Video Games, Competition and Exercise: A New Opportunity for Sport Psychologists?

Shane Murphy
Western Connecticut State University

The increasing influence of technology on sports and games is examined and the widespread popularity of video and computer games is identified as an opportunity for sport and exercise psychologists. Modern video and computer games can involve considerable physical activity and social competition and are thus a suitable subject for the application of sport psychology theories and intervention methods. A brief overview of some of the existing research from other fields on video and serious interactive games is presented. The advantages of studying competition, cooperation and exercise in video game play include application of existing theories to new areas, methodological research advantages, and new applied opportunities for practitioners. Sport and exercise psychologists are encouraged to research the long-term viability of studying important sport and exercise psychology topics such as aggression, teamwork and psychological skills using video game and related technologies.

Sports and technology have always had a symbiotic relationship. One can imagine that children in early civilizations soon realized some of the fun that was possible when they began playing with stones and sticks. The ancient Olympics of the early Greeks featured simple technological devices such as the discus and javelin (Coakley, 2001). Games that have been popular for the past 100 years feature other simple devices such as bats and balls, and in the past 50 years more complex technologies have made sports such as skiing and cycling extremely popular. Now in the 21st century, new technologies such as joysticks, dance pads, portable controllers and internet access have transformed the kinds of games and competitions that are popular in our society.

Nowhere has the influence of technology on competitive games been greater than in the development of computer and video games, which are now one of the favorite leisure-time activities for children and adults in Western industrialized countries (Subrahmanyam, Kraut, Greenfield, & Gross, 2001). In just a few decades, computer and video games have become so popular that many parents now worry that previously popular childhood physical activities such as backyard games of touch football or organized sporting contests such as youth baseball have
been displaced by games played on home video game consoles such as the Xbox 360 and the PlayStation 3 (Murphy, 1999). Many of the most popular games using these technologies are based on sports such as football, baseball and hockey. In 1982, less than 15% of US households owned a video game system and less than 5% owned a home computer. By 2000, 70% of US households owned at least one video game system and over 50% owned a personal computer (Williams, 2006). The most common use for personal computers is playing games (Salisch, Oppl, & Kristen, 2006). Games have also become ubiquitous via the proliferation of handheld devices, cellphones and websites that offer interactive games. Indeed, developmental psychologists are concerned that children who do not play video games are experiencing abnormal development. “The absence of video game play in the life of a contemporary early adolescent is a risk indicator” (Durkin, 2006, p. 415).

Professionals and researchers in fields as diverse as education, instructional design, psychology, artificial intelligence, discourse, semiotics, drama, information science, and game design have been productively studying video and computer games for more than two decades (Van Eck, 2008). Some researchers have called this area the study of serious games (Michael & Chen, 2005), or digital game-based learning (Prensky, 2001). An examination of some of the emerging research in this area indicates that many of the psychological concepts that form the basis for the field of sport psychology, such as motivation, fitness, teamwork, competition, cooperation, flow, transfer of skills, leadership and psychological skills are important topics in the study of serious games (Lieberman, 2006a).

Should sport and exercise psychologists also study these tremendously popular technology-based games? This paper makes the argument that we should and highlights two important trends in video games that have lead to a convergence of sport psychology and the study of video gaming. Next, some of the critical issues in the study of serious games that are most relevant to study from a sport psychology perspective are highlighted. Finally, the advantages and opportunities of studying video games for both practitioners and researchers are discussed. Technology will continue to have a great and evolving influence on sports and games and it is important for sport psychologists to be aware of the influences of changes resulting from technological advances. Video games are currently the best example of the confluence between technology and competitive games, although new areas of interaction will undoubtedly emerge. New methodologies, new research questions and new challenges can invigorate a field and help it stay in touch with the rapid changes that confront people in today’s technological world, even in a field itself as young as that of sport psychology.

