

A Motivational Model of Video Game Engagement

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More Americans now play video games than go to the movies (NPD Group, 2009). The meteoric rise in popularity of video games highlights the need for research approaches that can deepen our scientific understanding of video game engagement. This article advances a theory-based motivational model for examining and evaluating the ways by which video game engagement shapes psychological processes and influences well-being. Rooted in self-determination theory (Deci & Ryan, 2000; Ryan & Deci, 2000a), our approach suggests that both the appeal and well-being effects of video games are based in their potential to satisfy basic psychological needs for competence, autonomy, and relatedness. We review recent empirical evidence applying this perspective to a number of topics including need satisfaction in games and short-term well-being, the motivational appeal of violent game content, motivational sources of postplay aggression, the antecedents and consequences of disordered patterns of game engagement, and the determinants and effects of immersion. Implications of this model for the future study of game motivation and the use of video games in interventions are discussed.

Keywords: self-determination theory, motivation, video games

Psychological research examining video games is presently undergoing a dramatic shift in focus. Until very recently, the preponderance of research in video games has been concern-focused, with studies aimed at identifying the potential negative effects of gaming. Specific foci of these research programs have included the relations between gaming and increased aggression, social isolation, and overuse (Anderson & Bushman, 2001; Grüsser, Thalemann, & Griffiths, 2007). Yet, more recently, a number of researchers have become intervention-focused, hoping to harness the magnetic motivational appeal of video games to help relieve pain and stress or customizing games for educational or health-related interventions (for a review, see Baranowski, Buday, Thompson, & Baranowski, 2008). Increasingly, intervention-focused researchers are demonstrating that games can positively influence both psychological and physical well-being.

Although the goals of both concern-focused and intervention-focused research are dissimilar, both share a descriptive research approach: The methods and theories they employ evaluate the extent to which video games exert positive, negative, or no influence on specified outcomes under a given set of circumstances. What is less well understood and less widely studied are the mechanisms that underlie these positive and negative links.

In this article, we outline a theory-based empirical model for understanding and evaluating the processes through which video

games motivate sustained engagement, and how experiences with these games affect the psychological and physical well-being of players. Our approach is based on *self-determination theory* (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000a), a macrotheory of human motivation that is principally concerned with the potential of social contexts to provide experiences that satisfy universal human needs. We apply that theory to an understanding of how video gaming contexts satisfy or thwart psychological needs and thus foster or undermine sustained engagement and either positive or negative well-being outcomes for players. We present both direct and indirect empirical evidence that highlights the utility of our motivational approach, and show that it can inform such controversial topics as the appeal of violent games, the linkages between aggression and violent games, and the causes and consequences of disordered patterns of game engagement. The empirically based model we present here generates a number of novel and testable hypotheses, and thus has the potential of informing game-based interventions and supplying a better understanding of the positive and negative influences that video games exert on psychological and physical well-being.

Motivation and Video Games

Video games motivate a remarkable amount of goal-directed behavior. For example, every week well over 10 million players of the popular online game *World of Warcraft* forgo other opportunities for leisure and invest more than 225 million hours collaborating, exploring, and competing against one another in a virtual world. Why do so many people spend so much time engaged in such games? The immediate and most obvious answer is “because they are fun.” Indeed, video game play differs markedly from activities that are engaged in for some form of external reward (e.g., payment for work). Few video game players receive any

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external rewards for play; indeed, many pay tangible (e.g., subscription fees, game costs) and social (e.g., angry parents, lost social time) costs to play. Instead, the appeal of video games lies in the inherent properties of the experiences they provide.

Although video games are a relatively new entertainment medium, the empirical study of behaviors pursued because “they are fun” is not new. According to SDT (Ryan & Deci, 2000b), behaviors pursued for their own sake or their inherent satisfaction are identified as *intrinsically motivated*, whereas those pursued to access desired end states or avoid aversive ones are understood as *extrinsically motivated*. For more than 3 decades, one subtheory of SDT, *cognitive evaluation theory* (CET), has guided research on intrinsic motivation in sports, education, and leisure domains. For example, Ryan and Deci (2007) recently reviewed a substantial body of research on sport and exercise in which CET explained interest and sustained participation in these activities. In another recent example, Sheldon and Filak (2008) experimentally manipulated autonomy, competence, and relatedness support in a non-digital game-based learning context, showing that each of these basic needs independently predicted motivation for a game activity. This extensive body of research based on CET thus shows that specific psychological nourishments present in activities are necessary for activities to be experienced as inherently enjoyable or *fun*, and it is these nourishments that influence the effects the activities have on motivation and well-being.

CET-based research demonstrates that activities foster greater intrinsic motivation to the extent to which they satisfy three fundamental human needs: the need for *competence* (sense of efficacy), *autonomy* (volition and personal agency), and *relatedness* (social connectedness; Ryan & Deci, 2000a). When activities make rewards, punishments, and self-esteem pressures salient, they foster controlled forms of extrinsic motivation. Contrary to what may be assumed, these two forms of motivation are not additive. In fact, factors that can enhance extrinsic motivation, such as rewards, pressures, or evaluations, typically undermine intrinsic motivation (Deci, Koestner, & Ryan, 1999). Research has also shown that these forms of motivation have very different influences on individuals engaging in the same activity. Compared with those pursuing an activity for extrinsic reasons, intrinsically motivated actors enjoy the activity more, are more creative, demonstrate more cognitive flexibility, process information more carefully and completely, and incur greater psychological and physical health benefits (Ryan & Deci, 2000a).

The motivational model we propose for video games is based on the premise that the principles of CET and SDT that have been applied to the study of intrinsically motivated behaviors are also relevant to the psychological functioning and well-being of players engaged with video games. In support of this stance, we begin with a review of the brief history of video games, and how their development has increasingly enabled them to satisfy the basic psychological needs specified within SDT. We then turn to recent empirical work based on SDT that evaluates the need-satisfying potential of video games and the relations of need satisfaction with players’ intrinsic motivation and well-being. We suggest that the SDT model of need satisfaction predicts sustained engagement over time, as well as the short-term effects of game activities on players’ well-being.

Expanding on this application of our approach, we extend our need-based model to some concern-focused questions currently

being examined in the field. For instance, we examine violent game content and its contribution to motivation for and enjoyment of video games. Next, we present research that evaluates sources of player aggression as a consequence of video game engagement. Specifically, our interest is in the relations between game experiences that are psychologically need-thwarting and postgame aggressive feelings. We then shift focus and explore how player backgrounds shape game engagement, contrasting players who are *playing because they want to* and those who feel compelled or pressured to play or are *playing because they must*. Next, we review research exploring how a sense of immersion in virtual contexts shapes the influence of virtual content on real-world outcomes. Finally, we close with a discussion of how our model can help advance future basic research on video games, and we highlight the relevance of our model for both concern-focused and intervention-focused research questions.

