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THE THERAPEUTIC VALUE OF VIDEO GAMES

Mark Griffiths

Until recently, most reported effects of video games centered on the alleged negative consequences. These included video game addiction (e.g., Griffiths & Hunt, 1995, 1998), increased aggressiveness (e.g., Griffiths, 1998), and the various medical and psychosocial effects (Griffiths, 1996). However, there are abundant references to the positive benefits of video games in the literature, including brief overviews (e.g., Lawrence, 1986; Griffiths, 1997). Despite research into the more negative effects, for over twenty years, researchers have been using video games as a means of researching individuals. Many of these reasons also provide an insight as to why games may be useful therapeutically. For instance:

- Games are a natural part of human behavior. Using video games as a measurement tool, the researcher achieves the relaxation and ease that can be essential to successful experimentation.
- Video games can assist children in setting goals, ensuring goal rehearsal, providing feedback, reinforcement, and maintaining records of behavioral change.
- Researchers can use video games when examining individual characteristics such as self-esteem, self-concept, goal-setting, and individual differences.
- Video games are fun and stimulating for participants. Consequently, it is easier to achieve and maintain a person's undivided attention for long periods of time (Donchin, 1995).
- As research tools, video games are very diverse and attract participation by individuals across many demographic boundaries (e.g., age, gender, ethnicity, educational status; Washburn & Gulledge, 1995).
- Video games also allow participants to experience novelty and challenge.
- Video games also allow participants to engage in extraordinary activities and to destroy or even die without real consequences (Washburn & Gulledge, 1995).
- Video games can be useful because they allow the researcher to measure performance on a very wide variety of tasks, and can be easily changed, standardized, and understood.
- Video games may help adolescents regress to childhood play (because of the ability to suspend reality in videogame playing)

Research dating back to the early 1980s has consistently shown that playing computer games (irrespective of genre) produces increases in reaction times, improved hand-eye coordination, and raises players' self-esteem. What's more, curiosity, fun, and the nature of the challenge also appear to add to a game's therapeutic potential. This chapter will concentrate on the reported therapeutic benefits of video game playing. Some evidence suggests that important skills may be built or reinforced by video games. For example, video game playing can improve spatial visualization ability (i.e., mentally rotating and manipulating two- and three-dimensional objects) (Subrahmanyam & Greenfield, 1994). However, video games were more effective for children who started out with relatively poor skills. It was therefore suggested that video games may be useful in equalizing individual differences in spatial skill performance.

Many people seem surprised that video games have been used innovatively in a wide variety of therapeutic and medical contexts. As we shall see during the course of this chapter, "video game therapy" has been used successfully in rehabilitation for stroke patients, people with traumatic brain injuries, burns victims, wheelchair users, Erb's palsy sufferers, children undergoing chemotherapy, children with muscular dystrophy, and autistic children.

Video Games as Physiotherapy and Occupational Therapy

Video games have been used as a form of physiotherapy and/or occupational therapy with many different groups of people (e.g., those who are physically handicapped, learning disabled, emotionally disturbed, etc.).

Much has been written about how boring and repetitive exercises are if someone is attempting to recover from or cope with a physical ailment. Introducing video games into this context can be of huge therapeutic benefit. As we shall see, the same appears to be true for more complex psychological abnormalities.

Video games have been used innovatively as a form of physiotherapy for arm injuries (Szer, 1983), in training the movements of a thirteen-year-old child with Erb's palsy (Krichevets et al., 1994), and as a form of occupational therapy to increase hand strength (King, 1993). For instance, King (1993) showed that video games could be used in an occupational therapy setting to increase hand strength among patients with just three-minute "exercise" periods on computer games. Video games have also been used as therapeutic interventions to promote and increase arm reach in persons with traumatic brain injury (Sietsema et al., 1993). This paper reported the use of a computer game (described as an occupationally embedded intervention) to promote and increase arm reach in people with traumatic brain injury. The study showed that the game produced significantly more range of motion in all of their twenty participants.