**Emerging Trends in Video and Computer Games of Interest to Sport Psychologists**

Although technology is being effectively incorporated into sport psychology research, for example the use of driving simulators to study the effects of anxiety on performance (Wilson, Chattington, Marple-Horvat, & Smith, 2007), the study of video and computer games and related technologies has, to this date, been largely ignored. For example, no papers studying sport psychology and video games were found in past issues of this journal. While such neglect was perhaps justifiable during
the period when video games were less popular, it is much harder to defend such neglect now, especially when other fields of psychology are vigorously studying the psychology of video game play (Vorderer & Bryant, 2006). Video and computer games have become so popular that parents and policy makers are focusing increasing attention on their potential risks and benefits (Kirsh, 2006) and there is a risk that the decisions they come to will be poor if uninformed by research. Whether sport and exercise psychologists can contribute to this societal debate is an empirical question. Only by conducting appropriate research can this question be answered.

Of special interest to sport and exercise psychologists should be two trends that have dominated the development of video and computer game play over the past twenty years. One is the increasing use of physical activity in video games and the other is the increased popularity of competitive social video games.

**Physical Activity in Video and Computer Games**

Although there were games and virtual reality systems that incorporated player physical activity as early as the 1980s, the first popular incorporation of strenuous, and even aerobic, physical activity into video games was the game *Dance Dance Revolution* (DDR), released by game publisher Konami in Japan in 1998. This game is played with a footpad that players stand on, while dancing to music and following visual instructions for their dance moves. In the U.S., several hundred schools in at least 10 states now use DDR as a regular part of their physical education curriculum (Schiesel, 2007a). The merging of physical activity with video gaming reached new heights with the introduction of a new gaming system from Nintendo, the Wii, in December 2006. The Wii is distinguished from previous video game systems by the nature of the controller the player uses to interact with the game system. The Wii controller uses a combination of built-in accelerometers and infrared detection to sense its spatial position; information is relayed to the game system via a sensor placed nearby. The use of such controllers allows games to be designed that require gross physical movements of the player’s torso, limbs, hands and feet. In 2009, the game companies Microsoft and Sony announced the development of motion-sensing devices such as motion-sensitive cameras that will soon be part of games on the Xbox 360 and PlayStation 3.

These new kinds of game interfaces have lead to a proliferation of video games incorporating bodily activity, including *Wii Fit*, which offers a fitness training program containing aerobic, anaerobic, balance and coordination, and yoga activities. With such games, modern video games have apparently merged video gaming and the type of physical activities we have previously associated with traditional sports and exercise. This trend alone suggests that the study of video games, and perhaps especially the types of physically demanding games that some have called “exergames” (Lierberman, 2006b), may be very worthwhile for some sport and exercise psychologists.

**Competition and Social Interaction in Video and Computer Games**

Sport psychology research should also find a natural focus in a second trend that has emerged in video gaming over the past 15 years, the development of competitive and
cooperative social gaming. Although early video games may have initially fostered a solitary style of play, the history of video games indicates that the social features of games have been a driving force in their development (Williams, 2006). Home video game systems such as the Xbox 360, PlayStation 3 and the Wii all feature internet access that allow games to be played with online competitors and collaborators. As the internet has become more accessible and bandwidth has improved, a new type of computer game has become extremely popular, the massively multiplayer online game (MMOs). These games cater not to 3 or 4 players at a time, but to hundreds and sometimes thousands of players interacting in a virtual-world environment. Such games have become tremendously popular. One computer-based MMO, for example, World of Warcraft, produced by the US company Blizzard, is estimated to have over 11 million subscribers (Schiesel, 2006a).

Online gaming experiences have not replaced more traditional cooperative and competitive sports experiences in our society, but they have emerged as a new and dominant cultural experience that affects a very large percentage of children, adolescents and adults (Castronova, 2005). Sport psychologists interested in behaviors such as teamwork, aggression and concentration may well find competitive online video games to be at least as influential as sports in these areas. In the next section, a brief overview of some of the research on video games and serious games that has been conducted is presented. These research examplars will be used to suggest viable research opportunities from a sport and exercise psychology framework.