Psychological Need Satisfaction in Video Gaming Contexts: A Historical Look

There is good reason to expect that video games have the potential to satisfy basic psychological needs. Indeed, the ever-broadening appeal of games suggests that video games tap into motivational processes as well as or in some cases better than traditional forms of media entertainment. In fact, a brief historical review suggests that since their inception video games have increasingly tapped into the basic psychological needs specified within SDT. Specifically, the industry started with games tailored to meet competence needs through games focused on challenges and goals to be mastered. Over time, video game developers have broadened game designs and environments to better meet the autonomy need by providing flexibility in goals, choice over strategies, and opportunities for action in novel environments. Along with expanding autonomy, games have also increasingly been apt at satisfying relatedness needs by providing opportunities for engaging in online interactions and communities. We discuss each of these phases and the needs they meet in turn.

Competence Need

The earliest successful video games excelled at supporting the fundamental human need for competence. The developers of coin-operated games such as *Galaga*, *Pong*, and *Donkey Kong* that populated arcades in the 1970s and early 1980s structured these virtual environments so that reflex-based challenges gradually increased in line with the player’s progress through the game. The pacing of challenges was designed so players could continually experience enhanced competence as they progressed in the game, with challenges increasing apace with player ability. This balancing of game difficulty and player skill was critical to the success of arcade games; if the challenges underwhelmed players, they would lead to boredom, and if they overwhelmed the player, they would generate frustration. Developers sought to avoid either in order to hold the interest and loyalty of players.

Although the contemporary game industry has moved away from arcade settings, balancing player skill against game challenges remains a prime concern. For example, modern console-based games, such as *HALO 3*, use Internet technology to match

players against one another on the basis of their history of in-game performance. In addition to deriving new ways to balance challenges with ability, games have become more sophisticated in how they provide performance feedback and acknowledge the prowess of players. Some games approach feedback in general terms, whereas others provide granular and timely feedback in terms of points or indicators built into the game world. Microsoft's online gaming network provides a general indicator of players' skill by aggregating each player's performance across all of the Xbox 360 games a user owns and calculates an overall score. The music game *Guitar Hero* uses the in-game audience of nonplaying characters to provide continuous feedback as these characters cheer and scream if the player performs well (or boos and hisses if the player falters). Because skill-graded challenges and positive feedback are key to player experiences of competence need satisfaction (Ryan & Deci, 2000a), they represent an important element in motivating play.

Autonomy Need

Whereas early arcade games offered players a relatively constrained set of choices, as video game play moved from an arcade to a home-based activity in the 1980s and '90s, it also began to tap into the basic psychological need for autonomy. Games such as *Final Fantasy*, *The Legend of Zelda*, and *Adventure* placed players in the role of fictional characters and provided a wide range of in-game choices over goals and strategies and varied opportunities for action. These games drew on a wide talent base that included programmers, writers, and artists. Together, these teams created expansive virtual contexts, unexplored worlds populated by characters, and fantasy narratives. Creators of these games fostered a sense of equifinality (multiple routes to an end) for players in terms of overall achievement and supported autonomy giving players options over multiple game elements: what missions they choose, the skills they acquire, and how their characters appear. By enabling players to advance through different game challenges, allowing them to form and break alliances with nonplayer characters, players were empowered to shape the game's narrative. The creators of modern games aim to provide players with meaningful choices to continuously balance their boundless curiosity against a finite pool of resources and talent. For example, one recently created game, *Spore*, adopts a novel approach to this dilemma. Instead of relying on game professionals to place all of the objects and creatures in the *Spore*'s world, the game uses a technology called procedural generation, whereby novel environments are dynamically generated by the software using content created by other players of the game around the world. In this way, the game strives to generate almost limitless new content, and thus supports opportunity and choice for each player.

Relatedness Need

Social interaction has always been an important part of video game play, both in arcade settings and home console games. Only recently, however, have popular games provided players opportunities to interact and connect within large shared virtual worlds while at the same time occupying geographically remote real-world locations. Early computer terminal-based games such as *Zork* and *MUD1* were hosted by university computer mainframes

and provided dozens of players with text-based (i.e., nongraphical) game worlds populated with both computer- and human-controlled characters. Modern incarnations of multiplayer games, such as *World of Warcraft*, give players connected to the Internet access to a central virtual world that provides opportunities for both competitive and cooperative group play. These games allow players to band together in short-term groups to accomplish missions in a single gaming session and form longer term groups, known as guilds, factions, or clans, that persist over time. Game developers have increasingly brought Internet-based technologies to support longer term relationships between players, including Web forums, guild chat channels, and voiceover Internet protocol communication. These features enable players to develop social bonds, allowing them to cooperate in person or with tens of thousands of geographically remote peers.

Mastery of Controls

One key characteristic that distinguishes real-world from gaming contexts is that the latter lack physical substance. This difference carries two practical implications for the study of human engagement and motivation in games. First, player actions are mediated through a control interface, and second, player actions cannot readily capitalize on the sense of proprioception as a source of control and feedback. As such, players do not have a fully intuitive sense of orientation and action in virtual environments, and they must invest time and energy to master the control interface and learn the mechanics of each game. In the course of studying video game motivation, we termed the learned ability to effortlessly perform intended actions in the game's virtual environment as *mastery of controls*.

Mastery of controls plays an important role in game motivation, largely as a necessary, but not sufficient, condition for achieving psychologically need-satisfying play. Video game players and designers refer to the process of acquiring mastery of controls using the term *learning curve*. Games that have complex controls and mechanics are said to have a "steep" learning curve, and players generally do not enjoy this kind of engagement, instead viewing it as a price of admission to what is hoped will be future fulfilling game experiences. Once obtained, mastery of controls provides video game players with the chance to access developer affordances such as exploration, puzzle solving, or emerging victorious in combat. Therefore, although control mastery is not implicitly satisfying, it unlocks the game's potential to meet the player's psychological needs.

In recent years, game interfaces have become increasingly sophisticated and intuitive. Initially, control interfaces like those provided by arcade games were simple, but each game required players to learn and use different constellations of joysticks and buttons. Later, platforms standardized interfaces across games to facilitate player interface competence, allowing them to transfer skills from one game to another. Although some early games like *Duck Hunt* used inherently intuitive interfaces (the *NES Zapper*), such games were relatively rare until recently. Modern interfaces such as Nintendo's motion-tracking Wii controller and those patterned after musical instruments for games such as *Rock Band* and *Guitar Hero* reduce the burden of learning how to play, thereby allowing novice and experienced players to focus on playing well.

Research on Need Satisfaction in Games

According to our motivational model, video games have the potential to enhance intrinsic motivation and short-term well-being insofar as they provide players with experiences that satisfy universal psychological needs. This perspective emphasizes motivational processes inherent to the structure of gaming contexts. To say this another way, it is our view that games are generally more or less appealing, and have a greater or lesser influence on player well-being, as a function of the extent to which the in-game experiences they provide fulfill fundamental psychological needs.

The first published research applying this model consisted of four studies drawing on between- and within-persons research designs, varied samples, and experimental methods to gain a broad idea of the motivational principles at play in video games (Ryan, Rigby, & Przybylski, 2006). As part of this work, we designed and validated measures of need satisfaction within video game contexts that we called the *player experience of need satisfaction*. In addition to measuring autonomy, competence, and relatedness needs, these assess issues related to mastery of controls and players' experience of immersion. These assessments are used in the studies we review in this article unless otherwise indicated.

