findings**

A single superordinate theme emerged: “gaining a different perspective.” The board users expressed that it was both educational and informative to gain the perspectives of other caregivers and also of those who had experienced mental ill health. These different, but resonant, perspectives helped contextualize their own experiences and their caregiving role. This superordinate theme consisted of three subordinate themes: “insights into mental ill health,” “an insider viewpoint,” and “rediscovering hope.”

**Insights into Mental Ill Health**

Board users explicitly sought others’ perspectives on mental health issues in order to gain insight into their own circumstances and those of the people they cared for. The lack of personal experience of mental health issues generated a lack of confidence regarding the best care to offer:

“We just don’t know how to deal with the situation. Should we be angry with him? Should we pamper him?” (User 22)

Many users described their despair in relation to the deterioration of their loved one’s mental health and emphasized feelings of utter helplessness and a need to know more. Here, User 60’s mother had been hospitalized with suspected dissociation/depersonalization:

“Is anybody able to give any insight as to how it feels when you are going through this? There is no way mum can explain, she can’t even hold a conversation now…” (User 60)

By relaying concerns to the board, responses were elicited that included in-depth descriptions of mental ill health from users who had previously experienced this:

“I think it’s different for a lot of people, but for me, it was sort of like I was in a swimming pool and everyone else was outside the water. Like I existed in a different state to everyone else…I felt like something was watching me, planning to harm me…I think it’s really hard to understand.” (User 7)

The provision of first-hand experiential accounts offers different, previously inaccessible perspectives and facilitates understanding in caregivers. In-depth descriptions enable the development of insight into the inner nature of the condition, yet at the same time reassure that it is also acceptable to feel confused and bewildered. The majority of such descriptions provided detailed visions of what it is like to experience mental ill health. However, users would also offer advice based on their experiences of receiving care:

“One thing that I would advise is that it’s sometimes really horrible to be touched when you are in that state, so it’s probably best to check with her if you’re going to hug her or anything.” (User 7)

Gaining insights into the emotions and internal struggles that their loved ones might be experiencing helped caregivers to deal with their own experiences, both in terms of their encounters with particular conditions and their own caregiving:

“This site has helped me loads…it has given me so much more of a clearer understanding of what my hubby and our family as a whole go through and when things are tough there is always someone who can give me an understanding of how my hubby is feeling.” (User 13)

Emotional well-being was enhanced as a result of the insights gained from the board. The realization that other families were similarly affected reduced feelings of isolation and frustration, increasing control:

“We all find things easier when we know what we are up against.” (User 38)

The insights gained from board participation were generated by the sharing of perspectives very different from one’s own initially confused perspective.

**An Insider Viewpoint**

For many board users this was their first experience supporting someone with mental health issues. For others, the interaction with their friend or family member was their main source of contact with the real world, with their isolation appearing to stem from a lack of others’ understanding about mental health issues. Participating in board discussions enabled access to those who had previously experienced, or were currently experiencing, mental ill health themselves. These users were empathic towards the postings from caregivers, offering support regarding specific situations:

“I know it must be very hard for you to see your son like that…in some ways, I sometimes think it’s worse for people around us, because they don’t know what we’re going through and it must be so worrying.” (User 23)

Users clearly valued being asked to share their experiences of mental ill health:

“I think it’s really cool that you’re asking us rather than just lis-
tening to the doctors…I think listening to the people who have actually gone through this makes sense.” (User 7)

Caregivers used these different perspectives to realign their own experiential understandings. They could detail their own problematic experiences and receive responses that either provided affirmation for, or gave novel viewpoints on, their own situations. Here User 44, who experienced mental ill health, gave a vivid account of how his family relationship stopped his suicidal intentions:

“Wed-5 a.m. in the morning and the phone wakes me up…my Wife has had a fall, is bleeding a lot and is on her way, unaccompanied, to A&E. I meet her at the hospital and I take up my role as her advocate and communicator (she is unable to speak or write due to a neurological illness). I am needed…it fires me up and I forget my health issues and concentrate on getting her seen and discharged back into the nursing home. I drive her back, get her settled and off to sleep for a much needed rest. I come away and sit here feeling exhausted but elated. I was needed. I had a role. I hope this helps anyone who feels close to ending their life.” (User 44)

Caregivers expressed great appreciation for posts from those who had experienced ill health, for allowing them the opportunity to see events from the other side:

“I would like to say a big thank you for your posting. My hubby always thinks he is not needed (part of his illness, I think) and no matter how many times I tell him he is, it doesn’t actually connect until it actually happens. Even the slightest things can give him such joy if he has done them for me and our kids and although I understand why, reading your post has helped me REALLY understand why.” (User 13)

Such posts provide encouragement to users regarding the ways in which they could offer support. Caregivers could struggle to know how best to approach certain situations and board users provided advice based on their own personal experiences:

“Do you wait ‘til you get angry before you speak to her, or do you try and speak in calmness? Do you get visibly frustrated when she refuses help? Cos none of these things help.” (User 23)

In the following exemplars, User 53 is responding to a post from a woman whose husband suffered from mental ill health and had left her, leaving her questioning her own contribution to those circumstances.

“I read what you said about your husband and I understand both your confusion and pain and his need to shut you out (I think).” (User 53)

This non-judgemental response was representative of the position taken in the majority of posts. The post continued, sharing personal experiences of both mental ill health and encountering “support,” and offering a different perspective that enabled a situation to be redefined more positively:

“Maybe this perspective could help you? Your husband’s rejection is NOT about YOU. I imagine it’s more about what he fears you expect of him, and his realization that he’s burdened you. Please know that he has not made it about you as a couple from all else you’ve said – that, to be brutally honest, is YOUR perception that you are bringing to the mix. Take that burden off the relationship and see what a difference it will make…” (User 53)

Such straightforward and open expressions were rife among postings but appeared to be positively received despite their brutal frankness. The shared experience appeared to clarify uncertainties, reduce frustration and offer new routes forward.