Therapeutic benefits have also been reported for wheelchair users, burn victims, and muscular dystrophy sufferers. More specifically, some wheelchair users find regular exercise programs too difficult physically or psychologically, and many find that using standard arm crank or roller systems monotonous. O'Connor and colleagues (2000) looked for ways that individuals with spinal cord injuries would be motivated to exercise on a regular basis. As a consequence, they developed an interactive video game system (*Gamewheels*) that provided an interface between a portable roller system and a computer. This system enabled wheelchair users to play commercially available video games, and their results demonstrated improved physical fitness in a sample of people with spinal cord injuries, spinal cord diseases, amputations, nerve diseases, and multiple sclerosis. Most of their participants (86 percent) reported that they would like a *Gamewheels* system for their home.

Adriaenssens and colleagues (1988) reported the use of video game playing as an exercise program to facilitate the rehabilitation of upper-limb burn victims (using a variety of large to smaller joysticks). This technique not only helped overcome initial therapy resistance but also encouraged and shaped movement of the hand, wrist, and elbow by providing feedback for the desired performance while also offering a distraction from pain. Finally, video games were also used as a respiratory muscle training aid for young patients with Duchenne Muscular Dystrophy (Vilozni et al., 1994).

Using video games in almost all these differing contexts capitalizes on a number of interrelated factors. One of the most important is the person's motivation to succeed. Furthermore, video games have advantages over traditional therapeutic methods that rely on passive, repetitive movements and painful limb manipulation (i.e., they focus attention away from potential discomfort).

Video Games as Distractors in the Role of Pain Management

Studies have shown that cognitive/attentional distraction may block the perception of pain. The reasoning is that distractor tasks consume some degree of the attentional capacity that would otherwise be devoted to pain perception. Video game playing offers an ideal way to analyze the role of distraction in symptom control in pediatric patients. Redd at al. (1987) argue that the main reasons for this are:

1. Video games are likely to engage much of a person's individual active attention because of the cognitive and motor activity required.
2. Video games allow the possibility to achieve sustained achievement because of the level of difficulty (i.e., challenge) of most games during extended play.
3. Video games appear to appeal most to adolescents.

Video games have also been used in a number of studies as "distractor tasks." For instance, one study (Phillips, 1991) reported the case of using a handheld video game (*Nintendo GameBoy*) to stop an eight-year old boy picking at his face. The child had neurodermatitis and scarring due to continual picking at his upper lip. Previous treatments (e.g., behavior modification program with food rewards for periods free of picking and the application of a bitter tasting product to the child's fingers) had failed, so therapists used a handheld videogame to keep the boy's hands occupied. After two weeks, the affected area had healed. Another creative use of video games has been to help increase sitting tolerance for people with lower back pain (Butler, 1985).

There are also a number of studies (e.g., Kolko & Rickard-Figueroa, 1985; Redd et al., 1987; Vasterling et al., 1993) that have demonstrated that video games can provide cognitive distraction during cancer chemotherapy in children. All these studies have reported that distracted patients report less nausea prior to chemotherapy and lower systolic pressure after treatment (when compared with controls). Such distraction tasks also reduce the amount of painkillers needed. There are many practical advantages for using video game therapy for pediatric patients during chemotherapy treatment. Redd et al. (1987) argue that:

1. Video game playing can be easily integrated with most chemotherapy administration procedures.
2. Video games represent a more cost-effective intervention than many traditional behavioral procedures such as hypnosis and relaxation.
3. Video games can be played without medical supervision.

To date there has been no long-term follow-up to such interventions and it is unclear whether patients eventually tire of such games. Therefore, researchers need to explore factors such as novelty, game preference, and relative level of challenge. This pain management technique utilizing video games has also been applied successfully to children undergoing treatment for sickle cell disease (Pegelow, 1992). As mentioned in the previous section, the studies by Adriaenssens et al. (1988) and O'Connor et al. (2000) on burns victims and wheelchair users claimed that success was in part due to the distraction from pain.

Finally in this section it is worth noting that one report alerted doctors that children may mistake patient-controlled analgesia (PCA) devices for video game consoles. Blunt, Hastie, and Stephens (1998) reported the case of a seven-year-old boy with Ollier's disease undergoing an operation whose pain was managed via a PCA pump. On the third day following his operation, the boy's PCA usage escalated from zero to a total of seventy-four demands during a four-hour period. Upon questioning it became clear that the boy had been playing a video game and he had mistakenly been pressing his PCA pump as if it had been a video game!