We formulated and tested three main hypotheses in this initial research. First, we expected that need-satisfying experiences within video game play would contribute to (a) intrinsic motivation for play, (b) immersion in gaming environments, and (c) positive short-term shifts in player well-being. Second, we expected that the motivational affordances provided by games underlie their appeal over and above the content of games and individual differences. Finally, we expected that mastery over game controls and mechanics was necessary to access need-satisfying opportunities provided by games, but that an intuitive grasp of game interface was not a sufficient condition for enhancing player motivation or well-being.

In the first study, we assigned novice video game players to 40 min of video game engagement within a 3-D "platform" game that emphasized exploration and skill-based challenges. We expected that self-reports of autonomy and competence need satisfaction would relate to positive short-term shifts (pre- to postplay) in well-being, greater game enjoyment, and a greater likelihood that participants would elect to return to the game when given a choice to do so. Results confirmed these predictions and showed that the experience of autonomy need satisfaction during play related positively to change in affect and enjoyment of the game. In addition to these outcomes, experiences of competence need satisfaction related to greater immersion in the game world, increased self-esteem, and the likelihood of reengaging the game in a free-choice period.

A second study in the Ryan et al. (2006) series focused on how between-games differences in psychological need satisfaction related to their popular appeal. We created a within-subjects design that randomly assigned participants to play one of two games on their first visit to our lab and the other on their second visit. We selected two games that were closely matched on content but dissimilar in terms of their critical acclaim—one being a commercial and critical hit and the other a flop. We expected that the variability that existed between these games in terms of popularity reflected underlying differences in the extent to which each was psychologically need satisfying. Results supported this intuition.

Analyses conducted on the between-games level demonstrated that participants experienced greater levels of autonomy and competence need satisfaction playing the popular game. Analyses conducted on the within-person (between-games) level showed that differences in game enjoyment, immersion, as well as pre- to postplay shifts in well-being were directly associated with variability in the need satisfaction each game provided. In other words, the more popular game had a more positive influence on short-term well-being and was more intrinsically motivating precisely because it provided experiences that were richer in autonomy and competence need satisfaction.

In a third study, we focused on isolating the unique contributions made by need-satisfying play from variability based on differences in game content, player skill, or player demographics. Thus, our third study statistically modeled the relations between in-game need satisfaction, intrinsic motivation, and well-being outcomes using multilevel modeling, analyzing these links in terms of person-nested and game-nested effects (Bryk & Raudenbush, 1992). Participants came to our lab on four separate occasions and completed measures of well-being; then they were randomly assigned to play a different game on each visit before completing postplay assessments like those from the first two studies. We expected that experiences of autonomy and competence need satisfaction during play would relate to greater game enjoyment, immersion, preference for future play, and short-term increases in well-being. Between-persons analyses showed that players who experienced greater levels of autonomy and competence need satisfaction experienced greater game enjoyment, preference for future play, and immersion independent of variance yoked to specific game contexts. Of greater interest were within-person, between-games analyses that showed that play experiences that supported the autonomy and competence needs produced more enjoyable, more immersive play that was enhancing for player vitality, self-esteem, and affect. We found that psychologically satisfying experiences of play were a robust predictor of motivation and well-being across individuals and across the varied game contents and narratives.

A final study by Ryan et al. (2006) extended the model to self-selecting video game players to see whether motivation and well-being were similarly linked in this population. In addition, because the prior studies had focused only on autonomy and competence needs, we wanted to examine how opportunities for players to satisfy the need for relatedness were also associated with motivation and well-being. Results demonstrated that all three needs made independent contributions to game enjoyment, immersion, and estimations of future engagement. Furthermore, although relatedness need satisfaction was correlated with positive well-being outcomes, only autonomy and competence need satisfaction derived from play accounted for unique incremental variance in player affect following play.

In three of these studies, we specifically evaluated the motivational role filled by mastery of controls, defined as the sense one has intuitive command over a game's basic mechanics and control interface. Our main prediction was that mastery of controls constituted a necessary but not sufficient condition for video game engagement to satisfy psychological needs, be enjoyable, and bare positively on well-being. Results supported this, showing mastery of controls related to enjoyment and other outcomes as expected,

but it no longer accounted for unique variance in player motivation and well-being when in-game need satisfaction was considered.

Together, these studies showed that psychologically need-satisfying experiences form the root of intrinsically motivating play, and that such experiences positively influence short-term shifts in well-being and increased immersion in the game world. The studies suggest that the gaming environments, like their real-world counterparts, can be understood in terms of psychological needs, and that these frustrations and affordances provide a robust account for player motivation and the effects of play on wellness outcomes.

The Motivational Appeal of Violence in Games

Perhaps the most controversial aspect of video games is that so many involve conflict, combat, crime, and war. Violent games such as these have been widely studied, but this inquiry largely has focused on the effects violent games may have on player aggression outside of games (Anderson et al., 2004; Ferguson, 2007; Sherry, 2001). Some experimental studies have suggested that violent game play can be a cause of short-term shifts in aggression (Anderson et al., 2004), and others have shown no such effect (Ferguson, 2007). Longitudinal research findings are similarly mixed; some researchers have found that video game exposure contributes to subsequent player aggression (Anderson, Gentile, & Buckley, 2007), although others have found that violent game play does not relate to greater aggression over long spans of time in studies that randomly assigned individuals to play different games (D. Williams & Skoric, 2005). If indeed violent game play and aggression are related, the causal direction of such links is unclear.

Because our model is focused on motivation, we became interested initially in a slightly different question. In particular, we wondered whether violence played a *motivational* role in accounting for the appeal of games; that is, does violent content lead to more interest or sustained engagement in video games? Many authors have suggested that the violent imagery and narratives present in games are motivating in their own right (Kirsh, 1998; Olson, 2007; Zillman, 1998). Yet, according to our SDT view, violence itself does not fulfill basic psychological needs and therefore should not motivate play by itself. At the same time, our review of video games suggests that many features afforded by popular violent games could hold the potential to satisfy psychological needs. For example, games involving conflict and combat can readily support the need for autonomy by empowering the player with opportunities for action, choices over strategies and missions, and relatively open environments in which to act. Similarly, in-game carnage often serves to enhance the need for competence by providing players with intuitive and immediate feedback about their performance. Seeing blood, for example, immediately tells a player that he or she has hit the target. Similarly, team-based challenges can foster camaraderie and bolster relatedness in struggles against a common foe. Thus, our interest was in disentangling the relationship of need satisfaction to violence, to see whether violence per se provided any motivational appeal.

Given these questions, in our next series of studies (Przybylski, Ryan, & Rigby, 2009), we formulated and tested three primary hypotheses concerning the motivational appeal of violence in games. First, we expected that the core appeal of violent video

games would be based on the experiences of need satisfaction they provided; in other words, we anticipated game preferences and enjoyment would be largely a function of basic need satisfaction. Second, we hypothesized that the level of violence in games would relate to intrinsic motivation and immersion in gaming environments only insofar as it was reducible to need satisfaction. Third, we predicted that individuals high in dispositional aggression would opt into and value violent games to a greater extent because violent content fit with their trait-like styles, whereas people low in trait aggression would not prefer such games. To this end, we created six studies that evaluated the influence of violent game content on motivation and immersion during play.