**Rediscovering Hope**

Caregivers regularly posted on the discussion board in times of dire distress, describing their negative experiences of caregiving and expressing feelings of hopelessness:

“I feel like I’m banging my head on a wall and screaming HELP HELP! Please someone must know who can help…” (User 39)

Such posts expressed sadness and despair at the contemplation of the future and whether recovery was ever possible:

“I must admit I’ve wondered if this is it. Is this all we have to look forward to?” (User 22)

Posts such as these were always responded to supportively, either by offering general philosophical advice and coping strategies, or through the description of personal experiences:

“I have the same story as you. Four years ago my husband started with depression. Eventually he left me. He always told me he loved me and would be back when he got himself sorted. He turned up at my doorstep in a really bad way…He eventually told me the reason he left. It wasn’t because he didn’t love me. It was because he did. He knew he was ill and didn’t want to put me or the children through it. He thought he could fix it himself. He just didn’t realize how ill he really was.” (User 13)

The recounting of similar caregiver experiences, but ones which end with positive outcomes, not only reassures by reducing isolation but also offers hope that positive outcomes might occur elsewhere:

“Thank you so much for that reply…It really helps to know that his behavior isn’t totally unheard of. I can only hope that given time he will turn up on my doorstep too…” (User 75)

Board users who had experienced mental ill health themselves were also eager to share their positive stories and provide hope:

“It does get better. Your son will not always be this way. People...
do recover and have a better life. I too was once very de-
pressed/suicidal and attempted to take my own life. I was se-
tioned and now I’m recovered and take it one day at a time. I
function normally, take care of myself, even got married. I hope
it helps to know that this will pass. Just give him time.” (User
20)

“I’ve been using services for my mental health issues for 19
years, and it’s not stopped me living, in fact, my dissatisfaction
led me to studying and working in community mental health,
and for the last five years running a service for carers and fam-
ilies of people with mental health issues. It’s not the end of the
road, give people driving lessons and a sat nav, mental health
issues are just a roundabout with poor road signs!!!” (User 27)

The hope gained from board interactions was not merely a pas-
tive craving for recovery. Instead hope generated positive action
to improve immediate circumstances:

“You have restored my hope and I thank you for that. I’ll cer-
tainly take your advice and visit the library and your recom-
manded Web site. I’ll also investigate the CPN. Nobody has
ever suggested that to us before. My son has an appointment to-
morrow with the psychiatrist. I usually go but wait in the waiting
room. I think this time I’ll go in…I’ll ask about the CPN. I think
that would really help.” (User 22)

Taking action prevents hope from becoming the burdensome
yearning for potentially impossible futures and instead translates
it into a motivating force to assist current coping and a buffer
da against despair. The diverse variety of optimistic accounts of-
fering hope encouraged a more positive reflection on personal
experience and current difficulties.

**Discussion**

The analysis revealed the importance of online support for en-
abling caregivers to access others’ perspectives. These alter-
native viewpoints illuminated and contextualized their own
intensely personal experiences. As found elsewhere, the board
was used as an alternative to family and professional support
(Gooden & Winefield, 2007) and enabled understanding, insight
and perspective on the issues faced by people with, or encoun-
tering, a particular disorder (White & Dorman, 2001). Care-
givers seeking alternative perspectives, whether explicitly or
implicitly, had not experienced mental ill health themselves and
were unsure how to best offer support. They used the board to
gain insights into mental health conditions and to deepen their
understanding of their own caregiving. Eliciting perspectives
from both caregivers and those who experienced mental ill
health were equally important as these facilitated insights that
could not be otherwise accessed. Board users were extremely
willing to share intimate and extremely personal information
and this willingness to offer supportive disclosure online has
frequently been seen elsewhere (Walther, Gay & Hancock,
2005). Mental ill health is well recognized as eliciting stigma-
tized and discriminatory responses (Royal College of Psychia-
trists, 2001; Rüsch, Angermeyer & Corrigan, 2005), but the
anonymity of online boards allows those with experiences of
mental ill health to offer candid advice to caregivers and to de-
tail personal experience without risking personal psychological
safety (White & Dorman, 2001).

Caregivers used the elicited alternative perspectives to inject a
sense of hope into their own personal experiences. The disclo-
sure of personal difficulties would bring forth accounts of sim-
ilar struggles, but ones which had been successfully dealt with
providing the possibility of optimistic futures. Intimate self-dis-
closure assists users in forming positive online social relation-
ships and has been found to occur at higher rates on support
forums than on more general boards (Barack & Gluck-Ofri,
2007). Sharing experiences in this way can be used to provide
hope to others (Klemm, Hurst, Dearholt & Trone, 1999), in-
creasing shared identity and reducing isolation (Steffen, 1997).
Positive emotions like hope have been suggested to buffer
against stress (Grote, Bledsoe, Larkin, Lemay & Brown 2007;
Irvin & Acton, 1997) and discussion boards offer an ideal
medium for sharing experiences in order to strengthen these
emotions. The relative permanence of postings means that, un-
like face-to-face support, experiences are also accessible to oth-
ers not directly engaged in any given interaction. It is difficult
to determine whether those who merely read posts benefit in the
same way as active participants, however, it has been suggested
elsewhere that lurkers do still gain support from this more pas-
sive access of shared experience (Pittenger, 2003; Preece, Non-

As found elsewhere, the disclosure of personal difficulties also
facilitated the learning of new coping strategies (Perron, 2002).
Evidence suggests that psycho-education is an extremely effec-
tive tool for both those experiencing mental health problems
and their caregivers (Department of Health, 2008). The discus-
sion board’s combination of emotional support and practical ad-
vise helped caregivers to redefine their experiences and review
their coping resources. Being informed allows one to feel more
in control and this empowerment subsequently reduces the
stresses associated with caring (Joinson, 2003).

**Conclusion**

On a general level, this study supports and adds to the growing
body of evidence highlighting the advantages of health-related
online discussion boards. More specifically, it emphasizes the
benefits of such boards for mental health caregivers. It is clear
that particular benefits accrue from boards which involve both
caregivers and those who have experienced ill health, particu-
larly through the provision of novel perspectives. The partici-
pation of both groups facilitates the development of holistic
understandings, exchanging confusion for meaning-making.
This suggests that mental health practitioners should encourage
the use of such boards amongst their clients’ caregivers in order
to benefit the health and well-being of both groups.
REFERENCES


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

Mimi M.Y. Tse¹, Allen Cheong¹ and Rincy Leung¹

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.

Keywords: Environmental Safety, Community-dwelling Elders, Computer-based Technical Approach, Education, Community-based

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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The objectives of the ESAP were as follows: 1) to increase awareness of actual and potential hazards in daily living and the surrounding environment; 2) to identify safety measures in activities of daily living; and 3) to formulate suggestions and solutions to overcome actual and potential hazards in daily living and the surrounding environment.