Video Games and Cognitive Rehabilitation

Video games have been used as a rehabilitation aid among various groups of people. Fisher (1986) argued that computers (including video games) have the potential to aid cognitive remediation. Areas that can be helped include perceptual disorders, conceptual thinking, attention, concentration, memory, and difficulties with language. A number of researchers have studied these ideas empirically. For instance, Larose and colleagues (1989) carried out a study to test the hypothesis that computer games may be an efficient therapeutic tool in a cognitive rehabilitation program. Sixty participants who showed attention difficulties with or without cerebral dysfunctions participated in a twelve-hour training program based on intensive use of a video game. Analyses showed improvement for the experimental group on scanning and tracking variables, notwithstanding the nature of their particular dysfunctions. Other studies have successfully used video games in rehabilitation programs to improve sustained attention in patients with craniocerebral trauma (Lawrence, 1986; Funk, Germann, & Buchman, 1997), and as a training and rehabilitation aid to cognitive and perceptual-motor disorders in stroke patients (Lynch, 1983).

Other authors have advocated the use of video games as a cognitive rehabilitation aid (attention, perceptual spatial abilities, reasoning, memory) to assist patients who have had brain damage to regain lost function (Lawrence, 1986; Skilbeck, 1991). Video games have also been used to increase spatial visualization (Dorval & Pepin, 1986). However, more recent research by Subrahmanyam and Greenfield (1994) has suggested that spatial skills are only improved in those whose skills were very weak to begin with but unlikely to improve skills for those with average or above-average spatial abilities.

Video Games and the Development of Social and Communication Skills among the Learning Disabled

Video games have also been used in comprehensive programs to help develop social skills in children and adolescents who are severely retarded or who have severe developmental problems such as autism (e.g., Gaylord-Ross et al., 1984; Sedlak, Doyle, & Schloss, 1982). Case studies such as those by Demarest (2000) are persuasive. Demarest's account of her own autistic seven-year old son reported that although he had serious deficiencies in language and understanding, and social and emotional difficulties, video game playing was one activity at which he was able to excel. This was ego-boosting for him and also had a self-calming effect. Video games provided the visual patterns, speed, and storyline that help children's basic skills development. Some of the therapeutic benefits Demarest (2000) outlined were language skills, mathematics and reading skills, and social skills.

Horn, Jones, and Hamlett (1991) used video games to train three children with multiple handicaps (e.g.,

severely limited vocal speech acquisition) to make scan and selection responses. These skills were later transferred to a communication device. Other researchers have used video games to help learning disabled children in their development of spatial abilities (Masendorf, 1993), problem-solving exercises (Hollingsworth & Woodward, 1993), and mathematical ability (Okolo, 1992a). Other researchers have offered critiques on how best to use computer technology for improved achievement and enhanced motivation among the learning disabled (e.g., Blechman, Rabin, & McEnroe, 1986; Okolo, 1992b).

Video Games and Impulsivity/Attention Deficit Disorders

There are now a few studies that have examined whether video games might be able to help in the treatment of children with impulsive and attentional difficulties. Kappes and Thompson (1985) tried to reduce impulsivity in incarcerated juveniles (ages fifteen to eighteen years) by providing either biofeedback or experience with a video game. Impulsivity scores improved for both conditions. Improvement was also noted in negative self-attributions and in internal locus of control. The authors concluded that the most likely explanation for the improvement in both experimental conditions was the immediate feedback. Clarke and Schoech (1994) also used video games to help adolescents learn impulse control. They used a video game for four weeks with four subjects (eleven to seventeen years) diagnosed with impulse control problems. After the experimental trial, the participants became more enthusiastic and cooperative about treatment.