In a first study, we evaluated the motivational appeal of violent game content and experiences of need satisfaction across a broad spectrum of games. The central question was whether the level of violence present in a game is a consistent motivator? We surveyed a large number of players about their current favorite game and collected self-reports of intrinsic motivation, immersion, and likelihood of recommending the game. Level of violence in games was quantified using two coding schemes. First, we applied ratings provided by the Entertainment Software Ratings Board for each game, which assesses violent and sexual content. We also applied our own rating system that focused on the intensity and graphicness of the violence itself. We predicted that level of violence could be correlated with motivation, but would not be uniquely linked when basic need satisfaction was accounted for. Results largely supported this expectation, showing that player experiences that supported the autonomy and competence needs related to greater intrinsic motivation, environmental immersion, and word-of-mouth recommendations for games. Furthermore, results showed that level of violence was only weakly linked to immersion and was entirely unrelated to intrinsic motivation and word-of-mouth recommendations. These findings did not allow us to evaluate our hypothesis that the appeal of violence was reducible to need satisfaction because there was no relation to deconstruct or mediate. In addition, the null relation between level of game violence and motivation ran counter to the prevailing view that the presence of violence in games adds to their appeal.

Our subsequent studies focused on further zeroing in on the common belief that more game violence creates a more motivating play experience. In our second study, the central question we asked was whether game violence motivates some people but not others. We thus broadened the scope of our inquiry by assessing trait-level aggression. Trait-level aggression represents a stable individual difference that reflects variability in perceiving and reacting to the world in aggressive or hostile ways (Buss & Perry, 1992). We thus viewed trait aggression as a likely moderating factor that could account for a link between level of violence in games and some individuals' preference for them. Specifically, we hypothesized that play experiences that provided satisfaction of the needs for competence and autonomy would consistently predict intrinsic motivation, environmental immersion, and preference for future play, but we had no expectation that these should relate directly to violence. That is, we expected to find that, on average, violent games are no more preferred or need satisfying than nonviolent ones. Yet, we also reasoned that trait-level aggression would moderate preference for future play such that highly aggressive individuals would prefer games that embed challenges and choices

within settings involving violent graphic imagery and a violent narrative backdrop.

Participants were assigned to play a graphically violent game after completing a self-report assessment of trait aggression and before assessments of needs and motivation. Results showed that, as predicted within CET, autonomy and competence need satisfaction derived from play accounted for increased levels of game enjoyment, immersion, and preference for future play. Furthermore, individual differences in aggression were independent predictors of preference for future play, although interestingly not of enjoyment during game play. These results indicated that need satisfaction was a consistent motivator of play across all participants, but that those high in aggression exhibited a greater desire to play the violent game in the future despite not enjoying it, and that despite low enjoyment, they felt more immersed compared with participants lower in trait aggression.

In a third study, we wanted to establish a causal direction for the effects we observed between level of game violence and player preference. To do this, we implemented a design used in a widely cited study that focused on the effects of high- versus low-violence video game play (Anderson et al., 2004) in which players were randomly assigned to play either a high-violence or nonviolent game. We added an assessment of trait-level aggression before play and after-play assessments of motivational constructs. We expected that need satisfaction would account for game enjoyment, immersion, and preference for future play between participants and within games independent of their content, and that trait-level aggression would moderate the relation between the level of violence present in game content and preference for play such that those high in aggression would be more likely want opportunities for future high-violence play than low-aggression persons. Results showed that the games did not vary in the enjoyment or need satisfaction they provided, and that violent content by itself was not significantly related to enjoyment. Nonetheless, those high in trait aggression did report more preference for the violent game.

In the previous study, we used two different games that had violent versus nonviolent content. This design was concerning because the different games varied across a number of potentially confounding dimensions, including control interface complexity, graphic elements, game action, and many other dimensions besides violent content. The fourth study provided a more rigorous test of the motivating role of game violence. To this end, we extensively modified the content but not play mechanics of *Half-Life 2*, a popular computer game. The high-violence version provided graphic violence featuring firearms, gore, and a conflict-based kill-or-be-killed narrative, whereas the low-violence version had a friendly competition story describing the play as a game of tag wherein players teleported adversaries away. Following training in the game controls, we randomly assigned participants to high-violence or low-violence versions of the game. Results showed that the violent and nonviolent versions did not differ in the need satisfaction, enjoyment, or immersion they inspired. Of interest was the finding that in-game competence and autonomy need satisfaction, not level of violence, accounted for variability in these outcomes. Furthermore, trait aggression related to preference for future play only in the high-violence condition, thereby moderating the link between level of game violence and preference for future play. The core motivation for all participants was rooted in need satisfaction provided by the challenges and opportunities

present in both conditions, but those with high (relative to low) levels of aggression expressed greater desire to play the violent variation of the game in the future.

Two additional studies in this series extended the generalizability of our findings to experienced players. Our fifth study was an experimental design that randomly assigned experienced young male gamers to play a relatively violent game with either realistic or abstracted gore. Even among this cohort, analyses revealed that more graphic violence increased game appeal only for those relatively high in aggression. The violent version of the game was preferred only by those relatively high in trait aggression. Our sixth study surveyed players about their current favorite video game, and showed that play that supported the basic needs for competence and autonomy produced more immersive and enjoyable experiences relating to greater preference for future play. Level of game violence did not account for the appeal of games; in fact, it was negatively related to game enjoyment once need satisfaction was accounted for. Violence did, however, relate to valuing and preference for future play as a function of the level of player aggression. For those low in trait-level aggression, level of game violence served to undermine these outcomes.

We derived a number of novel findings by investigating violent game content in terms of its motivational value rather than its potential to incite aggression. First, we found that violent content does not by itself contribute to the appeal of games, a result that runs counter to the commonly held view that popular violent games such as *Grand Theft Auto IV* are popular *because* they are violent. Instead, we found that most popular violent games motivate engagement for players of subclinical levels of aggression as a function of the competence and autonomy need satisfaction they provide. Second, we found that violent game content did appeal to a subset of players: those relatively high in aggression. This finding suggests that a subpopulation of individuals might be more liable to seek out violent content across a broad range of media (e.g., film, music, literature) and could be more vulnerable to its influence. Finally, we found that violent game content can serve to undermine the appeal of games for those with moderate to low levels of aggression. This result indicates that video game creators could potentially be alienating a broad audience when they infuse inherently motivating game mechanics with gratuitous violence.