**Methods**

**Design and Sample**

This research was a quasi-experimental pre- and post-test control group design. After gaining approval from the Ethics Committee of the university, two community elderly centers were approached and older adults were invited to join the ESAP through simple randomization. One elderly center was randomly selected as the experimental group, receiving the ESAP, and the other as the control group, without the ESAP. The participants were recruited by convenience sampling. Center members who met the inclusion criteria and were willing to complete the ESAP were recruited through posters and promotion by the centers’ staff at monthly meetings.

Written consent was obtained from all participants. Inclusion criteria for the participants included being 60 or older, having the ability to communicate in Cantonese, being cognitively intact based on the Mini-Mental Status Examination (MMSE) (score > 23), and willingness to participate in the four-week ESAP program.

**Four-week Environmental Safety Awareness Program (ESAP)**

The four-week ESAP consisted of four lessons conducted by a registered nurse, including education on the normal aging process, safety issues in different settings, and recommendations for modification. The ESAP was divided into the first lesson on the home safety issue, including current e-news about home incidents from the Internet; the second lesson on the community safety issue, which included digital photos on potential hazard-inducing factors in the community from the Internet; the third on daily living safety issues, which included different signs and symptoms and prevention of weather-related illnesses like heatstroke and food poisoning; and the fourth lesson for revision and a summary of the home, community and daily living safety issues, using digital photos from the Internet to initiate discussion.

**Procedure**

Information regarding participants’ demographic characteristics and cognitive status was assessed by the MMSE, their sense of balance was assessed by the Berg Balance Test, they were tested using the timed “Up and Go” test, and vision acuity data were also collected. A personal safety awareness test was also administered to both groups in weeks one (pretest) and four (post-test) by asking participants to review a set of digital photos and three video clips, and identify the immediate and potential hazards. Older adults in the experimental group were invited to join the four-week ESAP, while those in the control group continued their usual activities in the elderly center without the ESAP. Post-test data were collected upon completion of the ESAP for the experimental group, and the control group also received a post-test at week four. The contents and expected outcomes of the ESAP are listed in Table 1.

<table>
<thead>
<tr>
<th>Week</th>
<th>Contents</th>
<th>Expected Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Home Safety</td>
<td>Participants are able to verbalize potential risk factors at home.</td>
</tr>
<tr>
<td></td>
<td>- Current local newspaper clipping sharing from the Internet on home hazards</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Education on relationship and importance between aging and safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Digital photo sharing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Suggestions on home modification</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Community Safety</td>
<td>Participants are able to verbalize possible community hazards.</td>
</tr>
<tr>
<td></td>
<td>- Current local newspaper clippings on accidents that have occurred in the community</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Physiology between nervous system, aging and musculoskeletal system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Case study on digital photos in the community with potential safety hazards</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Daily Living Environmental Safety</td>
<td>Participants are able to verbalize how to prevent heatstroke and hypothermia.</td>
</tr>
<tr>
<td></td>
<td>- Newspaper sharing of incidents that have occurred in different weather conditions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Education on heatstroke and hypothermia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Education on food safety</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Summary</td>
<td>Participants are able to verbalize safety measures in their daily living.</td>
</tr>
<tr>
<td></td>
<td>- Education on correct choice of shoes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Education on drug safety</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Education on proper use of walking aids</td>
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</tr>
</tbody>
</table>

**Outcome Measurements**

The measurements included knowledge and awareness of personal and environmental safety. The participants’ knowledge was measured by correctly identifying potential hazard-related items shown in digital photos and videos before and after the ESAP. Their awareness of personal and environmental safety at home and in the community was assessed by self-evaluation on a 0-10 point scale before and after the ESAP.

**Data Analysis**

Several statistical methods were used in the data analysis. De-
Descriptive statistical analysis of the quantitative data was conducted using the Statistical Package for the Social Sciences (SPSS), version 15, 2006. The Chi-square test was employed to determine differences within the experimental and control groups, while the independent sample and paired sample t-tests were used to examine differences between the experimental and control groups in terms of safety knowledge and awareness. A p-value <0.05 was considered statistically significant.

**RESULTS**

**DEMOGRAPHIC DATA**
A total of 66 older people participated in this study – 40 in the experimental group and 26 in the control group. The mean ages were 75.15±6.99 S.D. and 74.04±13.62 S.D. in the experimental group and the control group, respectively. Table 2 shows the demographic data for this study. There were no significant differences in gender, marital status, education level and financial status between the experimental and control groups. Most of the participants in both the experimental group (65.0%) and the control group (65.4%) lived in public housing estates. However, the majority of the participants in the experimental group lived with their spouse (30%), while a higher number in the control group lived with their children (53.9%).

The participants’ ability to engage in Activities of Daily Life (ADL) was similar in both groups. Nearly all participants (>95%) were able to go out independently. The health condition of the participants in the two groups was similar. Many were diagnosed with hypertension, hyperlipidemia, diabetes mellitus and heart disease. In terms of their vision, 65.4% had difficulties identifying distant objects. Also, over 95% had encountered various vision problems, including presbyopia and cataracts.

The common pain sites in both the experimental and control groups were the knee and back. The mean overall pain score of the experimental group was 4.93 ± 2.81 S.D. and 5.46 ± 1.90 S.D. for the control group. Details of the pain conditions are listed in Figure 1.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Demographics of Participants (N=66)</th>
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<table>
<thead>
<tr>
<th>Gender</th>
<th>Experimental (N=40)</th>
<th>Control (N=26)</th>
<th>Sig. (2-tail)</th>
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<tr>
<td>Male</td>
<td>23</td>
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<tr>
<td>Female</td>
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<th>Age Group</th>
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<th>Control (N=26)</th>
<th>Sig. (2-tail)</th>
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</thead>
<tbody>
<tr>
<td>Under 50</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>50-69</td>
<td>15</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>70-79</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>80-89</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>90-99</td>
<td>0</td>
<td>0</td>
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<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Experimental (N=40)</th>
<th>Control (N=26)</th>
<th>Sig. (2-tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
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<td>3</td>
<td></td>
</tr>
<tr>
<td>Married</td>
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<tr>
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<td></td>
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<tr>
<td>With children</td>
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<tr>
<th>Fall History Past 12 months</th>
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<td>Diabeties</td>
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<td>Glaucoma</td>
<td>1</td>
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</table>

Note:

a. Chi-square test was used

b. Independent sample t-test was used

* p-value ≤ 0.05 level is considered statistically significant.
Fall History and Related Findings
Twenty-five percent of participants in the experimental group had a fall history in the previous 12 months, compared with 23.1% in the control group. Seventy percent of the participants with a fall history had fallen in the community, and barriers were the chief reason for these falls. Thirty percent of the fallers had skin abrasions or fractures. Most participants in this study were able to walk unaided including 66.0% in the experimental group and 86.7% in the control group. The majority (77.5%) of the participants in both groups had not installed safety alarms at home.