**Emerging Research in the Study of Video and Computer Game Play**

A brief examination of some of the research being done by our colleagues from related fields suggests that the application of the types of theories and models used in sport and exercise psychology is a viable strategy for understanding some important aspects of video game play. Five key areas are reviewed.

**The Relationship Between Video Game Violence and Aggression**

Many studies have examined the psychological and behavioral effects of violence in video and computer games on players, focusing on an hypothesized link between in-game violence and subsequent aggression by the player (Anderson & Bushman, 2001; Anderson & Dill, 2000; Ballard & Lineberger, 1999; Funk & Buchman, 1996; Funk et al., 2002; Scott, 1995). Some of this research has followed from a history of research into the effects of viewing television violence on aggression—and indeed some researchers have linked the two together: “We know with reasonable certainty that children and adolescents who are heavy viewers of action television shows and frequent players of violent video or computer games are more likely to show higher levels of aggression and disruptive noncooperative behaviors” (Singer & Singer, 2005, p. 5). Indeed, based on a report from a special Committee on Violence in Video Games and Interactive Media of its Media Psychology Division, the American Psychology Association (APA) in 2005 adopted a formal resolution that stated, in part, “whereas comprehensive analysis of violent interactive video game
research suggests such exposure (a) increases aggressive behavior, (b) increases aggressive thoughts, (c) increases angry feelings, (d) decreases helpful behavior, and, (e) increases physiological arousal . . . that APA advocate for the reduction of all violence in videogames and interactive media marketed to children and youth” (APA, 2005).

There are, however, critics of this research. Ferguson (2007) conducted a meta-analytic review of the research on video game violence and aggression and concluded that “the extant literature on video game violence effects . . . has not provided compelling evidence to support either a correlational or causal relationship between violent game play and actual aggressive behavior” (pp. 479–480). Ferguson has argued that there are definitional and methodological problems with much of the extant research on video game violence and aggression (Ferguson, 2009). Savage and Yancey (2008) conducted a meta-analysis of 28 research studies on the relationship between exposure to media violence and violent aggression and found that experimental studies did not indicate that media violence and criminal aggression are positively associated. Williams and Skoric (2005) recruited 213 participants and randomly assigned them to either play a violent online game for a month or to be in a control group that did not play a game. Results indicated that compared with the control group, those who participated in the game play intervention were not different in their normative beliefs on aggression than they were before playing the game, did not increase their argumentative behaviors after game play, and were not more likely to argue with their friends and partners.

There appears to be an opportunity for sport psychology research that contributes to further understanding of this issue. For example, a very similar issue, understanding the effects on behavior of playing violent sports, has been studied in sport psychology, but the general consensus on the findings of this research is different. Instead of arguing that violence in sports games necessarily leads to violence off the field, sport psychologists and sociologists have found that the experience of participation in violent sports is related to off-the-field violence only under certain conditions (Bloom & Smith, 1996; Crosset, 1999). Changes in moral reasoning and conceptions of gender identity are often associated with participation in violent sports (Bredemeier & Shields, 1986). Some of the definitional and methodological concerns that have been debated in the sport psychology literature (e.g., Abrams & Hale, 2005; Kerr, 2002; Tenebaum et al., 2000) particularly concerning definitions of “aggression,” “anger,” and “hostile violence,” may be helpful to consider by researchers studying video game violence. One attempt has already been made to provide an alternative to the most researched model in this area, the General Aggression Model (Anderson & Carnagey, 2004), by incorporating some of the theories and concepts from sport psychology to reanalyze this aggression research (Murphy, 2007).