Sources of Player Aggression

The potential of video games to influence human aggression is a highly controversial subject, both in popular culture and increasingly in scientific circles. The empirical study of player aggression focuses on how the violent content and themes of games can serve as a source of increased aggression postplay, especially among highly aggressive individuals (Giumetti & Markey, 2007). Given the predominance of interest in violent game content, it is noteworthy that little research to date has examined how game structure might also shape short-term shifts in aggression through motivational processes. Past SDT research has shown that motivational processes based on psychological need deprivation can lead to more aggressive behavior in real-world contexts (Assor, Roth, & Deci, 2004; Ryan & Grolnick, 1986). Related research indicates that interfering with performance in goal pursuit, even in trivial tasks, can elicit heightened aggression (Berkowitz, 1989; Pedersen, Gonzales, & Miller, 2000). Based on our motivational

approach, we expected that video game play could serve to increase player aggression independent of game content (e.g., violence) when experiences of play undermine the basic psychological needs of players. As a specific example, we expected that mastery of controls (i.e., the player's ability to enact actions in the game world through a controller) could be linked to aggression when it frustrates feelings of competence. That is, overly complex or nonintuitive control interfaces are likely to frustrate the competence needs and lead to enhanced postplay levels of aggression. To test this, Przybylski (2009) looked at competence frustration and player aggression in a recent series of studies.

The first study replicated the basic design of a violent video game study conducted by Anderson and colleagues (2004). The main purpose of drawing on this method was to examine how experiences that supported versus undermined mastery of controls influenced short-term shifts in player aggression. It was important to isolate this effect from differences in the level of violent game content. The nonviolent game used in the original study of Anderson et al. (2004) had a relatively simple control interface, whereas the violent game had a much more difficult and complex one. It was expected that participants randomly assigned to play the nonviolent game would therefore experience greater mastery of controls than those playing the violent game because only four keyboard keys were required to play the former, whereas a mouse and more than a dozen keys were needed in the latter. Furthermore, it was hypothesized that an experience of need deprivation, reflected by low scores on the self-report of mastery of controls, would lead to pre- to postplay increases in state-level aggression. Also, it was expected that such shifts in aggression would be negatively related to game enjoyment. Results largely supported these intuitions. Players assigned to play the violent game that featured a more complex control interface experienced lower mastery of controls compared with those who played the nonviolent game. In addition, pre- to postplay increases in aggression were in evidence for participants assigned to play both games when they experienced low mastery of controls. Increased levels of aggression in turn related to lower levels of game enjoyment. In summary, it was an inability to master the game controls instead of differences in violent game content that contributed to the observed shifts from pre- to postplay aggression.

A second study examined how the inherent complexity of video game control schemes could increase player aggression entirely independent of contributions of violent game content. Two experiments, one focusing on a violent game, the other on a nonviolent game, manipulated the complexity of the control interfaces used to interact with game challenges. In both experiments, it was predicted that mastery of controls would be the lowest and pre- to postplay shifts in aggression would be the greatest for participants randomly assigned to games using more complex interfaces. Also, it was expected that increases in aggression for players of each type of game would lead to less game enjoyment. Results showed that complex interfaces undermined player competence and fostered increases in aggression in both experiments. Increased aggression related negatively to game enjoyment for participants assigned to play high- and low-violence games.

A third study tested how opportunities to practice with a complex game's control interface before playing shaped how the game influenced short-term shifts in player aggression. Przybylski (2009) identified practice as an important factor to consider in light

of a meta-analysis of video game play and aggression reported by Sherry (2001). This study demonstrated that the length of game engagement moderated the links observed between type of game and aggression; that is, aggression was lowest for players of high-violence games when they were assigned to play these games for long periods of time. When viewed through the motivational lens of our model, this result suggests that longer play periods provide opportunities for participants to develop mastery over game controls. In the first experiment, participants were provided the opportunity to learn the controls and mechanics of a game with complex controls before being assigned to face challenges that featured high- or low-violence stories and acts. The second experiment mirrored the first in most respects but provided a practice period (to teach game controls and mechanics) to only half of the participants. Level of violent content related to increased feelings of threat in participants assigned to high-violence play in both experiments, but content was on balance unrelated to shifts in aggression. Holding violence content constant, results from the first experiment demonstrated that players who felt competent at the game controls felt less aggressive following play. Additional findings from the second experiment showed that participants who were provided practice time developed greater mastery of controls, whereas those who had not practiced incurred increased aggression pre- to postplay.

A fourth study aimed to test the generalizability of need support versus deprivation as a source of aggression on the between- and within-persons levels in a sample of avid video game players. It was predicted that experiences of play characterized by competence need satisfaction would relate to lower postplay aggression, higher game enjoyment, higher postplay positive affect, and lower postplay negative affect. A sample of avid players provided data on three games they were currently playing, their experiences of need satisfaction, and postplay affect. These games were coded for level of violence using the methods we had used when studying the appeal of violence in games. Multilevel modeling (Bryk & Raudenbush, 1992) was used to isolate the effects between games. Results showed that game engagement that supported the basic psychological needs predicted greater game enjoyment and postplay positive affect as well as lower levels of postplay aggression and negative affect. On the other hand, consistent with previous studies, violent content did not significantly relate to player outcomes when in-game need satisfaction was considered.

In sum, these recent studies suggest that the extent to which the features of play support versus undermine basic psychological needs ought to be considered as a robust source of variability in postgame player aggression and negative affect. The results showed that although the level of violence in game content did not consistently account for short-term shifts in aggression, structural elements of games such as interface complexity and the provision of practice carried robust motivational and well-being implications for players.

This pattern of results suggests that future research focused on violent game content and short-term shifts in aggression should be wary of using different games that vary across motivational dimensions to represent high- versus low-violence play experiences. It also further testifies to the utility of the needs model in locating some of the concern-focused outcomes in video game research. The needs model provides a new, motivation-based way of studying player aggression among those with subclinical levels of trait

aggression, an approach markedly different from the dominant social-learning viewpoint.

Having Versus Wanting to Play

Many commentators have expressed concern about the overuse of video games and their potential to undermine healthy development. Supporting such concerns are research findings suggesting that the quantity of time players devote to games is negatively correlated with player well-being and adjustment (Grüsser et al., 2007). Beyond this correlational link, however, little is understood about the circumstances that make some individuals vulnerable to the overuse and disordered use of games or the factors that make others resilient. A recent study by Przybylski, Weinstein, Ryan, and Rigby (2009) used SDT as a conceptual and empirical bridge to examine patterns of obsessive play and overuse. The aim was to explore whether individual differences in basic psychological need satisfaction in everyday life could serve as a protective factor against unhealthy forms of play and need deprivation could serve as a risk factor. Even more specifically, we wondered whether players might even derive different benefits from video game engagement as a function of their styles of play.

The SDT perspective holds that individuals who have their basic needs satisfied in daily life are more likely to experience volition and choice and have high levels of global well-being compared with those who have their needs undermined (Ryan & Deci, 2000b). Accordingly, Przybylski, Weinstein, et al. (2009) predicted that individuals who have their needs for competence, autonomy, and relatedness satisfied in daily life would experience more sense of choice about their engagement in video games and would be more likely to play because they want to. In contrast, SDT research has shown that the undermining of basic needs exposes individuals to less self-determined, more compulsive behaviors (Deci & Ryan, 2000). In line with this, Przybylski, Weinstein, et al. expected that individuals with low levels of need satisfaction would feel more compelled to engage games or to report that they often play because they “have to.”