New research (Pope, 2001; Wright, 2001) suggests video games linked to brainwave biofeedback may help children with attention deficit disorders. Biofeedback teaches patients to control normally involuntary body functions such as heart rate by providing real-time monitors of those responses. With the aid of a computer display, attention-deficit patients can learn to modulate brain waves associated with focusing. With enough training, changes become automatic and lead to improvements in grades, sociability, and organizational skills. Following on from research involving pilot attentiveness during long flights, a similar principle has been developed to help attention-deficit children stay focused by rewarding an attentive state of mind. This has been done by linking biofeedback to commercial videogames. In their trial, Pope and Palsson (2001; cited in Wright, 2001) selected half a dozen *Sony PlayStation* games and tested twenty-two girls and boys between the ages of nine and thirteen who had attention deficit disorder. Half the group got traditional biofeedback training, the other half played the modified video games. After forty one-hour sessions, both groups showed substantial improvements in everyday brainwave patterns as well as in tests of attention span, impulsiveness, and hyperactivity. Parents in both groups also reported that their children were doing better in school. The difference between the two groups was motivation. The video game group showed fewer no-shows and no dropouts. The researchers do warn that the "wrong kinds of video game" may be detrimental to children with attention disorders. For instance, "shoot 'em up" games may have a negative effect on children who already have a tendency toward short attention and impulsivity. They also state that the technique is an adjunct to drug therapy and not replacement for it.

Video Games and the Elderly: Therapeutic Benefits

One could perhaps argue that video game manufacturers have done very little to target older people as prospective video game users. This might be different if they were aware that there is a growing body of evidence that video games may have beneficial therapeutic effects for the elderly. Given that video game playing involves concentration, attention, hand-eye coordination, memory, decision-making, and speed reactions, the activity may be of great benefit to this particular cohort. Researchers working in this area have postulated that the intellectual declines that are part of the natural aging process may be slowed (and perhaps counteracted) by getting the elderly involved as active users of technology (Farris et al., 1994). For instance, a game as simple as *Tetris* can engage the mind in an enjoyable problem-solving exercise. The same enjoyable pleasures that occur when any of us master a new computer skill may have therapeutic value to both young and old. Learning something new on the computer results in a sense of accomplishment and satisfaction that invariably creates a feeling of well-being. Technology with the aged can therefore foster greater independence and can be put to therapeutic use. Dustman, Emmerson, Laurel, and Shearer (1992) showed that video games could increase reaction times among the elderly after an eleven-week period of video game playing.

McGuire (1984, 1986) examined the effectiveness of video games in improving self-esteem among elderly long-term care residents. In one wing of the institution, researchers made video games available for an eight-

week period. Residents of a second wing did not have the opportunity to play them and were used as a control group. Results showed that the video game group exhibited significant improvement in self-esteem. Other researchers have found similar results. For instance, Goldstein and colleagues (1997) reported that (noninstitutionalized) elderly people improved reaction times, self-esteem, and positive sense of well-being, as a result of playing video games for five hours a week for five weeks. However, there was little improvement in cognitive performance compared with controls. Riddick, Spector, and Drogin (1986) examined the impact of video game play on the emotional states and affiliative behavior of elderly nursing home residents. The experimental group had an opportunity to play video games three times per week for up to three hours per session, over a six-week period. In comparison to the control group, the experimental group underwent significant changes in their arousal state and affiliative behavior.

Weisman (1983) suggested that video games may have a role to play in meeting clients' needs for fun and mental stimulation and in enhancing self-esteem. He reported that moderate mental and physical impairments did not prevent fifty nursing home residents from participating in four video games that were especially adapted for this population. Further research by Weisman (1994) on the institutionalized elderly found that computer and video game use was found to be a valuable learning and diagnostic tool. The author urged practitioners to investigate the possibilities of using video games in their work with the elderly.

Farris et al. (1994) suggested that older adults can benefit significantly from ongoing education, and that computers can be valuable tools in this process. They advocate the use of computers for long- and short-term memory functioning. They reported a study using the video game *Memory of Goblins*. This game was developed primarily for use in the assessment of working memory but can also train working memory. Conclusions were difficult to draw from this particular study, but there is evidence to suggest that the impact of computer use among the elderly population can be profound. Ryan (1994) also used the *Memory for Goblins* video game to assess memory skills among various groups. Preliminary results with older users suggested they find it novel and interesting although there appeared to be little effect on improvement of working memory.