Knowledge and Awareness on Safety
Table 6 shows the pre- and post-test results for both groups on safety knowledge and awareness. After attending the ESAP, there were significant increases in the experimental group’s knowledge (p< 0.05) and awareness (p< 0.05) of home and community safety. Participants were able to identify potential environmental risk factors in the set of digital photos and video clips. They were also confident of being able to modify their home setting to prevent hazards. One participant in the experimental group brought back a photo of his living environment, showing an unsafe stool. There were no significant differences in the knowledge and awareness levels of participants in the control group.

Discussion
According to the Census and Statistics Department (Census & Statistics Department, 2007), 35.8% of those aged 65 or above were illiterate, 39.2% had received primary education, 15.9% had received secondary education, and 8.6% had tertiary or above education in the 2006 population by-census. The elderly participants in this study were similar to the local population in that most had only received a primary education.

Compared with the 2004 results from the Department of Health (Department of Health, 2006) showing that 10.1% of 40,000 older adult participants had fallen in the previous six months, 25% of participants in this study had a fall history in the previous 12 months. The higher the prevalence of falling, the more the precautions should be promoted. Most of the falls among our participants had occurred in the community, so it is crucial to enrich older adults’ safety awareness and ability to identify potential risk factors in order to minimize injuries. Furthermore, most participants in this study were unaided walkers and had not installed safety alarms at home, indicating that they might be lacking a sense of potential crisis. They might have believed that if an accident or heart attack occurred suddenly, they would still be able to walk unaided. Therefore, highlighting the importance of anticipation and crisis management would be beneficial to enhance older adults’ safety awareness.

Dim lighting, uneven and slippery floors, unreachable storage areas, unanchored carpeting, loose or non-existent grab bars and handrails, poorly designed and maintained stairs, absence of fire safety devices, and poor hot water systems are potential environmental hazards (Carter, Campbell, Sanson-Fisher et al., 1997; Huang, 2005; Lan, Wu, Chang, & Chen, 2009). Therefore, teaching materials in the ESAP enhanced the safety awareness of the participants in different settings. Ultimately, the medical expenses incurred in rehabilitation would be reduced due to the minimized fall risk of older adults. In addition, the stress placed on family members by caring for the injured older adult would be minimized, resulting in a better family rapport and more harmonious atmosphere, both of which are beneficial to healthy aging.

In the present study, the use of the Internet provided the ESAP participants with real-time, real-life digital photos and local newspaper articles, so that they could obtain up-to-date information. Information technologies and the Internet used to only be beneficial to those with a good education or advanced computer skills. However, the demonstration of digital photos and...
simulated videos of local newscasts can enable illiterate viewers to visualize situations and enrich their memory, resulting in a better and longer-lasting impression. Consequently, awareness and knowledge are available even to those with lower levels of literacy through using, for example, an iPad. The convenience, affordability and reusability of information technologies may help to provide a better storage system for various kinds of information, like building up a photo bank. The Internet plays a role in circulating information around the world. As a result, a greater number of older adults can be equipped with knowledge on safety awareness. However, further studies are required to empower older adults in preventing possible dangers in their daily living. The digital photo bank used in this study needs to be further merged with local elderly Web sites for online education purposes. More funding is also recommended for the purchase of digital cameras in order to allow participants to take photos of their daily living environment and upload them to the photo bank. Through the use of computers, the Internet and digital cameras, older adults may build up their social networks and develop different interests that help them to achieve the aim of successful aging and active engagement in life. Finally, the collaboration of community partners in conducting the ESAP would be effective in contributing to a healthy aging progression among older adults.

One of the limitations in our study is there is no evidence that participating in the ESAP had effects that generalized beyond knowledge gained from the intervention. Further assessments on the use of this knowledge into their daily living and its effects, e.g., decrease in fall rate, are needed.

In conclusion, participants of the ESAP experienced an improvement in their safety awareness through empowerment. The use of information technologies, video demonstrations of information, and visualization of local news from the Internet is beneficial in enabling both the well educated user and the illiterate user to understand environmental hazards.

### Table 3
Pre- and Post-test Result Measures (N=66)

<table>
<thead>
<tr>
<th></th>
<th>Experimental (N=40)</th>
<th>Control (N=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre: Mean = S.D</td>
<td>Post: Mean = S.D</td>
</tr>
<tr>
<td>Photo</td>
<td>16.15 ± 4.00</td>
<td>21.08 ± 3.69</td>
</tr>
<tr>
<td>Video</td>
<td>6.20 ± 2.10</td>
<td>8.15 ± 2.07</td>
</tr>
<tr>
<td>Total</td>
<td>22.35 ± 5.32</td>
<td>29.23 ± 5.25</td>
</tr>
<tr>
<td>Awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community</td>
<td>7.60 ± 2.86</td>
<td>9.28 ± 0.75</td>
</tr>
</tbody>
</table>

Note:
β: Paired sample t-test was used
β 1: Experimental Pre vs. Experimental Post
β 2: Control Pre vs. Control Post
#: Independent sample t-test was used
# 1: Experimental Pre vs. Control Pre
# 2: Experimental Post vs. Control Post
* p-value ≤ 0.05 level is considered statistically significant

### References


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
video games, and 60 people defining themselves as “not video gamers”). They were immersed with a head mounted display (HMD) 180° Focal [Crescent 2010] in a 3-D VE inducing fear in real time, created with Autodesk tools 3Dsmax, Adobe Photoshop and Virttools Dassault system. The viewpoint is first person and participants could see their virtual hands tracked with optical trackers. These trackers consisted of eight Vicon cameras located around the subject (see Figure 1) and were also used to track the HMD. Movement in the VE was achieved through the use of a PAD type Xbox360 connected via USB.