**Video Game Play and the Development of Physical and Cognitive Skills**

A variety of studies have been published examining the development of physical and cognitive skills due to video game play, a topic of natural interest to sport psychologists. Researchers have found that playing interactive video games improved the ability of North American boys and girls to anticipate spatial paths (Subrah-
manyam & Greenfield, 1996); improved the ability to mentally rotate objects in space (Okagaki & Frensch, 1996); helped players effectively divide their attention by learning to keep track of events at multiple locations (Greenfield, DeWinston-ley, Kilpatrick, & Kaye, 1994); and enhanced performance on dual-attention tasks (Satyen & Ohtsuka, 2001). Researchers have also found that an important motivation for boys to play video games, especially repetitively, is to improve their fine motor skills to become more successful at the game (Salisch et al., 2006). This research is relevant to the extensive sport psychology research on the development of expertise (Williams & Ericsson, 2008). Rosser et al. (2007) found that out of 33 surgeons from Beth Israel Medical Center in New York that participated in their study, the nine doctors who had at some point played video games at least three hours per week made 37% fewer errors, performed 27% faster, and scored 42% better in the test of surgical skills than the 15 surgeons who had never played video games. Research has also been conducted on possible negative effects of video game play on physical skills. Fischer, Kubitzki, Guter and Frey (2007) found that the frequency of playing video and computer racing games was positively associated with competitive driving and frequency of car accidents. These studies indicate some of the potential for research into the development of physical and cognitive skills and expertise via video game play, although nearly all such research has so far appeared in fields other than sport psychology. Given that many of the most popular video games are based on sports such as football, baseball and golf, it seems relevant to ask how much influence playing these games has on the development of sports skills, knowledge and commitment.

Serious Games and the Study of Prosocial Effects of Video Games

Just as there has been an effort in sport psychology to develop sports and games that promote prosocial behaviors such as cooperation (e.g., Orlick, 1981), there has been from the earliest days of gaming efforts to use video games for positive and educational purposes (c.f., Van Eck, 2006). Sometimes these educational efforts have focused upon integrating commercial off-the-shelf (COTS) video games into various learning environments. A review of these efforts concluded that when “individuals play many commercial video and computer games, they must employ a wide range of higher-order skills. This suggests that games may be effective in teaching these skills” (Federation of American Scientists, 2006, p. 20). Their report suggested a wide range of skills that may be gained through participation in games such as sims and MMOs, including skills of special interest to sport psychologists such as team building, negotiation, collaboration, thinking strategically and planning and executing plans, multitasking and making decisions in rapidly changing situations, and exercising leadership.

There has also been a significant effort to design and develop games that are primarily educational in nature and these have come to be known as serious games. Many of the early efforts to develop serious games were commercial failures, slowing the momentum in this area, although occasional successes, such as Logical Journey of the Zoombinis (1996), showed that serious games could be delightful fun as well as effective learning tools. Later efforts have been more focused and
more effective. In a study of diabetic children and adolescents, Leiberman (2001) found that children who played a diabetes self-management game for the Nintendo for six months increased their diabetes knowledge and perceived self-efficacy for diabetes self-care and their urgent care and emergency visits for diabetes treatment decreased by 77%. A control group that played an entertainment video game with no health care content showed no changes in diabetes-related outcomes. In a review of the literature, Lieberman (2006a) concluded that both serious games and the best entertainment games can help players: increase perceptual and coordination skills; enhance problem solving; learn and retain knowledge; learn new skills and behaviors; gain self-regulation skills such as attention regulation and emotional management; enhance self-esteem and self-efficacy; build social relationships, develop communities and foster teamwork; increase their motivation to learn; and change attitudes and values. Sport psychologists who wish to study these processes in sporting or competitive settings should keep in mind the research that shows that digital game-based learning does not occur just because a game is designed with a serious purpose, or is employed in an educational setting. The implementation of interactive game technology utilizing effective learning principles is critical in determining the effectiveness of serious games (Van Eck, 2006).