Hollander and Plummer (1986) reported the use of a hands-on microcomputer experience in forty-one senior adults. Over a three-week period, video games served as a therapeutic and rehabilitative tool, as well as a form of social and educational enrichment. Results indicated that thought-provoking games (*Trivia* and *Hangman*) held the participant's highest level of attention, and were perceived as exciting and stimulating. Schueren (1986) also analyzed the value of video games as an activity program for geriatric populations in skilled nursing home facilities. It was concluded that video game playing may be a successful small group recreational activity for those residents with adequate eye-hand coordination, vision and mental functioning. Researchers proposed suggestions for equipment adaptations to correct problems of poor visual clarity and awkward manipulation of controls.

Given this small but growing body of evidence, there is clearly a need for more research on video game use among this particular group of people. There are many areas that researchers need to explore in more detail including elderly use of technology in general, the use of computers and video games to develop and strengthen memory skills, intergenerational computing projects (teaming seniors with school aged students), and the use of computers and video games to assess cognitive functions. Many older adults may be receptive to using technology if introduced to it in a comfortable environment. If introduced in the right way, technology (including video games) may become a major hobby and interest in the lives of the elderly, and may also be of therapeutic value.

Video Games in Psychotherapeutic Settings

Therapists working with children have long used games in therapy and games as therapy in sessions with their young patients (Gardner, 1991). Play has been a feature in therapy since the work of Anna Freud (1928) and Melanie Klein (1932), and has been used to promote fantasy expression and the ventilation of feeling. The recent technological explosion has brought a proliferation of new games that some therapists claim to be an excellent ice-breaker and rapport builder with children in therapy and behavior management (e.g. Spence, 1988; Gardner, 1991). Research in the mid 1980s had already suggested that video games may actually facilitate cooperative behavior and reinforcement in more educational settings (e.g., Strein & Kochman, 1984; Salend & Santora, 1985).

Lawrence (1986) advocates using video games in the treatment of psychological problems during therapy. In an overview, he reported that there had been approximately two dozen efforts in the published

literature to deliver counselling or other psychological intervention services by computer. Although not concentrating on video games specifically, he did refer to games, computer-aided instruction, biofeedback, and behavior therapy. He concluded that computers (including games) could make meaningful contributions to the treatment of psychological problems.

Gardner (1991) claimed that the use of video games in his psychotherapy sessions provided common ground between himself and his child clients, and provided excellent behavioral observation opportunities. According to Gardner, such observations allowed him to observe:

1. The child's repertoire of problem-solving strategies
2. The child's ability to perceive and recall subtle cues as well as foresee consequences of behavior and act on past consequences
3. Eye-hand coordination
4. The release of aggression and control
5. The ability to deal with appropriate methods of dealing with the joys of victory and frustrations of defeat in a more sports oriented arena
6. The satisfaction of cognitive activity in the involvement of the recall of bits of basic information
7. The enjoyment of mutually coordinating one's activities with another in the spirit of cooperation

Gardner went on to describe four particular case studies that used video games to support psychotherapy. Although other techniques were used as an adjunct in therapy (e.g., storytelling, drawing, other games), Gardner claimed it was the video games that were the most useful factors in the improvement during therapy. Gardner's contention is that clinical techniques tend to change as a function of the trends of the times, though the goals remain the same. Slower paced and more traditional activities such as those outlined above may lengthen the time it takes to form a therapeutic relationship as the child may perceive the therapist not to be "cool" or "with it."

Spence (1988) is another advocate of the therapeutic value of video games and has incorporated them into his repertoire of behavior management techniques. Spence believes that video games can bring about changes in a number of areas and provided case study examples:

1. *Development of relationships:* Used video games to provide the basis to develop a therapeutic relationship. The video games gave an acceptable "middle ground" for both parties to "meet," which provided an enjoyable experience that could be shared. Relationships become close and trusting.
2. *Motivation:* Used video games as "bargaining counters" to motivate children to do things. This simply involved negotiating with an individual for a set period of work time or tasks in return for a set period of time playing video games.
3. *Cooperative behavior:* Used video games to develop social skills and cooperation in individuals by making them share a computer with peers. Through the medium of video games, individuals developed friendships that fostered cooperation.
4. *Aggressive behavior:* Used video games to "take the heat out of situations," i.e., individuals played video games when they were angry so that they inflicted "damage" on the video games' characters rather than human beings.
5. *Self-esteem:* Used video games as a measure of achievement to raise self-esteem. Because video games are skill based and provide scores, they can be compared and provide a basis for future goals. Beating personal high scores raised self-esteem in the individual.