The experiment took place during the day at a professional and consumer trade fair at an annual VR event in Laval (LavalVirtual), which facilitated the recruitment of a wide array of gamers and novices, or non-gamers.

![Figure 1. The experimental set-up during the Laval Virtual exhibition.](image1)

**Equipment and the Virtual Environment**

The HMD used was the HEWDD-1080 manufactured by Crescent, Inc. which relied on LCOS rear projection, providing a definition of 12.2 megapixels (R + G + B) * (Left Eye + Right Eye) a resolution of 1920 * 1080, an Horizontal FOV of 140 degrees and 90 degrees vertical with an overlap of 90 degrees.

The application ran on two HP xw9400 workstations with two Quadro graphics cards 5800 (one for each eye). The environment was modeled as 3-D polygonal techniques LPM (Low Polygon Modeling) EV-specific, all with 3DSmax. The total volume of the model was 35,000 triangles. Textures made in Photoshop were saved as DDS (Direct Draw Size) and the pixel dimensions of images were conventionally of the type 28, 29, 210, 211. We used several layers of textures: 30 MB diffuse textures, specular textures, textures bumps, textures and Height Maps Normal Maps: 8 MB.

Shaders were programmed in HLSL, DirectX and included light maps (light textures) and normal map (bump map).

![Figure 2. A screenshot of the VE used for the induction of fear and surprise: the secret operation lab.](image2)

The environment frequently used dark lighting to induce anxiety and fear. We used combined lighting using lightmaps format 29 and several real-time lights of Virttools, using shadows type stencil shadows.

Sixteen ambient and contact sounds were used for the application (wind, creaking door, buzzing neon lights, cries and moaning from the virtual human aggressing the user at the surprise ending).

The real time application used the 3-D engine (Virttools Dassault system 4.0).

**Procedure**

The experiment lasted between eight and ten minutes. Participants were asked to make a virtual journey through dark alleys. The liberty of the subject was constrained by the topology of the site. Although the user had relative freedom of movement, there was only one path available.

The user found himself starting from a narrow street crowded with garbage and trash. After walking about twenty feet in a straight line, the subject turned left at the corner of the next street and a dog-like Bulldog throws himself on the participant, barking loudly, and is restrained only by a chain. After a few meters, on the right, the only possible choice of path was through an old door, leading the participant to a staircase whose size was reduced to create a feeling of suffocation. The staircase was poorly lit, with some of the lights flickering and shutting off. At the bottom of the stairs, the participant turned and entered an abandoned and badly lit room.

This room was a secret underground laboratory, with a low vaulted ceiling, damp walls and several items on the tables that were reminiscent of a surgical unit (see Figure 2). A dismembered body laid on a surgical table. When the participant approached the body a threatening person loudly and unexpectedly emerged from behind. The experiment was then terminated by a fade to black.

After the experiment each user completed a semantic differential questionnaire based on three emotional responses (Osgood,
1975). The three questions were: “Are you afraid?” “Were you anxious?” “Were you surprised?” Participants had to answer using a scale ranging from 0 to 21. All information collected was and analyzed with one way ANOVAs.

**RESULTS**
The sample consisted of participants from both sexes (27% female in the gamers condition and 34% in the non-gamers condition, \(X^2(1) = 4.02, p < .05\)) and their age varied between 12-50 years old. The gamers were younger than the non-gamers (see Table 1; \(X^2(2) = 15.47, p < .001\)). A Bonferroni correction was applied to the critical \(p\) values in order to control the error rate; the significance level was thus fixed at \(.0.5/3\), or \(.015\).

The one-way ANOVAs for fear and surprise were both statistically significant \([F(1,139) = 7.81, p < .01 \text{ and } F(1,139) = 8.22, p < .01\), respectively], which is significantly lower than the corrected significance level. The ANOVA for the measure of anguish did not reach significance \([F(1,139) = 0.53, \text{ ns}]\). The eta-squared of .004 showed that the effect size of the difference between the two conditions was very small. To test if differences between the conditions on gender and age influenced the results, each analysis was performed again with age and gender as covariates. Since these ANCOVAs did not change the results of the ANOVAs performed on the three dependent variables, these results are not reported here.

Table 1
*Mean (and standard deviation) of participants for the three emotions measured post immersion*

<table>
<thead>
<tr>
<th>Variable measured</th>
<th>Experimental condition</th>
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<tr>
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<td>Gamers</td>
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<tr>
<td>Fear</td>
<td>6.62 (5.41)</td>
</tr>
<tr>
<td>Anguish</td>
<td>5.12 (5.19)</td>
</tr>
<tr>
<td>Surprise</td>
<td>11.83 (6.04)</td>
</tr>
</tbody>
</table>

The one-way ANOVAs for fear and surprise were both statistically significant \([F(1,139) = 7.81, p < .01 \text{ and } F(1,139) = 8.22, p < .01\), respectively], which is significantly lower than the corrected significance level. The ANOVA for the measure of anguish did not reach significance \([F(1,139) = 0.53, \text{ ns}]\). The eta-squared of .004 showed that the effect size of the difference between the two conditions was very small. To test if differences between the conditions on gender and age influenced the results, each analysis was performed again with age and gender as covariates. Since these ANCOVAs did not change the results of the ANOVAs performed on the three dependent variables, these results are not reported here.

**DISCUSSION**
The objective of the study was to determine whether being an experienced video game player influenced sensitivity to the emotion of fear in VEs. The results regarding fear and surprise are significant. They show that subjects considering themselves as FPS video gamers experience less fear and surprise in VEs than subjects considering themselves as non video gamers. However, game experience has not shown the expected results with regards to the emotion of anxiety.

One consequence of these results is that it is likely that, for designers of video games or VEs, the task of inducing emotion will become more complex with the growing number of people who play video games, given the increasing number of players and time consumed interacting with the medium. Similarly, cognitive behavioral therapy using VR to induce emotions may also be affected by this challenge if patients (made up of a increasing number of video game consumers) are less sensitive to VEs.

In this sense it seems that even partial knowledge of the mediation system created a habit that can partially inhibit emotional response during the immersion. If this is the case, then researchers working on VR applications for mental disorders should control for video gaming experience, and even purposely include video gamers in their samples, since gamers are more difficult to scare in VR.

