

Using Sports Videogames to Promote Real-World Physical Activity Among Young
Adolescents

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Abstract

Many researchers are looking for ways to understand and prevent the decline in youth physical activity that typically starts in early adolescence. Given that the prevalence of obesity among school-age children and teens has tripled since 1980, and Type 2 diabetes is no longer a childhood rarity, we urgently need to reverse this trend. Moreover, participation in sports and recreation is linked to less involvement in health-risking behaviors, and to benefits such as higher self-esteem and school performance.

Videogames, once blamed for undermining exercise, are increasingly looked to as potential saviors or, at the very least, therapeutic agents. Active games such as the *Dance Dance Revolution* series (Konami, 2001) are even being incorporated into school physical education classes. However, the potential for videogames to model and trigger real-world exercise has barely been explored. Videogames are not incompatible with exercise; the U.S. National Longitudinal Study of Adolescent Health (Nelson and Gordon-Larsen, 2006) identified a cluster of heavy video/computer game players who were also physically active (bicycling, skating, skateboarding). Realistic sports games (e.g., basketball, skateboarding, soccer) are consistent bestsellers, especially among boys. Could they have a role in promoting real-life sports?

This chapter discusses results of a survey (by a team based at Massachusetts General Hospital/Harvard Medical School) with a diverse sample of 1,254 U.S. middle-school students, which found that playing off-the-shelf sports videogames was significantly related to hours per week that boys spent on physical activity. It also reports on focus groups with boys that revealed unexpected links between sports videogames and

increased interest in sports, perceived improvement in sports skills, and willingness to try new sports. It will integrate these studies with the growing body of research on factors that support or reduce boys' and girls' participation in real-world physical activity.

Finally, it will suggest ways that commercially available sports videogames might be used to influence these variables to promote adolescent health, and encourage conversations between researchers and game developers.

“The kids today...they sit around in the house a lot just playing videogames.”

“When I was a kid, everyone was out in the street playing.... They’ve just become lazy—my son—and overweight, and zombie-like.”

– *Comments from parents in a Boston-area focus group*

Parents, researchers and doctors alike increasingly worry that our children spend too much time sitting, and about the implications of those hours slouched on the sofa for health—now, and in adulthood—and school success. A study that surveyed almost 13,000 American children and teens three times over two years (Kahn et al., 2008) found a worrisome pattern: an upward trend in physical activity until the early teen years, then a decline after age 13. The latest Youth Risk Behavior Surveillance report on the health of U.S. high school students (Eaton et al., 2010) shows that for both boys and girls, participation in team sports and involvement in physical education classes drops steadily from 9th to 12th grade. Why do so many teens seem to give up on sports? One reason may be that as children get older, the focus shifts from teamwork and fun to competing and winning. Average players are left sitting on the bench.

Whatever the causes, reversing this decline is a public health priority for multiple reasons. One is the alarming rise in the proportion of children carrying excess pounds. Roughly 17% of school-age children and adolescents are now obese (i.e., with a body mass index at or above the 95th percentile, based on Centers for Disease Control BMI-for-age-and-gender growth charts from 2000); this is three times as many as in 1980 (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Type 2 diabetes, which is strongly linked to obesity, is no longer rare among children and adolescents; the majority of obese youth also show risk factors for future heart disease such as hypertension and high cholesterol

levels (Bell et al., 2011). These statistics drive health researchers to focus on the potential of physical activity to prevent or reverse obesity, although research findings are mixed on whether exercise by itself can make a substantial difference (Waters et al., 2011).

However, it's increasingly clear that lack of exercise in itself is a major risk factor for many modern causes of disability and death, from cancer, stroke and dementia to falls, heart attacks and fractures (Weiler, Stamatakis, and Blair, 2010). Exercise offers myriad benefits, and can improve health and reduce mortality even if no weight is lost.

Exercise: What's in it for kids?

A review of 850 articles by Strong et al. (2005) found multiple short-term pluses for children from exercise, ranging from reduced risk factors for cardiovascular disease and Type 2 diabetes and healthier bones, to higher school grades and test scores. In a national survey of college students (Taliaferro, Rienzo, Pigg, Miller, and Dodd, 2008), weekly exercise was linked to a lower risk of depression, hopelessness and suicidal behavior.

