

Rapid Communication

Beyond Self-Selection in Video Game Play: An Experimental Examination of the Consequences of Massively Multiplayer Online Role-Playing Game Play

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ABSTRACT

There is burgeoning interest in the study of video games. Existing work is limited by the use of correlational designs and is thus unable to make causal inferences or remove self-selection biases from observed results. The recent development of online, socially integrated video games (massively multiplayer online role-playing games [MMORPGs]) has created a new experience for gamers. This randomized, longitudinal study examined the effects of being assigned to play different video game types on game usage, health, well-being, sleep, socializing, and academics. One hundred 18- to 20-year-old participants (73% male; 68% Caucasian) were randomly assigned to play arcade, console, solo computer, or MMORPG games for 1 month. The MMORPG group differed significantly from other groups after 1 month, reporting more hours spent playing, worse health, worse sleep quality, and greater interference in "real-life" socializing and academic work. In contrast, this group also reported greater enjoyment in playing, greater interest in continuing to play, and greater acquisition of new friendships. MMORPGs represent a different gaming experience with different consequences than other types of video games and appear to pose both unique risks and benefits from their use.

INTRODUCTION

CURRENT VIDEO GAMES have evolved far beyond their roots. Video games were once simple and repetitive, involving monochromatic blocks for graphics and tasks such as moving a rectangular "paddle" in a vertical plane to intercept a moving "ball" (Pong, a forerunner of modern video games). In contrast, modern video games include levels of complexity and realism beyond what was imagined 30 years ago. By and large, the evolution of video

games rides the back of the technological and computing advances that drive the personal computer revolution. Much of the attention paid to such advances, particularly regarding graphics, revolves around the consequences of more realistic depictions of violence in video games.^{1,2} In contrast, however, claims of benefits from advanced graphic video games have also been made.³⁻⁸ More notably, video games have recently taken advantage of the ability to virtually connect individuals via the Internet or local networking. This player networking

dramatically changes the nature of video games from a solitary or small group activity into a large, thriving social network (and has been accompanied by an explicit call for the study of such processes in gaming).⁹

A variety of game types involve player networking. Massively multiplayer online role-playing games (MMORPGs) are persistent online gaming worlds¹⁰ that continuously exist and evolve, and literally thousands of players in this world can meet, interact, and play together. Previous work indicates that individuals who self-select to play MMORPGs play often ($M = 25$ hrs/week, with 4% of players in excess of 50 hrs)¹⁰ and report that the most enjoyable and important aspects of the game are interpersonal in nature—helping others, making friends, and socializing in this virtual world. Although informative, survey data have a limitation in that they are unable to distinguish between preexisting differences among individuals (i.e., those individuals who elect to play such games, or self-selection bias) and effects consistently produced by game play. We conducted a prospective randomized trial examining the consequences of being randomly assigned to play one of several different game types (arcade, console, solo play on computer, and MMORPG) for 1 month over the course of one semester during college. Our focus was to determine whether playing a MMORPG would produce noticeably different consequences than playing other types of video games.

METHODS

Participants

Participants in this study were 100 university student volunteers (73 males, 27 females). Participants were 18 to 20 years old ($M 19.2$), the majority were Caucasian ($n = 68$), and the remainder were African American ($n = 18$), Asian ($n = 13$), or not specified ($n = 1$). The study was approved by the University Institutional Review Board, and all participants provided informed consent.

PROCEDURE

Participants were randomly assigned to play one of four types of video games (no participants reported extensive experience with the game to which they were assigned). These games were chosen to represent the more “traditional” video game play and to contrast with the emerging game type of the

MMORPGs. The game types included arcade, console, solo play on computer, and MMORPG. Arcade play was arranged by having participants receive free game tokens to play arcade games. Console game play was on the PlayStation2 console game system, using the game *Gauntlet: Dark Legacy*, a fantasy-themed adventure game. The solo play on the computer used *Diablo II*, also a fantasy-themed adventure game. Finally, the MMORPG game was *Dark Age of Camelot (DAOC)*, a fantasy-themed game with a clear narrative, persistent world, and the other features unique to MMORPGs. With the exception of the arcade group, who were required to go to the game arcade, games and required equipment were provided (with no financial costs to participants). Participants were instructed to play their game a minimum of 1 hour per week but could play more if they so chose. Participation in the study was for 1 month, after which participants were no longer able to use the game laboratory or arcade.