As Spence's brief summaries show, the benefits are similar to those Gardner (1991) outlined. Similar techniques have also been advocated for behavioral management of exceptional children (Buckalew & Buckalew, 1983).

Olsen-Rando (1994) reported on the development and initial assessment of a video game version of the *Talking, Feeling, and Doing Game*. The game was developed by Richard Gardner, M.D., in order to facilitate the therapeutic process for those children who are inhibited, constrained, or resistive, or as an alternative therapeutic tool for children who are not characterized as resistive and thus freely reveal information. The game provides children an opportunity to talk about themselves in a way that is less anxiety provoking than traditional methods of eliciting information about their underlying psychodynamics. Unfortunately, this was a descriptive account only and contained no evaluation. Similarly, Kokish (1994) described the use of a personal computer loaded with various video games to aid play therapy with children, outlining case studies and making reference to the fact that learning to use the computer as a play therapy tool was more difficult and slower than expected.

Favelle (1994) also described some therapeutic applications of computer software and video games in

work with both individuals and groups. The applications described were used with adolescents at a psychiatric treatment center and involved using commercially available software and video games. An adventure-fantasy game and a role playing game were described as helpful in work with individuals. This is because the importance and utilization of fantasy in play was expressed. A mystery computer game was presented as useful when working with groups. The author concluded that video games have useful therapeutic value if applied by skilled professionals, and suggested that further research would result in improvements to computer-assisted therapy.

Sherer (1994) described the development and application of a computerized therapeutic simulation game for the purpose of raising the moral level of youth in distress. The effects of the video game on moral development were determined by a moral development measure. The level of moral development of a research group (n = 13) and a control group (n = 14) were measured before and after exposure to the therapeutic video game, using total of five indices of moral development. Two of these, Moral Stage and Punishment, revealed a positive effect on the participants.

There is some research suggesting that video games can be useful when evaluating schizophrenics in their attitudes and responses (Samoilovich et al., 1992). To do this, Samoilovich et al. (1992) investigated the initial attitude of ten chronic, defected schizophrenic patients to a computer video game session. Six of them enjoyed the experience and wanted to repeat it. Cooperation and performance were compared by means of video games and a standard psychometric test (WAIS). Video game performance correlated with the execution test IQ more than with the verbal test IQ. The authors also claimed that video games can be used for psychological testing, motivation, and reward, and to evaluate psychomotor activity.

It has also been suggested that some psychiatric patients who are socially undisciplined may be reachable with computers and video games (Matthews et al., 1987). Studies were reported that explored the usefulness of computers with chronic psychiatric patients. In one study, video games were made available to patients, and one-half showed an active interest. The second study showed a neutral relationship between patients' social communication skills and their involvement with video games. Thus, some patients who were socially intractable may be reachable with computers. The researchers argued that the computer can effectively automate many tasks normally undertaken by clinicians and that the computer may have special advantages over the clinician for some purposes.

Video Games and Health Care

In randomized clinical trials, it has been reported that children and adolescents improved their self-care and significantly reduced their use of emergency clinical services after playing health education and disease management video games (Brown et al., 1997; Lieberman, 2001). Three games were investigated: *Bronkie the Bronchiasaurus* for asthma self-management; *Packy & Marlon* for diabetes self-management; and *Rex Ronan* for smoking prevention. In these interactive video games, children and adolescents assume the role of a main character who also has their chronic condition or is battling the effects of smoking and nicotine addiction. Children who used them for one week (smoking prevention) to six months (diabetes self-care) increased their resolve not to smoke, markedly improved their ability to manage their asthma or diabetes, and reduced by as much as 77 percent, on average, their urgent or emergency care visits related to their illness.