The Study of Video Gaming, Physical Activity and Fitness

An important area of research for sport and exercise psychologists is the study of the relationship between video gaming and physical activity and fitness. Despite the impact of the Wii gaming system, electronic game play is still often a sedentary activity, involving no more than sitting in front of a PC or television screen using a mouse and keyboard or game pad. Yee (2006) conducted a survey of 5,509 players of MMOs and found that 8% of respondents spent 40 hr or more a week playing and 70% reported they had played an MMO for at least 10 hr continuously at least once. Yee’s research suggests that the lifestyles of at least some players are at times almost completely sedentary. In contrast, a study of the gaming activity of college students (Murphy & Oswald, 2008) found a significant positive correlation between the amount of time students said they had played video and computer games the previous week and the time they said they spent in sport and exercise in a week ($r = .26, p = .03$).

As described above, some video games are increasingly utilizing physical activity as an integral aspect of game play. One of the earliest such games, *Wii Sports*, was the focus of a study by researchers who examined the physical activity level of a small sample of 13- to 15-year-olds (Graves, Stratton, Ridgers, & Cable, 2007). They found that children playing *Wii Sports* expended significantly more energy than when playing a typical video game on another system (the Xbox). Their conclusion that fitness levels may be modified by appropriate video game play is very relevant to the field of sport and exercise psychology:

Active gaming used less energy than authentic bowling, tennis, and boxing, and the exercise was not intense enough to contribute towards the recommended amount of daily physical activity for children. Nevertheless, new generation computer games stimulated positive activity behaviours—the children were
on their feet and they moved in all directions while performing basic motor control and fundamental movement skills that were not evident during seated gaming. Given the current prevalence of childhood overweight and obesity, such positive behaviours should be encouraged. (Graves, et al., 2007, p. 1283).

The combination of physical activity and video games has come to be known as exergaming and various research studies are underway to examine the effects of exergaming on fitness and health (Lierberman, 2006b). Significant efforts have been made to increase the amount of research in this area and sport and exercise psychologists stand to benefit from such increased funding. For example, in 2008 and 2009, the Robert Wood Johnson Foundation provided $8.25 million for its Health Games Research initiative, funding research on games that increase physical activity and/or games that improve self-care (Robert Wood Johnson Foundation, 2009).

The Study of the Social Psychology of Video Games: Team Building and Group Cohesion

An area of research that has recently flourished among communications and information science scholars is the study of the social characteristics of interactive games, especially online games. Research has demonstrated that participation in commercial social interactive games can produce powerful social learning effects. Ducheneaut and Moore (2004) found that participation in MMOs teaches players valuable interpersonal skills such as leadership, learning team roles, team coordination, instructional coaching behaviors and altruistic helping. Jakobsson and Taylor (2003) found that a variety of complicated social structures emerge in MMOs that are unrelated to the goals of game designers. These social support structures have the potential to foster prosocial attitudes such as trust and responsibility, although development of negative attitudes such as greed and prejudice are also possible. In a long-term study of participation in MMOs, Seay, Jerome, Lee and Kraut (2004) found that a measure of commitment was an excellent predictor of level of game participation, a finding that resonates with the sport commitment model of motivation (Scanlan & Simons, 1992; Raedeke, 1997). The development, maintenance and decay of virtual teams within online games has been studied (Duchenaut, Yee, Nickell, & Moore, 2007) using concepts that are analogous to such constructs as team cohesion (Carron, Michelle, Wheeler & Stevens, 2002) and team development (Tuckman, 1965) that are employed by sport psychologists.

Sport psychologists should be able to find many opportunities to study teams, instrumental social groups, and both competitive and cooperative social gaming activity in interactive and online games. Readily accessible mechanisms to form both small and very large teams characterize nearly all online video games. First, the games themselves are structured with social play in mind. Game designers encourage social play by various means, such as providing easy in-game communication and establishing mechanisms for players to form persistent small or large groups, to accomplish shared objectives. Communities of players in such games are known by such role-playing names as guilds, clans and outfits. Second, online games require social play. Although most MMOs support single-player modes in which a player can go online and pursue solitary objectives, nearly all the major goals of such games
can only be accomplished through the cooperation of dozens, and sometimes even hundreds, of players. Other in-game goals promote vigorous competition, pitting teams of players against each other. In this respect, online social games may become the electronic “sports” of the 21st century (Schiesel, 2006b). Teamwork, leadership, competition and even online spectators are integral to online social games and present a host of research, and perhaps applied, opportunities for sport psychologists.