Another non-obvious benefit of moderate to vigorous exercise is its effects on what's called "executive function": basically, the thought processes that organize and control goal-directed actions (Best, 2010). Executive function is linked to measures of academic achievement as well as to factors known to affect school success, such as the ability to pay attention and to manage emotions. There seem to be additional benefits from game-oriented exercise (such as team sports) that challenges players physically and mentally; they involve strategy, coordinating play with others, complex physical movements, and adapting to constantly changing demands.

In sum, finding ways to create and maintain the habit of physical activity has tremendous implications for individual and public health.

So our kids sit too much: Are videogames to blame?

Many parents worry that videogames steal time from other activities—especially the kind of outdoor play fondly recalled from their own childhoods (Kutner, Olson, Warner and Hertzog, 2008). “Screen time” has lately become a catchphrase in studies on children’s media; the term lumps together all time spent with computers, television, and other electronic screens. Some researchers, concerned that hours sitting in front of screens is unhealthy and promotes obesity, have called for reductions in children’s screen time. In fact, a recent review found 33 studies of programs meant to reduce screen time (Maniccia, Davison, Marshall, Manganello, and Dennison, 2011).

However, this concern does not seem to be supported by recent research, including those studies that single out video and computer games. A 2004 meta-analysis (a study of studies) by Marshall, Biddle, Gorely, Cameron and Murdey looked at relationships between television and video/computer game use, body fat and physical activity in youth aged 3 to 18. Only six of 30 studies focused on video/computer games. Based on the confidence interval for the sample-weighted effect size, the authors concluded there was probably no relationship between electronic game use and body fat in the population. A four-year longitudinal study of over 10,000 children aged 10-15 (Taveras et al., 2007) failed to find a link between year-to-year changes in hours of television viewing and leisure-time physical activity, suggesting that these are “separate constructs, not functional opposites.”

In short, videogames don't seem to undermine or replace exercise. Is there any evidence that they might actually *promote* physical activity? Let's look first at videogames that force players to get up and move.

Can videogames be part of the getting-kids-moving solution?

In recent years, dozens of studies have looked at the potential for games that demand physical movement—a.k.a. exergames—to reduce sitting time and burn calories. Technological advances now make possible a wide variety of exergames (from dancing to boxing) that attract both boys and girls. Some have been shown to appeal to overweight as well as normal-weight youth (Sallis, 2011). This is noteworthy, because exercise can be uncomfortable or embarrassing for children burdened with extra weight. Several recent reviews of research on use of active video games by children or adolescents (Biddiss and Irwin, 2010; Rees et al., 2006; Mark, Rhodes, Warburton and Bredin, 2008) concluded that active games can indeed create measurable physiological effects, such as increased heart rate and oxygen consumption, linked to better health. Active games such as *Dance Dance Revolution* are even being added to school physical education classes (Staiano and Calvert, 2011). This led Ballas (2010) to suggest that videogames ought to have exercise ratings, based on average calories burned per hour, to help parents choose games that might benefit their children's health.

However, it's not yet clear whether exergames can promote exercise participation over the long term, or outside structured settings such as gym class. A study by Baranowski and colleagues (2012) tried to assess the effects of exergames in a natural game-play environment. Children ages 9 to 12, of normal weight or overweight, were

given a Wii console and a game of their choice (plus an appropriate controller) from a set of five active games, including titles such as *Wii Fit Plus* (Nintendo, 2009), *Wii Sports* (Nintendo, 2006), and *Dance Dance Revolution Hottest Party 3* (Konami, 2009). Trying to simulate a normal home play situation as much as possible, the researchers provided no instruction on how or when to play the games. Also, children could play other games on the Wii if they wished. A second, control group of children also got Wiis, but were only offered non-active games. During the 13-week experiment, researchers measured children's activity twice, for a week at a time, using an accelerometer attached to an elastic belt. At the end of the study, the researchers concluded that having access to active Wii games did not lead to higher levels of physical activity.

Why didn't access to exergames lead to more exercise? There are several possible explanations. First, there was "cross-contamination" between the experimental and control group: in other words, it turned out that children in both groups played active and non-active games. Another factor is the lack of explicit instructions on how to play the new games (which helped promote exercise in other studies). The researchers also noted that none of the active games had a narrative or story which might potentially have motivated children to spend more time or effort on the exergames.