Electronic games have also been used to enhance adolescents' perceived self-efficacy in HIV/AIDS prevention programs (Cahill, 1994; Thomas, Cahill, & Santilli, 1997). Using a time travel adventure video game format, researchers provided information and opportunities for practice discussing prevention practices to high-risk adolescents. Video game playing resulted in significant gains in factual information about safe sex practices, and in the participants' perceptions of their ability to successfully negotiate and implement such practices with a potential partner.

Video games and simulations have been used extensively in a comprehensive health promotion for adolescents. For instance, Bosworth (1994) used these strategies to attract adolescents to BARN (Body Awareness Resource Network), as well as helping to hold interest. In each of the six topic areas (AIDS, Alcohol and Other Drugs, Body Management, Human Sexuality, Smoking, and Stress Management), video game quizzes challenged users to test their knowledge on a topic. Simulations challenged users to apply health information in hypothetical situations. Video games were a more important factor in the selection of BARN for younger users than for older users. BARN game users were not more likely than nongame users to be users of other computer or video games, nor did game users engage in more risk taking behaviors (e.g., alcohol and other drugs) than nongame users. Similar types of health promotion video games have been used

successfully for drug use (Oakley, 1994), alcohol (Resnick, 1994a), marijuana (Henningson, Gold, & Duncan, 1986), sexual behavior (Starn & Paperny, 1990), life choices (Thomas, 1994), and antisocial behavior (Resnick, 1994b). One of the major problems with this area is that reported positive effects from video games in a health promotion context is that almost all of the video games evaluated were specially designed rather than those that were already commercially available. This does raise questions about the utility of generally commercial games in helping health promotion activities.

Conclusion

It is clear from the preceding overview that in the right context, video games can have a positive therapeutic benefit to a large range of different subgroups. Videogames have been shown to help children undergoing chemotherapy, children undergoing psychotherapy, children with particular emotional and behavioral problems (ADD, impulsivity, autism), individuals with medical and health problems (Erb's palsy, muscular dystrophy, burns, strokes, movement impaired), and the elderly. In terms of video games being distractor tasks, it seems likely that the effects can be attributed to most commercially available video games. However, as with the literature on video games aiding health promotion, one of the major problems is that reported positive effects in other instances were from specially designed video games rather than those that were already commercially available. It is therefore hard to evaluate the therapeutic value of video games as a whole. As with research into the more negative effects, it may well be the case that some video games are particularly beneficial, whereas others have little or no therapeutic benefit whatsoever. What is clear from the empirical literature is that the negative consequences of video game playing almost always involve people who are excessive users. It is probably fair to say that therapeutic benefits (including such things as self-esteem) can be gained from moderate video game playing.

Clearly there are many areas for future research and development in this area as most of the field is disparate in terms of positive therapeutic consequences. There is also a need to examine closely the factors that facilitate therapeutic benefits in the first place. This is because benefits (such as educational learning) depend on other factors than the nature of the video game itself. For instance, psychologists have shown that working cooperatively can speed up the time taken to do problem-solving tasks but are slowed down when they are done competitively. Also, psychologists have found that girls who do problem-solving tasks together with other girls tend to cooperate, whereas boys compete against each other. For those video games reliant on strategy and problem solving, such findings may have implications for therapeutic potential.

One unexplored area in video game research is people's attitudes toward playing. How a person thinks about a particular game—or video game playing in general—may actually affect the therapeutic value. For instance, one could speculate that when it comes to video games, there are three different types of people. The first type is the *technophobe* who thinks that video games are (literally) a complete waste of time and want nothing to do with them whatsoever. Technophobes would probably take every opportunity to be critical of them on a matter of principle and therefore gain little therapeutically. The second group of people are the *technosceptics* who use and enjoy the technology but are not convinced that it is a vital therapeutic tool, although there may be some therapeutic uses in some circumstances. The final group are the *technoromantics* who raise people's expectations about the capabilities and potential of computer games and who sing their praises at every available opportunity. It is these individuals who may benefit most therapeutically from video games.

Video games do seem to have great positive therapeutic potential in addition to their entertainment value. Many positive applications in education and health care have been developed. There has been considerable success when games are specifically designed to address a specific problem or to teach a certain skill. However, generalizability outside the game-playing situation remains an important research question.

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