Hopefully this overview of past and ongoing research on interactive and serious video games has demonstrated some of the potential for research into exercise and competition using video game technologies to further our knowledge base in sport and exercise psychology. This brief review was not meant to be exhaustive, but to convey a sense of the potential for research and application in areas as diverse as the study of violence and aggression, the development of physical and cognitive skills, prosocial attitude and behavior development, exercise and fitness, and the study of teamwork and social processes. In this paper’s final section some of the concrete methodological and theoretical advantages for the field of exercise and sport psychology of studying video game participation are described.

Advantages and Opportunities in the Application of Sport and Exercise Psychology to Video Game Play

In this article I have suggested that the physicality and competitive nature of video games make them a suitable platform for the study of important sport and exercise psychology questions and that professionals and researchers from other fields are studying many issues concerning video game play that are relevant to research and application in our field. In this section some concrete suggestions are provided regarding ways in which theory and practice could benefit from studies in this area. I do not intend to suggest that sport and exercise psychology should be the primary perspective for understanding video game play—clearly many other disciplines have provided valuable insights into this activity. Nor do I mean to imply that video games should become a primary focus for many sport psychologists. A colleague who helped me with a review of this paper commented, “If Sport Psychology is concerned with human behavior relating to Sport, then surely the study of competitive gaming is the domain of “video psychologists”? I believe that we can study video game play and the use of other technologies in sport and still retain our focus on sport and exercise psychology issues. For example, I have a colleague who works extensively with NASCAR race drivers, yet he considers himself a sport psychologist and not a race car psychologist. Technology can strongly influence the sports-related activities we study, but we are still interested in sport and exercise issues.

In this section I suggest three ways in which the study of video games and serious games can be advantageous for sport psychologists. Such studies can be theoretically advantageous, as they allow us to test our theories and models with different populations in new situations. There are many methodological advantages to studying video games, especially being able to study intense competition in real-time in a laboratory environment. Finally, the study of video game play may open up exciting new practice opportunities.
Sport Psychology Theory Testing With Video Game Studies

A continuous process in any specific field of science is the application of existing theories and models to new populations or situations. This process allows for theory testing and development and usually strengthens a theoretical model through replication and modification (Landers, 1983). Hopefully, the brief research review provided above has illustrated some of the many ways in which theories from sport and exercise psychology could be effectively applied to help us understand the psychological dynamics and effects of video game participation. Such theory testing not only offers the potential to explore whether sport and exercise psychology theories can explain behavior in a new form of competitive and cooperative play but there also appear to be many areas in which specific theories from our field could enhance existing knowledge in the video gaming area.

An example of this potential is research into the participation motives of computer and video gamers. Although several studies have described a broad array of motives that drive often intensive participation in video games (e.g., Yee, 2006; 2007), this research has been surprisingly atheoretical. Indeed, one of the models that forms the basis for some of this research is an almost anecdotal typology of motivations derived by the game designer Bartle (2003).

Sport psychology offers several theoretical approaches which have been very effectively applied to an understanding of participation motivation in sports and could also be applied to understanding participation motivation in competitive games played via video game and computer technology. For example, Nicholls’ (1984) developmentally based theory of achievement motivation may help us understand the motives of social gamers. According to Nicholls (1989) there are two pathways by which players judge their own ability. Task-involved players will develop a sense of increased competence and ability by using their own level of effort and task completion to assess their progress. On the other hand, ego-involved players will attempt to demonstrate superior ability at the game by achieving a high level of success with the minimum expenditure of effort. Social computer games, in particular, provide a highly visible social structure for judging success and progress. For example, players can instantly judge another player’s degree of experience by looking at that player’s avatar’s “level;” and in shooter games, matches end with announced kill totals and player deaths. Social games offer players multiple opportunities to set goals in either ego or task—or both—fashions and to experience rapid feedback as to goal attainment and perceived ability.