Materials

Participants provided simple demographic information and completed several measures specific to this study. Regarding past video game use, participants reported the average number of hours in a week they typically spend playing video games and how much they like video games in general (0 = not at all, 6 = extremely). At the start and end of the 1-month study protocol, participants reported how many hours in the last week they had played video games. Participants also rated their overall health, sleep quality, academic performance, social life, and well-being (on a scale of 0 = very poor to 6 = very good). At the end of the study, participants reported (using 0 = not at all, 6 = extremely) how enjoyable they thought the game was, how much pleasure they derived from playing the game, how likely they would be to continue to play the game after the study was over, to what degree playing the game interfered with real-life socializing, to what degree they had made new friends by playing the game, and to what degree the game had interfered with academic achievement.

RESULTS

The groups at the start of the study did not differ on any demographic variables, the average number of hours video games were played each week, the report of how much video games were liked in general, or the report of the number of hours of video game play in the previous week ($F < 2.0$,

$p > 0.15$ for all variables). Two participants did not complete the study, one from the arcade group and one from the console group. Analyses of variance (ANOVAs) were used to evaluate group differences at 1-month followup, using first an omnibus F -test and then planned comparisons. Group differences at the end of the study are presented in Table 1. Significant group differences existed in the reported hours of video game play in the previous week, with the MMORPG group reporting more hours played than other groups ($F(1,96) > 7.32, p < 0.01$). The MMORPG group also reported significantly worse overall health ($F(1,96) > 4.14, p < 0.05$) and worse sleep quality ($F(1,96) > 3.97, p < 0.05$). The MMORPG group reported greater enjoyment in the game ($F(1,96) > 4.64, p < 0.05$), a greater interest in continuing to play the game ($F(1,96) > 3.98, p < 0.05$), and new online friendships to a greater degree ($F(1,96) > 6.97, p < 0.01$), yet concurrently reported that game play had interfered more with real-life socializing ($F(1,96) > 5.01, p < 0.05$) and school-work ($F(1,96) > 4.00, p < 0.05$). Finally, there were no significant group differences on reported academic performance over the month, overall ratings of social life, or overall ratings of quality of life ($F(1,96) < 2.76, p > 0.10$).

DISCUSSION

This study examined the new game type of MMORPGs. There exists little data on the nature

or consequences of playing these games, although the structural differences (e.g., virtual social networking) suggest that the experience of playing MMORPGs may be considerably different from that of playing more traditional video games. This prospective, randomized experiment assigned individuals to play one of four game types: arcade, console, solo computer, and MMORPG. This methodology allows us to distinguish the “real” consequences of video game play from results due to individual characteristics of people who elect to play certain games (i.e., self-selection biases).

At the 1-month followup, the MMORPG group reported, on average, substantially more hours played in the previous week (14.4) than did other groups (range 2.1–6.2). Individuals in the MMORPG group were not selected on the basis of any preexisting interest in this type of game (and they did not differ on baseline measures from other groups). As a result, some mismatch was certain to have occurred, consequently suppressing usage results. That is, some people would not normally choose this type of game and may not enjoy it as much as others (or as much as a game type they self-selected). This conjecture is consistent with the difference between the reported hours spent playing MMORPGs in the experimentally assigned context (~14 hrs/wk) and the survey data (a self-selected audience, ~25 hrs/wk).¹⁰ Despite such mismatching, however, it is clear that the MMORPG exerted a significantly greater influence on usage behavior than the other video games.

TABLE 1. REPORT OF CONSEQUENCES AT FOLLOWUP OF VIDEO GAME PLAYING BY GROUP, MEANS AND STANDARD DEVIATIONS

Variable	Arcade (n = 24)	Console (n = 24)	Computer (n = 25)	MMORPG (n = 25)
Hrs played last week*	2.1 (0.9) ^a	3.4 (1.1) ^a	6.2 (2.8) ^b	14.4 (6.8) ^c
Overall health*	4.6 (1.2) ^a	4.0 (1.0) ^a	4.3 (1.1) ^a	3.2 (1.8) ^b
Sleep quality*	4.2 (1.2) ^a	4.1 (0.9) ^a	3.9 (1.2) ^a	2.9 (2.1) ^b
Academic performance	4.5 (1.5)	4.3 (1.3)	4.1 (1.8)	3.9 (2.4)
Social life	3.2 (2.1)	3.5 (2.4)	3.3 (2.0)	3.0 (2.6)
Overall well-being	4.5 (1.8)	4.4 (1.9)	4.3 (1.3)	4.5 (1.8)
Game enjoyed*	3.2 (1.1) ^a	2.8 (1.4) ^a	3.4 (1.8) ^a	4.4 (1.9) ^b
Continue to play*	2.8 (0.8) ^a	2.3 (1.1) ^a	3.0 (1.2) ^a	4.2 (2.1) ^b
Interfere social*	0.9 (0.8) ^a	1.0 (1.0) ^a	1.7 (1.1) ^a	2.4 (1.9) ^b
Made new friends*	2.1 (0.9) ^a	2.0 (1.1) ^a	1.6 (0.9) ^a	3.4 (2.1) ^b
Interfere academics*	1.7 (1.1) ^a	1.8 (1.3) ^a	2.1 (1.1) ^a	3.0 (1.5) ^b