One limitation to the generalization of our study to clinical samples is the type of VE used. The frightening VE used in this experiment relied on stressors typically used in horror video games (Perron, 2005) such as gloomy ambiance and the element of surprise. The stimuli used to elicit emotions in clinical applications are tailored to emotionally relevant cues that are specific to each disorder (e.g., a shopping mall, for the treatment of agoraphobia) and do not trigger the same response in people who are not afflicted by that disorder (Robillard et al., 2003). A potential indirect support for the hypothesis of habituation to specific stimuli is the study from Gamito et al. (2010) showing that presence increases with experience in VEs.

Yet, other explanations must also be considered to explain why gamers could experience less fear and surprise. The work by Darken and Allard (1998) may provide an understanding of the habituation effect based on the concepts of controlled attention and involuntary attention allocation.

Work on tele-presence (Darken, Allard et al., 1998) has shown that in the context of television viewing, mediation mechanisms of perception and cognition may be directed to a stimulus for two reasons:

1) Users can voluntarily devote their attention to the product of the media – this action is defined as "controlled attention." It seems such a link between the habit of using a portion of the medium and the level of specific attention to the construction of a "Spatial Situation Model (SSM)" (Wirth, Vorderer et al., 2007) is one that induces an emotional level.

2) The medium may trigger the allocation of attention without the user being aware; this is called "involuntary attention allocation." The presence in space is determined by two steps (Wirth, Vorderer et al., 2007). Initially the subject constructs a mental model of the mediation situation. We believe that this model is constructed in a manner that is linked to our attention on both a conscious and subconscious level (as it is voluntary or involuntary). It is correlated with the level of knowledge of the media used. The higher the level of media literacy is important and the more "controlled attention" is low. In a second step the subject creates the model of spatial presence via a PERF-
hypothesis (PERF = Primary Egocentric Reference Frame), emerging from the SSM. The subject may ask the question "Am I in that area/room?"

We believe that the answer to the PERF can be directly induced by the activation level of emotions. It is the direct link that allows passage between the two stages of creating a spatial model of presence.

The media experience in which a user is personally and physically present in the intended application is called "presence," or especially, "spatial presence" (Lombard et al., 1997). Lombard and Ditton define presence as "the illusion of the absence of mediation" in this single concept of VR technology; its development may lead to a total experience of presence (Lombard et al., 1997) if the presence can be synthesized by the "sense of being there" in the environment depicted by the VR system (Held, 1992). A large amount of research shows that in most observed cases, presence significantly increases regardless of the type of emotion induced (Riva, Mantovani et al., 2007). Anxiety also increases the feeling of presence in a VE (Bouchard, 2008). The degree of novelty determines the level of surprise that Brown and Kulik defined as equal to the emotional level. This storage is called flashbulb memory (FBM) by Finkenauer. The longer perceived consequence is the trigger, also called the “object” by William James (James, 1884); the emotion is more important and the FBM is detailed (Finkenauer, Luminet et al., 1998).

If the degree of novelty influences the emotional level, it should be acknowledged that the lower this level is, the fewer emotions will be strong. This appears to be the same for the "controlled attention," insofar as the two values are related to level of presence. Patrice Bouvier’s work shows the important role of the subject's involvement in the emergence of presence (Bouvier, 2009) and introduces the idea that acceptance of the experience of the game is essential to presence. This acceptance refers to the requirement for a person to accept a VE as a Primary Ego Reference Frame (PERF) (Wirth, Vorderer et al., 2007). A PERF is defined as a mental model of an organized world from a first person view (Mou & McNamara, 2002). Previous work on the presence in VEs shows the intrinsic connection between presence and willingness (Sas & O’Hare, 2001; Sas, 2003). In the case of our subjects, video game players are less sensitive to emotions, because their "controlled attention" is less than that of non-players. They are more aware of the artificiality of the virtual world. Concerning knowledge of the VE for video gamers, their mechanically induced visual attention is made up of any part of the VE PERF. When little attention is controlled, a weaker emotional state is produced, and the emergence of presence is lower for players compared to non-players: indeed, the implication is less.

**Conclusion and Future Work**

The results observed during the experiment show less awareness of emotions in the VE, according to the usual exposure to video games. Given our research and findings, these results can only be explained by a lower psychological investment, with lower involvement for people with experience in the mediation systems used. Furthermore, subjects who participated in the experiment during Laval Virtual almost always responded negatively to the three questions on their emotional level during the experiment. These subjects are de facto used to using VR mediation systems. Our work highlights the intrinsic link between the level of knowledge of the medium and the level of emotional arousal. This suggests an important role of emotions in the establishment of presence in VEs using the terms "controlled attention" and "involuntary attention allocation." These two concepts could be the link between the creation of a Spatial Situation Model (SSM) and PERF, essential for the construction of presence in a VE.

The aim of our future work will validate the schematic illustration of presence, including emotions and notions of "controlled attention" and "involuntary attention allowance" as constituent elements of presence. This research will correlate the presence of measures using the equation Presence = T (Creative Imagination; Absorption; Empathy → Fantasy Subscale; K) (Sas, 2003), and physiological and subjective measures of emotion. Further research should be undertaken to determine the relationship between the activation of emotions in VEs and the concepts of "controlled attention" and "involuntary attention allocation" in the illusion of non-mediation. This research will be developed on subjects made up of players and non players of FPS video games, some under clinical case studies of pathologically proven phobias.

**Acknowledgements**

This research was made possible by the collaboration with Crescent Tokyo JAPAN and ESCIN College FRANCE (Wendy Soreau & Irvin Thomas).

**References**


Osgood (1975). The measurement of meaning, Ninth printing.


The field of cybertherapy is becoming more widely accepted and implemented worldwide. The advantages that tele-health and mobile health have to offer, such as more readily accessible medical records, reliable user-friendly health advice on demand and patient-centric care are undeniable, and have resulted in exciting advances in how the needs of patients and caregivers alike are addressed. Better educated patients are becoming more responsible and proactive, taking charge of their own health and adopting and adhering to healthier lifestyle choices, and the goal of a healthy population and more efficient and effective healthcare becomes more attainable each day.

This book presents contributions from researchers and practitioners in the field of cybertherapy which not only illustrate the progress made in treating a variety of disorders, but also identify the challenges still faced in this field; such as the development of easy to use and more affordable hardware and software as well as the need to address potential side-effects and implement more controlled evaluation of cybertherapies as compared to more traditional treatments.