Preliminary research has indicated that the constructs of ego and task goal orientation translate effectively to video game research. A survey of 92 undergraduates (Murphy & Oswald, 2008) employed a widely used measure, the Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda, 1989) to identify the goal orientations of students toward their favorite video game. There were a number of significant and consistent differences among players in their emotional responses to video game play, as measured by the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1992), based upon the nature of their goal orientations (Murphy, 2008). Although there were some direct correlations, for example ego orientation was significantly positively correlated with measures of aggression, anger and anxiety, a more meaningful picture of the relationships emerged when an analysis using an orthogonal interpretation of task and ego orientation was employed. Specifically, the high ego and high task, and
the low ego and low task groups were consistently very different in their responses from the other groups. Interestingly, similar findings regarding differences between groups when an orthogonal approach to assessing goal orientation or a cluster analysis of motivational profiles is employed have emerged in the sport psychology literature (Chian & Wang, 2008; Roberts, Treasure & Kavussanu, 1996). Applying the established measures and theoretical frameworks of sport psychology to the study of video and computer games offers great potential for theory testing in our field.

**Methodological Advantages of Studying the Sport Psychology of Video Games**

One of the fascinating aspects of the convergence of sports and technology is that the very technology that has emerged as a research focus also offers many methodological advantages for the interested researcher. Imagine a sport psychologist working with a baseball team who can record every game the team plays, from the perspective of each individual player, cataloging every player’s behavior, actions and reactions, along with a record of all communication among the players. Such technology already exists in interactive gaming! The level of access a researcher can have to the important behaviors of interest when studying competitive video game situations is one of the most appealing advantages of research in this area. Research costs are minimal, as many games already feature these services as part of game play. A specific game play experience can be stored as a video record for later analysis, and most serious teams of competitive gamers use voice chat technology for coordination of play, which can also be recorded and synched with the video record. Competition between teams can be studied with simple internet access, since most gaming teams are virtual and no physical proximity is required. Field data would be easy to collect, since many serious gaming teams seek improvement by analyzing recordings of their competitive game experiences. Such records could simply be sent electronically to the researcher. Access to active participants is straightforward. Not only is video game play a very popular activity, but participants are well represented across both genders and all ages. Forty percent of all players are female and twenty-six percent of game players are over the age of 50 (Entertainment Software Association, 2008).

It is also possible for the researcher interested in players’ real-time emotional and cognitive responses when gaming to study behavior in the laboratory, which is not true for most sports. Real-time behaviors, decisions and emotions can be assessed in such settings, and for researchers interested in such issues as stress, decision-making, and aggression it would also be more feasible to use physiological and neuropsychological monitoring than is typically the case in sports settings. The participation record left by exercise participants who use exergaming offers a large database to researchers interested in health and fitness issues, and research funds are on offer for important research projects in this area. Many researchers in this field are already using a variety of portable and unintrusive assessment devices to study activity levels and new technologies continue to emerge. Online social games are also a natural laboratory for the study of game-playing teams and groups, and offer researchers a controlled and accessible environment for such research. Emerging video and computer technologies offer many advantages for sport and exercise psychology researchers who are willing to use the opportunities presented.
New Sport Psychology Practice Opportunities With Video Game Play

The field of applied sport psychology has flourished because of the nearly universal popularity of sports as a favorite leisure time activity (Kontos & Feltz, 2008) so it would be surprising if the emergence of another extremely popular leisure activity involving games, competition and teamwork did not present many practice opportunities for applied sport psychologists. Indeed, informal feedback from many colleagues suggests that such opportunities are emerging, although they may still be “below the radar” at the moment. A few specific practice opportunities are suggested here, but practitioners will surely find potential in situations that can perhaps be scarcely imagined today.