To examine these questions, we applied the *dualistic model of passion* (Vallerand, 2008), a motivational theory in line with SDT. The dualistic model of passion has previously been applied to Internet use (Seguin-Levesque, Laliberte, Pelletier, Blanchard, & Vallerand, 2003) and video gaming domains (Wang, Khoo, Liu, & Divaharan, 2008), and thus provides a means for assessing “wanting to” versus “having to” play. Results from these previous studies have shown that players often engage in computer activities through a *harmonious passion*: They have a strong inclination to engage that feels consistent with abiding values and motivations. Previous results also have suggested that people with harmonious passion experience more positive outcomes from computer activities (e.g., self-determined relationships, positive affect). Conversely, some people have an *obsessive passion* for computer activities. Like harmonious participants, they have an equally powerful motivation to play, but it is experienced as a more compulsive and uncontrollable urge to act, and is predictive of more negative outcomes associated with play. Our interest was in predicting harmonious and obsessive engagement in video games as a function of need satisfaction (or its deprivation) in everyday life.

Przybylski, Weinstein, et al. (2009) sampled a large number of regular video game players and assessed individual differences in basic psychological need satisfaction, motives for play, mood immediately after play, and overall levels of player well-being. It was expected that individuals high in basic need satisfaction would pursue play with a sense of volition, as a harmonious passion, and that those unable to access need satisfactions in day-to-day life would be more likely to engage games with a sense of compulsion, as an obsessive passion. Przybylski, Weinstein, et al. predicted that harmonious passion for play would relate to greater game enjoyment and postplay mood, and obsessive passion would be linked with a greater quantity of play and poorer mood following play.

Results showed that individual differences in basic need satisfaction were associated with the way in which individuals engaged video games. Across a diverse variety of favored games, those who experienced high levels of need satisfaction had more harmonious passion for play, which in turn was linked to an enhancing pattern: more game enjoyment and positive postplay mood. In contrast, low levels of need satisfaction predicted obsessive passion for play, which in turn was associated with a disordered pattern: less game enjoyment, negative postplay mood, and yet a higher overall amount of engagement.

Two additional findings of interest were uncovered. First, when individual differences in need satisfaction were accounted for, passion for video game play related robustly to player well-being tied to the gaming context (mood immediately after play), but it was not uniquely related to overall (global) levels of player well-being. That is, although harmonious versus obsessive game play had associations with general well-being, it was no longer predictive when accounting for everyday need satisfaction. This suggests that video game styles may be more a symptom than a cause of psychological distress. In other words, a disordered pattern of game engagement can be thought of as one consequence (among many) of psychological need deprivation in day-to-day life. Second, high numbers of hours of video game play were not invariably related to negative outcomes. When they were, it was in part because players were obsessively engaged. Analyses showed that obsessive passion moderated the link between the amount of game engagement and player outcomes, such that a high level of hours led to negative outcomes insofar as they were accompanied by a compulsive drive to play. Taken together, these findings suggest that future video game research focused on disordered play should account for the quantity and motivational quality of game engagement. The direct influence of video game play on overall well-being, for good or ill, may be much less significant than previously thought.

The Moderating Role of Immersion

Video games can provide highly immersive experiences, allowing the player to experience a strong sense of presence in the game world. Immersion reflects an *illusion of nonmediation* between the player and the gaming context, so that the player feels directly embedded in the virtual environment and the story happening there (Lombard & Ditton, 1997; Rigby, 2004). The ability of video games to immerse participants might shape how the content of video games serves to influence player psychology. Our research approach trifurcates the general immersion state into three sub-components or subscales: *physical presence*, feeling as if one is

actually in the world; *emotional presence*, feeling that game events have real emotional weight; and *narrative presence*, having a personal investment and engagement with the story (Ryan et al., 2006). Although these three components of immersion are thought to be highly collinear, they have different profiles within different games; for example, some games have little narrative but afford a great physical sense of presence.

Many game designers and players assume that a sense of immersion is based mainly on the fidelity of the graphics and sound provided by a virtual environment. It is interesting that our findings suggest a minor role for these elements. Instead, the major predictor of presence is the degree to which games satisfy motivational needs. Video game play that satisfies the needs for competence, autonomy, and relatedness robustly increases a player's sense of immersion, both across different game types (Ryan et al., 2006) and game contents (Przybylski et al., 2009). In other words, when players have their needs satisfied within the game, they are more phenomenologically embedded in the emotional, physical, and narrative elements of the game world.

Although the immersive dimensions of video games have been points of interest in writing by researchers studying aggression (Carnagey & Anderson, 2004) and disordered play (Grüsser et al., 2007), the moderating influence of immersion in virtual contexts has not been examined. Recent research by Weinstein, Przybylski, and Ryan (2009) was the first to empirically evaluate how immersion shapes links between the content of virtual contexts and real-world interpersonal goals and decision making.

In the first study, participants engaged one of two virtual contexts: One featured manufactured imagery including cities and skyscrapers; the other had natural settings such as forests and streams. Based on past research (Kasser, 2002; Schultz, 2002), it was hypothesized that participants exposed to the manufactured imagery would espouse increased self-focused or self-centered goals, whereas those shown natural imagery would have higher levels of other-focused or prosocial goals. More important for this discussion, Weinstein et al. (2009) predicted that immersion, assessed using an adapted version of the Physical Presence subscale of the Player Experience of Need Satisfaction Scale, would amplify the effects of content (manufactured vs. natural) on shifts in interpersonal goals. Results supported these expectations: Manufactured content led to greater self-focused goals, and natural content was linked to greater prosocial goals. Of key interest, however, was the finding that these shifts in interpersonal goals were significantly more pronounced for participants who were highly immersed in the virtual contexts.

Expanding on these findings, two additional experiments presented by Weinstein et al. (2009) explored mechanisms through which immersion amplifies this carryover effect. Results from a second study showed that immersion enhanced the link between nature content and prosocial goals because high levels of immersion amplified the extent to which participants felt connected to nature as a whole. Similarly, participants who were highly immersed in manufactured content had more self-focused goals insofar as immersion in this content undermined basic needs. That is, experiencing oneself as physically present in a virtual environment was shown to moderate the main effect of content per se. The third study replicated and extended these results, and showed that immersion also played a role in shaping actual decision-making behavior.

Although not focused directly on concerns about aggression or behavioral dependence, the work of Weinstein and colleagues (2009) suggests that feeling physically present in a virtual context can intensify the carryover of the content of that context into real-world cognition and behavior. Weinstein et al.'s approach and results have special significance for future video game research when set against those of Ryan et al. (2006) and Przybylski et al. (2009), which showed that the physical, emotional, and narrative facets of presence are based on the basic need satisfaction games provide. Given that these elements of immersion could increase or decrease the carryover effects of game content into real-world outcomes as a function of need satisfaction, future video game research concerned with disordered play or player aggression should consider immersion as a key moderating construct and assess or manipulate it in the course of inquiry.

Other Perspectives on Video Game Motivation

As noted above, most social and personality psychology research begins examining the influences of video games by quantifying the extent to which engagement is linked with negative psychosocial outcomes (e.g., aggression, behavioral dependence). Research based on the mass communications theory focuses more attention on factors that influence player motivation. We very briefly highlight these approaches and compare them with our motivational perspective.