The book, which will be of interest to health professionals and patients alike, is divided into four sections: Critical Reviews contains summaries and evaluations of emerging cybertherapy topics; Evaluation Studies includes chapters which undertake to solve some specific practical problems and assess the value of cybertherapy interventions; Original Research addresses new cybertherapy methods or approaches; finally, Clinical Observations explores case studies and research protocols with long-term potential.
Contents:

Critical Reviews
Evaluation Studies
Original Research
Clinical Observations

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On September 30-October 2, 2011 the NATO Advanced Research "Wounds of War IV: Pain Syndromes – From Recruitment to Returning Troops" drew over 25 eminent experts from 11 countries to discuss the topic of increased pain syndromes in our service men and women.

Held in Südkärnten, Austria at the Hotel Amerika-Holzer, discussion topics included increased pain syndromes as a result of missions, as well as how pain syndromes may be prevented. Research has shown that those who have served in both combat missions and peacekeeping operations are at an increased risk for pain syndromes. The ultimate aim of the workshop was critical assessment of existing knowledge and identification of directions for future actions. The co-organizers of the workshop alongside Professor Brenda K. Wiederhold included Professor Kresimir Cosic, Professor Mark D. Wiederhold and Colonel Carl Castro.

Full papers will be published with IOS Press TO ORDER: cybertherapy@vrphobia.com

The post-conference book will reflect the key topics discussed in the four sections at the workshop:

**First Session**
Vulnerability to Pain Syndromes

**Second Session**
Diagnosis and Assessment of Pain Syndromes

**Third Session**
Treatment of Pain Syndromes

**Fourth Session**
Clinical Updates on Pain Syndromes
**CYBERPROJECTS**

**IN THIS FEATURE,** we will try to describe the characteristics of current cyberpsychology and rehabilitation research. In particular, CyberProjects aims to describe the leading research groups and projects, actually running around the world, with a special focus on European research.

**PACO-PLUS: PERCEPTION, ACTION AND COGNITION THROUGH LEARNING OF OBJECT-ACTION COMPLEXES**

Robotic demonstrators developed by European researchers produce compelling evidence that “thinking-by-doing” is the machine cognition paradigm of the future. Robots act on objects and teach themselves in the process. European researchers at the PACO-PLUS project have developed robotic demonstrators to illustrate a new approach to robotic cognition. The team uses a concept called “object-action complexes” (OACs), pronounced oaks.

These complexes represent a combination of perception of and action upon any given object. The OACs are recorded by the robot every time it performs an action. These recorded actions can be saved and exchanged with other robots, and over time the team hopes it will lead to entire libraries of OACs that can be exchanged between researchers. But that is just a major bonus of this particular system. The primary thrust was to show that robots could teach themselves simple actions, leading to more complex actions and, hopefully, leading to abstract thoughts in the future. The PACO-PLUS team performed a large number of demonstrations with humanoid robots and the results so far are very promising.

**AUTONOMOUS EXPLORATION**

With autonomous exploration, a robot can patiently explore thousands of potential ways to interact with an object it has no prior knowledge of – learning over time that grasping it in one way is better than another, that it balances better in one direction than another, etc. “The first thing a robot will do when it encounters an object for the first time is to lift it before its eyes and then rotate the object so the robot gets a look at it from all angles. After that, [the robot] will be able to identify the object from any angle,” explains Tamim Asfour, leader of the Humanoids Research Group at the Institute for Anthropomatics at the Karlsruhe Institute of Technology (KIT) in Germany and co-coordinator of the PACO-PLUS project.

One can see how complex actions could arise over time, as a robot progressively teaches itself how to interact with a cup, jug, handles and doors. Similarly, as the robot’s experience with different objects expands, its options expand, too, and it could learn to use a key with a hole in a door to see if that action will lead to any result.

This is the core of the OAC concept, that interaction with the environment leads to ever-more sophisticated strategies over time, and ultimately gives rise to “intelligence.” Of course, the autonomous exploration process is extremely time consuming, unsurprising when one recalls that it took hundreds of millions of years to evolve intelligent life. So another method for teaching robots is learning from human observation and human coaching, and PACO-PLUS developed a large range of successful demonstrators with this method as well.

**HUMAN COACHING**

With coaching, robots can watch humans perform an action, for example, wiping a table, and then they can imitate it. It is astonishing how easy it is for robots to mimic complex actions like this. Similarly, a coach can guide the robots through a complex task, for example, putting a cup in a dishwasher. At each stage the coach tells the robot “open the dishwasher,” “take this object/cup,” and “put it in the dishwasher.” Over time, the robot learns these sorts of actions.

This is a phenomenally sophisticated demonstration of robotic learning, and it was achieved, using a new approach, in the space of just four years. As such it stands as a remarkable testament to the work ethic of the PACO-PLUS team and the power of its approach. “Of course, we did a lot of other work too,” notes Asfour. “For example, we looked at some situations with more traditional industrial robots, to see how our work could be applied there.”

The work has been very well received in the wider robotic community, and some partners are looking at how they can integrate some of the results into other projects. In the meantime, PACO-PLUS is currently pursuing further research funding to perfect the work achieved. But already PACO-PLUS has dramatically advanced the field of robotic cognition and helped to set the research and development agenda for the next decade.

The PACO-PLUS project received funding from the ICT strand of the Sixth Framework Programme for research.

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New technologies are developing at a rapid pace. To help you stay abreast of the latest trends in advanced technologies and healthcare, this feature showcases upcoming 2011 events which will provide you with the opportunity to connect with leading experts worldwide and remain on the cutting edge of the most recent developments.

The CyberFocus column welcomes your contributions. To supply relevant information for this feature, please send an E-mail to: office@vrphobia.eu.

CyberPsychology & CyberTherapy17: Experience the Future of Health & Well-Being
September 25-28, 2012
Brussels, Belgium
www.interactivemediainstitute.com/CYBER17

The Journal of CyberTherapy & Rehabilitation is the official journal of the CyberPsychology & CyberTherapy Conference (CYBER17). CYBER17 will bring together researchers, clinicians, funders and policymakers to share and discuss trends in healthcare and technology. CYBER17 continues to seek input from a wider segment of the scientific community, and is interested in attracting experts in clinical therapy and rehabilitation, cognitive sciences, social sciences, and computer sciences dedicated to shaping the future of health & well-being.