**Psychological Skills Training for Video and Computer Game Play.** Digital game-based learning researchers have focused extensive attention on the role of interactive games in promoting the learning and maintenance of new skills, for example in simulation-type games (Aldrich, 2003), but there has been very little focus in this literature on the very common applied sport psychology approach of teaching players the cognitive skills such as concentration, imagery and stress management needed to increase game performance. This approach, known as psychological skills training, or PST (Vealey, 1988), has obvious applications to interactive games in an environment where professional gaming leagues, with video game players under contract, have emerged across the USA and overseas, when nationwide tournaments with cash prizes for the winners are held for the most popular video and computer games, and when television networks televise highlights from events such as the World Series of Video Games (Schiesel, 2007b). A colleague’s recent experience provides an example.

A worried mother brought her 16-year-old son to see a psychologist because the boy had recently finished in the top eight in a nation-wide online competition hosted by a very popular video game and was being flown to the opposite coast by the company to compete in the final. First prize was $100,000. The mother was concerned because her son displayed almost complete disinterest in the contest, which she viewed as a potential source of funds to help defray future college costs. My colleague initiated a brief assessment and intervention just as he would with any young athlete, discovering that the teen’s apparent disinterest was a mask for controlling competition anxiety. The psychologist helped him develop competition-specific stress management skills (the boy finished second, winning a new PC, to the mother’s disappointment).

**Team Building Using Social Online Games.** The research described previously on the social aspects of interactive games suggests that many of the skills needed to succeed in a team environment could be taught within the environment of such games. It is possible that sport psychology practitioners could use already existing commercial games to develop learning experiences to help teams with skills such as providing feedback to one another, practicing role switching, and increasing task-relevant communication, but there is probably even more potential in the development of team- or sport-specific game tools for such learning. The development of serious games for sport psychology is at present an almost untapped field.
Using Technology to Enhance Participation in Fitness Interventions. Sport and exercise psychologists who conduct programs of varying kinds focusing on fitness, exercise and health may be intrigued by the potential of using technology to increase the motivation of participants. Leiberman (2006a) suggests that some of the reasons why interactive games are so attractive and motivating to participants include the challenge and imagination of the games, their entertainment appeal, interactivity, engagement, flow and story line. Both COTS and specifically designed programs or devices may be useful to practitioners in the fitness field. In the field of psychological rehabilitation, the use of virtual reality systems, some of them game-based, is already common practice and researchers are studying the effects of such technologies on patients such as those with traumatic brain injuries (Tsirlin, Dupierrix, Chokron, Coquillart & Ohlmann, 2009). Applied opportunities will continue to develop as technology evolves and interacts to an ever-increasing extent with sport and exercise (witness the development of such new exertion interfaces as dance pads, cameras pointed at players, motion-detecting remote controllers, etc.).

Conclusion

This paper has discussed the issue of whether sport psychologists should join the rapidly expanding group of professionals and researchers studying the influence of technology-based games and competitions and the use of serious games for changing behavior. The argument was presented that at the very least, research using a sport psychology perspective should be conducted to empirically evaluate this issue. Sport psychology may be a useful framework for studying and understanding the interface between technology, competition and exercise. Two trends in the development of video games, their increasing physicality and their increasingly social and competitive nature, were emphasized to highlight sport and exercise psychology issues inherent to video games that should be of interest to sport psychologists. A brief overview of existing research on video games was presented and the relevance of using sport psychology theories as a framework to understand the influence of video gaming on issues such as aggression, cognitive skills, and fitness was discussed. Finally, some of the advantages of studying important sport psychology topics using video game technologies were presented and some suggestions were provided concerning possible applied work for consultants in this area. Ignoring this very popular leisure activity may limit the long-term development of applied sport psychology. As sports and technology continue to merge it is vital that sport psychologists pay attention to relevant new developments in technology. Only by developing a sound research base in this area can we answer the questions that are likely to be asked of us.

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