Uses and gratifications theory (Blumler & Katz, 1974), a general framework intended to describe how different media (e.g., televised sports) serve as solutions to everyday problems (e.g., boredom), is the main model applied to games in the communications domain. Sherry and Lucas (2003) applied uses and gratifications theory to create a statistically validated taxonomy of the reasons individuals hold for engaging in video games. Their findings suggest that players use games as a means of accessing one (or more) of the following psychological states: (a) *competition*, experience defeating others; (b) *challenge*, experience success following effort; (c) *diversion*, escape an experience of stress; (d) *fantasy*, experience novel or unrealistic stimuli; (e) *social interaction*, have a social experience; and (f) *arousal*, experience activated positive emotions such as excitement. In addition, they found that these reasons were more or less prevalent with respect to some kinds of games and were linked to different levels of engagement. For example, video game engagement enacted to socialize with friends or escape aversive psychological states related to more hours of play each week. Further research by Lucas and Sherry (2004) extended the application of uses and gratifications theory, showing that gender-based differences between preferences for some kinds of video games (e.g., *HALO* vs. *The Sims*) could be explained, in part, by differences between the satisfaction players of each gender anticipated deriving from engagement. For example, Lucas and Sherry (2004) showed that females preferred games that conveyed the experience of successful completion of challenges compared with those that imparted a sense of domination of others.

Although they might seem topically similar, the uses and gratifications theory approach differs in many ways from the motivational model we are presenting. The SDT- and CET-based approach views sustained video game engagement as a function of a set of basic psychological needs that video game play may or may not fulfill. In our view, competence, autonomy, and relatedness are

irreducible, universal human needs. Studies conducted in a wide range of cultures have shown that basic need support is linked to intrinsic motivation (e.g., Chirkov & Ryan, 2001; Deci et al., 1999; Jang, Reeve, Ryan, & Kim, 2009). This consistency adds utility to our model for understanding the influence of games; if it is known to satisfy basic needs, there is reason to expect it will have positive influences in other samples. The uses and gratifications theory focuses instead on differences in what satisfaction people consciously seek in media use, and research demonstrates that such satisfaction varies with media type (Greenberg & Hnilo, 1996), a media user's gender (Lucas & Sherry, 2004), or culture (Greenberg, Li, Ku, & Tokinoya, 1991). Yet, SDT has a long tradition of showing that people's goals, even when fulfilled, do not always yield need satisfaction, and therefore do not always predict persistence or well-being outcomes (Ryan, Kasser, Sheldon, & Deci, 1996).

Based on theoretical work of Bartle (2004), recent research conducted by Yee (2006a, 2006b) focuses on the motives that different types of players adopt when engaging popular online games (e.g., *World of Warcraft*). This approach links the subjective importance players place on actions they enact in the game world to differences in player demographics and the amount of time individuals spend playing. Yee (2006a) identified three overarching motives for in-game behavior: (1) *achievement*, accumulation of status or power; (2) *socializing*, formation and maintenance of relationships; and (3) *immersion*, exploration of the game's narrative, locales, and characters. Yee (2006b) reported that female players placed greater emphasis on the socializing and immersion motives, whereas male players considered achievement motives most important. Furthermore, Yee's research showed that the social and immersion motives were linked to more hours of play each week.

Although Yee's player motive approach evaluates motives tied to the game proper, it differs from our SDT-based perspective in terms of the underlying appeal of games. Namely, Yee's (and Bartle's) model is based on a set of motives deduced from the affordances multiplayer online games currently provide; in contrast, our model focuses on the fundamental psychological needs that such motives may or may not tap into or satisfy. Because Yee's approach represents a rigorous empirical approach to assessing players' expected uses and gratifications in the video game sphere, we conducted a study in which we compared the two. Specifically, we evaluated the relative contributions of factors derived from our need satisfaction model (competence, autonomy, and relatedness) and those from Yee's player motive model (achievement, socializing, and immersion) in predicting player well-being following play, game enjoyment, future months of play, and weekly hours of play in a population of online video game players (Ryan et al., 2006; Study 4). We regressed each outcome simultaneously onto need satisfaction and player motives; these results are summarized in Table 1. Results demonstrated strong support for our model. Competence and autonomy were linked to postplay well-being, all three needs predicted game enjoyment and future play, and competence and autonomy related to more hours of play each week. When competing for variance with the SDT needs model, Yee's player motives model was substantially less predictive of outcomes, as the player motives were unrelated to game enjoyment or future play. Some evidence showed, however, that the achievement motive predicted some independent variance

Table 1
Simultaneous Regression Models Comparing Unique Contributions of Player Need Satisfaction With Player Motives Model to Well-Being and Motivation Outcomes (From Ryan et al., 2006)

Model	Need	β
Well-being	Competence	.12**
	Autonomy	.36**
	Relatedness	.03
Player motives	Achievement	-.21**
	Socializing	.08
	Immersion	-.08*
Game enjoyment	Competence	.24**
	Autonomy	.49**
	Relatedness	.12**
Player motives	Achievement	-.06
	Socializing	-.07
	Immersion	.01
Future play	Competence	.14**
	Autonomy	.15**
	Relatedness	.12**
Player motives	Achievement	-.05
	Socializing	.01
	Immersion	-.14
Weekly play	Competence	.09*
	Autonomy	-.03
	Relatedness	.18**
Player motives	Achievement	.19**
	Socializing	-.02
	Immersion	.02

Note. $N = 730$.

* $p < .05$. ** $p < .01$.

in hours of play each week, and the achievement and immersion motives related to lower postplay well-being. Future research examining how players' explicit goals in play, or their desired utilities, relate to the basic psychological needs they actually fulfill as identified within our SDT approach will undoubtedly further clarify the dynamics of video game play.

Integration and Conclusion

The model for video game engagement we present in this article is based on self-determination theory (Ryan & Deci, 2000b), a macrotheory of human motivation used to understand psychological process and well-being. The investigations we reviewed demonstrate preliminary support for our position that video game engagement can be effectively studied and understood through the proposed motivational lens. Specifically, the evidence suggests that the broad appeal of games is based on the psychological need satisfaction play can provide, that these motivational processes are robust predictors over and above differences in player demographics, and that they apply across game genres and content.

Unlike basic need satisfaction, results suggested that violent game content is not, on average, a significant motivator of play. In fact, although violent game content appeals more to players who

are dispositionally high in aggression, even for them, violence was a weak and unreliable motivator of play or source of enjoyment. For most players, in fact, violent content was unrelated or even detracted from game appeal. These findings thus not only speak to the (lack of) value added by violent content, but also illustrate how an empirically based model of in-game motivations can yield novel results.

We also reviewed studies that focused on psychological need-thwarting as a motivational source of player aggression. When game engagement served to undermine a sense of competence consistently, through complex control schemes or insufficient practice, it elicited aggression over and above violent content in games. It is likely that play experiences that thwart the other needs (autonomy and relatedness) will extend this research to look at how other in-game frustrations (e.g., experiences of being rejected or controlled) catalyze postgame aggression.