Key focus areas will include:

1. The Impact of Technologies as Tools: technology's use in training, therapy, rehabilitation, and education to improve the quality and availability of healthcare.

2. The Influence of New Technologies: technology's influence on behavior and society (e.g., positive technology for well-being, healthy ageing, and inclusion).

3. The Imprint of Social Networking: the exploration of social networking tools on individual behavior and societal relations.

4. New Technologies/New Terms: studying the psychological aspects of new areas influenced by technology (e.g., cyberfashion, cyberadvertising, cyberstalking).

2011 Conferences

Association for Behavioral and Cognitive Therapies (ABCT 2011)
November 10-13, 2011
http://www.abct.org/Conv2011/
Toronto, Canada

mHealth Summit 2011
December 5-7, 2011
http://www.mhealthsummit.org/
Washington D.C., USA
2012 Conferences

The Engineering Reality of Virtual Reality 2012
January 22-26, 2012
http://spie.org/electronic-imaging.xml
San Francisco, CA, USA

ACM SIGHIT International Health Informatics Symposium
January 28-30, 2012
http://www.sighit.org/ihi2012/
Miami, Florida, USA

Medicine Meets Virtual Reality (MMVR19/NextMed)
February 9-11, 2012
http://nextmed.com/
Newport Beach, CA, USA

International Conference on Telehealth (IASTED)
February 15-17, 2012
http://www.iasted.org/conferences/home-765.html
Innsbruck, Austria

IEEE Virtual Reality 2012
March 4-8, 2012
http://conferences.computer.org/vr/2012/
Costa Mesa, CA, USA

Augmented Human International Conference
March 8-9, 2012
http://www.augmented-human.com/
Megève, France

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April 16-18, 2012
http://www.worldcongress.com/events/HR12000/faq.cfm
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CONTINUING EDUCATION QUIZ
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Serious Games for Therapy: A Training Perspective (Bowers et al., pg. 447)

If you answer 10 out of 12 questions correctly, you will be awarded one CE credit.

1. The fundamental challenge in developing serious games is:
   a) Integrating the tenets of effective training and valuable therapy.
   b) Using elements of an engaging game.
   c) Integrating the tenets of both effective training and valuable therapy with elements of an engaging game.

2. Indicate the most correct and complete statement among the following:
   a) Guardian Angel is a synthetic RP practice environment for phobias and others disorders.
   b) Guardian Angel is a game-based therapy maintenance tool which serves as an intervention for recovering alcoholics in therapy to learn and practice relapse prevention skills.
   c) Guardian Angel is a serious game specially designed for female veterans that have experienced military sexual trauma disorder.

3. Which skills are included in the Guardian Angel game?
   b) Drink Refusal/Addictive Voice, Temptation Avoidance, Stimulus Control, Manage Craving/Urge Surfing and Cultivate Individual Resources.
   c) Drink Refusal/Addictive Voice, Temptation Avoidance, Gleefulness, Frustration-tolerance and Forgiveness and Anger Control.

4. When do players win the game?
   a) Players win when they stop drinking, get a job and have a family.
   b) Players have to obtain friends, recover their driver’s license and have a certain number of days sober to win the game.
   c) To win, players have to guide the in-game characters to 365 days of sobriety without a relapse.

5. In the Guardian Angel game, we can see an example of RP Skill in Stimulus Control when:
   a) Players must avoid alcohol and situations where alcohol might be present.
   b) Players must avoid violent situations with other characters in the system.
   c) Players must seek the elements needed for relaxation.

6. In relation to the skill “Drink Refusal,” what kind of response receives the best score in the game?
   a) “No, I don’t want to drink any alcohol tonight.”
   b) “I promised myself I wouldn’t drink again.”
   c) “Please, don’t offer me again, I am a former alcoholic.”

7. The player’s objective in the “Route Planner” is:
   a) To improve his spatial orientation skills.
   b) To create a route home that has the least amount of tempting stops along the way.
   c) To create a route home using the least amount of money and time possible.

8. What is the goal of the Balance Out minigame?
   a) To provide players with the training and resources needed to help cope with stressful situations that may lead to alcohol abuse.
   b) To provide players with an environment to practice their skills to cope with stressful situations that may lead to alcohol abuse.
   c) A and B are correct.

9. Guardian Angel is:
   a) An easy game for patients to use with technical support.
   b) A useful and high technology game for patients.
   c) An accessible and intuitive training tool for patients.

10. For a game to be used as a training tool for therapy:
    a) It must add value and demand resources from the treatment staff.
    b) It must provide good feedback to the patients to keep them motivated.
    c) It must relate to the patient in terms of characters, situations and problems.

11. The key to developing successful serious games in the future is:
    a) To keep the population’s demographics and expectations in mind.
    b) To be applied to a variety of populations.
    c) To make an imaginative game.

12. A serious game for therapy is most effective when:
    a) It takes into consideration that fun and creativity are more important than game play mechanics, mode of control, level of difficulty and learning curve.
    b) It takes into consideration that game play mechanics, mode of control, level of difficulty and learning curve are more important than fun and creativity.
    c) There is an equilibrium between therapy-relevance and optimum game design.
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Interactive Media Institute
a 501c3 non-profit, is approved by the American Psychological Association to offer continuing education courses. We are pleased to announce the following course offerings:

- Virtual Reality and Anxiety Disorders (including phobias and panic disorder)
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The Official Conference of the International Association of CyberPsychology, Training & Rehabilitation (iACToR)

CYBER17 will bring together researchers, clinicians, funders and policymakers to share and discuss trends in healthcare and technology. CYBER17 continues to seek input from a wider segment of the scientific community, and is interested in attracting experts in clinical therapy and rehabilitation, cognitive sciences, social sciences, and computer sciences dedicated to shaping the future of health & well-being.

Key focus areas will include:

1. The Impact of Technologies as Tools: technology's use in training, therapy, rehabilitation, and education to improve the quality and availability of healthcare.

2. The Influence of New Technologies: technology's influence on behavior and society (e.g., positive technology for well-being, healthy ageing, and inclusion).

3. The Imprint of Social Networking: the exploration of social networking tools on individual behavior and societal relations.

4. New Technologies/New Terms: studying the psychological aspects of new areas influenced by technology (e.g., cyberfashion, cyberadvertising, cyberstalking).

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