Note: Significant omnibus F -tests for group differences are indicated with * in the column header ($p < 0.05$). Different cell superscripts indicate significantly different group means on that measure (comparison $p < 0.05$). Ratings made on scale of 0 = not at all, 3 = moderately, 6 = extremely, or 0 = very poor, 3 = moderately good, 6 = very good, as appropriate.

The MMORPG group also differed from the other groups in several other ways. Overall physical health was lower in the MMORPG group at followup than in the other groups, as was reported sleep quality. It is likely that these factors are related. Anecdotal evidence suggests that many other health behaviors equally suffer in the context of extensive video game playing. For example, individuals may eat a poorer diet, smoke more, and not exercise. Each of these behaviors may influence health directly as well as reduce sleep quality, creating a vicious cycle in which difficulty sleeping may lead to additional game play, and so on.

The MMORPG group did not differ on reports of overall academic performance yet reported the game to have interfered more with their schoolwork. This apparent contradiction may reflect the short time frame of the study (1 month during the middle of the semester). Thus, the former item may reflect no changes in the participants' perceived grades or the belief that they can make up work later on. In any case, this item reflects their general perception of their overall academic performance. In contrast, the latter item may reflect more immediate outcomes associated with academic work, such as how frequently an individual missed a class or did not complete an assignment as a result of playing the MMORPG. This is particularly relevant given the high usage rates observed in the MMORPG group, as evidence suggests that excessive play of online games more generally is associated with educational disruption.¹¹

Moving to social interactions and overall well-being, a more complicated picture emerges. The MMORPG group participants did not report different levels of satisfaction with their social life yet did report more interference with real-life socializing and a greater development of new friendships (presumably online) as a result of playing the game. Indeed, the social interaction with many other people online is a defining feature of MMORPGs and is commonly cited as the best feature of the games.¹⁰ People may systematically reduce time spent socializing with real-life friends to spend more time online, to play but also to socialize and form social networks or connections with online friends. The social venues created by online gaming may, in particular, allow shy and socially inhibited individuals to build friendships more effectively.¹² The sensation of being completely immersed in the game, or "enthralment,"¹³ may attenuate the need to seek out experiences (social or otherwise) that provide excitement in the real world, contributing to reductions in real-life socializing. More generally, that online and virtual social connections may be emerg-

ing as surrogates for real-life social engagement (and social capital) has been suggested.⁹ In fact, social interactions may be a core component driving online game use.^{14,15}

Seemingly, MMORPG play leads to much greater usage, worse reported health and sleep, and possibly some problems in academic and social life. Although the clinical significance of these reported maladaptive outcomes is unclear, MMORPG use may pose risk to some subset of individuals who play excessively. Considerable research attention should be devoted to understanding when MMORPG play is maladaptive, what factors (either intra-individual or environmental) predispose someone for problem gaming, and the development of interventions for individuals with problem gaming behavior.¹⁶ On the other hand, MMORPGs may have a number of benefits. Most individuals appear to play without negative impact. For these people, play can be enjoyable, and they may benefit from the development of additional relationships and social interactions. Video games are, more generally, being looked at for their therapeutic value, such as for training children with chronic illnesses in self-care regimens, pain management, or even improving basic perceptual processes, reaction times, and well-being.^{3-8,17-22} These potential benefits are consistent with the literature on "paper and pencil" role-playing games, suggesting that the social interactions required in these games may also develop social or emotion regulation skills.²³⁻²⁷ Complex games requiring a variety of skills to succeed may also contribute to academic success by promoting problem-solving skills, critical thinking, and creativity.^{25,28,29}

MMORPGs provide a truly dynamic social world, social interaction, and social interdependence that may substantively impact social and emotional skill development among its players. Future work should consider the possible benefits of playing MMORPGs (or even the development of MMORPG-like therapeutic or skill-building games) along with the potential risks and costs. The clearest theme that emerges from this study, however, is that MMORPGs create a compelling, immersive, and socially rich virtual environment. As many more people become immersed in virtual societies, it is important that we continue to examine the costs and benefits of partaking in such worlds.

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