Further research we reviewed showed that chronic need deprivation in everyday life presented a risk for individuals to be more obsessively engaged in video games. By contrast, people with high need satisfaction were more likely to engage in games in a more harmonious way—their motivation being more likely based on a sense of volition and choice. Moreover, we found that obsessive passion for play was related to low game enjoyment, high game engagement, and negative postplay mood, whereas harmonious play led to high game enjoyment and positive postplay mood. A further important finding also emerged from this research. When set against the backdrop of broader life pursuits, we found that the contributions of video game play on general well-being were not robust, suggesting that the influence of games may be constrained to outcomes proximal to the games themselves. Put differently, it is important in linking video games to overall wellness that researchers control for need satisfaction outside of games.

Finally, we presented evidence that suggests that immersion in virtual contexts can serve as a key moderating variable that amplifies the effects of virtual content on actual goals and decision making. We used the effects of immersion in settings with natural versus manufactured content on prosocial attitudes and decisions as an illustrative case of this amplification effect. Deep immersion in natural environments was associated with more prosocial goals and decision making, whereas high levels of immersion in less natural contexts produced more self-interested orientations. This suggests that future research on the impact of video games (as well as other environments) should consider immersion as a moderating factor.

Limitations

The main limitation of the evidence we have reviewed is that it represents findings drawn from still nascent motivation-focused research programs. Video games are a relatively new application for SDT, and the studies we have reviewed reflect only our initial attempts to apply this motivational theory to this complex area of behavioral engagement in virtual contexts and to an understanding of its psychological effects. Future empirical studies will hopefully bring a wider range of methods, including more extensive use of experience sampling, more differentiated samples, third-party data sources, and longer term longitudinal studies. These designs will allow more definitive conclusions to be drawn.

Another limitation is that the research we reviewed focused mainly on short-term, pre- to postplay shifts in well-being and affect. This evidence does not speak to more generalized or enduring links between psychological need satisfying (or depriving) play and overall levels of well-being. In fact, some of the findings we reviewed suggest that motivational factors tied to games correlate with, but are not uniquely related to, global indicators of well-being. Even among avid players, it appears that the net impact of games is smaller than some might expect. For players, video game engagement is a single type of activity that is necessarily nested within a wider constellation of experiences, relationships, and behaviors.

Future Directions

One interesting avenue for future research could focus on how specific game features influence basic need satisfaction. Despite wide structural variation between games, many share common mechanics and ways of communicating challenges, choices, and opportunities to players. Differences between games in how they provide a feature, such as performance feedback or rewards for achievements, may have different motivational consequences depending on how they are implemented. Games that provide performance feedback in ways that emphasize how the player excelled and suggest tactics for future improvement could serve to enhance need satisfaction, whereas feedback communicated only in terms of what went wrong (or who the player performed worse than) is likely undermining. Similarly, the ways in which reward contingencies are communicated to players might undermine need satisfaction and intrinsic motivation (e.g., Deci et al., 1999) insofar as the enticements for achievement shift focus toward acquiring and away from the inherent satisfaction of game challenges.

Another important avenue for future research is concerned with the potential of need-satisfying games to enhance learning and promote healthy behaviors (Rigby & Przybylski, 2009). An increasing number of health interventions are investigating video games as a tool for educating patients and promoting behavior change. SDT-based research has shown that need support is key to integrative learning, such that when the act of learning is intrinsically motivated, it promotes a more thorough and deep understanding than learning guided by extrinsic factors (Niemic & Ryan, 2009). In the health domain, computer-assisted health interventions have been shown to be more effective when they support basic needs (G. C. Williams, Lynch, & Glasgow, 2007), and research on exercise and weight loss (Vansteenkiste, Matos, Lens, & Soenens, 2007), the treatment of opioid dependence (Zeldman, Ryan, & Fiscella, 2004), and smoking cessation (G. C. Williams, Gagné, Ryan, & Deci, 2002) highlights the importance of basic psychological needs to successful long-term regulation of health behaviors. Future intervention-focused video game research in the education and health domains should account for the need satisfaction provided by games when evaluating the influences of games.

A third route for future research would focus on how need satisfaction derived from games compares with needs met in other domains. In other words, does need satisfaction influence well-being to a greater or lesser extent based on whether the activity in question is a video game or comparable activity? Many might assume that playing a game is less psychologically enriching than

playing a sport, or that online relationships are less fulfilling than in vivo ones. This presents an interesting empirical question, one that would require between- and within-persons analyses of activities, basic need satisfaction, and well-being outcomes. Such research would be necessary in evaluating the relative value of video game-based need satisfaction to well-being.

Three findings we reviewed from our approach provide routes for future concern-focused research concentrating on violent video games. First, our research on the motivational appeal of violent game content suggests that more aggressive individuals prefer games when they present more graphic content. Given that this draw is largely independent of the structural elements of games, chronically aggressive individuals might have some person-level vulnerability that disposes them to seek out other violent media (e.g., film, literature, and TV) in ways different from the population at large. Second, the research focusing on competence-thwarting play experiences demonstrates that acute spikes in player aggression are based on need frustration, and that the use of different games to represent high- versus low-violence play experiences can introduce highly problematic confounds. Lastly, the moderating effect of immersion on links between virtual content on real-world outcomes suggests that the inconsistencies in laboratory studies of violent game content on aggression may be unified through assessing and manipulating player immersion.

Closing

Debates focused on the positive or negative influences of video games can be traced back to the advent of these games, and it is unlikely that a consensus will be reached in the foreseeable future. In popular discourse, people often wonder whether on balance video games are good or bad. Yet, as video games become an increasingly ubiquitous part of human experience, it is essential to move beyond such dichotomous thinking and develop new theories and use methods that assess both the good and the bad and the factors that draw players into these worlds where both types of outcomes can occur.

Our SDT-based model represents one such attempt to advance models of inquiry by exploring the mechanisms through which video games influence human motivation and psychological well-being. In applying SDT, we found empirical support for the notion that video games are experienced as ends in of themselves precisely because they tap into fundamental need-based motivational processes. Moreover, we found that the influences of video games on players are not uniform. The results suggest that games can enhance wellness, at least in the short term, when the experiences they provide satisfy the universal needs for competence, autonomy, and relatedness. Yet, games can exert a negative influence if these experiences undermine needs, prompting negative affect and even aggression.

Thirty years ago, few anticipated that video gaming contexts would transition from an activity pursued mostly by young male technophiles into a dominant, mainstream entertainment medium that appeals to all demographics. In this period since the video gaming genie was released, knowledge of games and player motivation derived from the social sciences has lagged behind the blistering pace of technical innovations within the game industry itself. Whether social science research will be relevant to video games in another 30 years remains an open question. If the main

thrust of research stays focused on the relative merits of recorking the bottle, research will have little to contribute on the mute point. The cultural penetration of video games and virtual environments will only increase; *it is inevitable*. Therefore, an important agenda becomes that of employing new theoretical models and statistical tools to empirically explore these domains. The knowledge derived could meaningfully inform more effective health and education interventions, identify and help heal those vulnerable to aggressive or addictive behaviors, and advance the basic science of what is going on when humans play.

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Received December 28, 2009

Revision received December 28, 2009

Accepted January 16, 2010 ■