Other issues that may have affected children's use of the active games came up during post-study interviews. When asked what they didn't like about the games, children mentioned not understanding what a game character was saying, being yelled at by a competitor character, finding the game too hard, or simply "not having someone to play with." This last factor may be especially important. Children often learn to play a new game from a friend or sibling, and most view gaming as a social activity (Olson,

Kutner, and Warner, 2008). This may explain why a study by Chin, Jacobs, Vaessen, Titze, and van Mechelen (2008) found that children were more likely to stick with exergaming when assigned to multiplayer dancing games at a sports center versus only home-based use.

These studies imply that we ought to look more closely at factors that motivate a child to try and to stick with a new videogame, and with active games in particular. The potential of exergames might be unleashed with the help of good stories, options for collaboration and competition, and evolving technologies that support more complex movements and put games into homes, schools, clubs and on the streets.

But to get the greatest health boost from videogames, we also need games that will motivate exercise even after the console, computer or phone is turned off. Can we design videogames in ways that will strengthen those motivating elements and overcome some of the emotional and practical obstacles that block a child's path to fitness? One place to start is by looking at videogames that we *know* are motivating, based on the fact that millions of young people choose to play them every day.

Beyond “exergames”: Could existing sports videogames be the coaches and cheerleaders that get children moving?

“When I play videogames...sometimes I can learn from it. Like basketball, if I see someone in the game like, shoot a three pointer and make it in perfectly, I would want to practice my three pointers until I can be just like that.”

-Focus group comment from a 13-year-old boy

One recent review of the potential for video games to fight obesity (Guy, Ratzki-Leewing and Gwady-Sridhar, 2011) concluded that we ought to study whether exergames could serve as a gateway into organized sports. The idea was that exergames could increase self-efficacy (confidence in sports skills) and feelings of empowerment, and expose children to “the rules and play of sports activities.”

Could we use commercially available videogames to model and trigger real-world exercise? In the rest of this chapter, I’ll describe some promising qualitative and quantitative research findings, making the case that widely available, realistic sports games may have a role in promoting real-world physical activity. Here, a “realistic” sports videogame is one that mimics aspects of individual or team sports (tennis, basketball) or other skill-based physical activities (skateboarding, dancing) that young people might watch or practice in their everyday lives. Some games allow players to act as a coach, developing strategies for their virtual teams—often based on real teams and actual statistics—to execute. Others put the player directly in the action, practicing moves similar to those in the real-life sport.

One great advantage of commercially available sports videogames is their wide availability; most families with game consoles already own sports games. According to the Entertainment Software Association (2011), sports video games are second only to the “action” genre in popularity. In 2010, sports videogames (ones related to real-world sports, excluding dancing and fighting games) accounted for 16.3% of units sold (excluding computer games). Six of the top 20 video games were sports or rhythm games, including *Madden NFL 11*, *Wii Fit Plus*, *Just Dance 2* [Ubisoft] and *NBA 2K11* [2K Games] (ESA, 2011). The few questions on game content in the Kaiser Family

Foundation study support the popularity of sports video games among youth; two-thirds of participants (64%) had played *Wii Sports* or *Wii Play* at least once, and 47% had played a *Madden NFL* (realistic football) game (Rideout et al., 2010).

Is there any evidence that videogames can support real-world sports?

This is a hard question to answer. Few studies have looked for any relationship between videogames and real-world exercise, and those few tend to focus on whether videogames displace exercise—on the assumption that videogames breed “couch potatoes.” A national survey of youth aged 8 to 18 by the Kaiser Family Foundation (Rideout, Foehr, and Roberts, 2010) nixed that assumption, finding no relationship between time spent with electronic media and time devoted to physical activity (e.g., sports, dancing or going to a gym).

Similarly, a survey of 392 British college undergraduates, followed by individual interviews with 16 of those students (Crawford, 2005) found no evidence that playing digital games reduced sports participation. However, Crawford did find that sports video games were the most popular genre among male students, and that sports video games appeared to increase interest in and knowledge about sports.

An intriguing analysis of data collected for the U.S. National Longitudinal Study of Adolescent Health (Nelson and Gordon-Larsen, 2006) hints that video game play could be compatible with, or perhaps even supportive of, real-world exercise. This nationally representative study of nearly 12,000 youths in grades 7 to 12 focused on possible links between teens’ active and sedentary pursuits, and health risk behaviors (e.g., alcohol or cigarettes, unprotected sex, not wearing seat belts). Nelson and Gordon-

Larsen identified seven non-overlapping groups of adolescents based on teen active/sedentary behavior patterns. Two of these groups were heavy video game players; one also spent a lot of time watching television, but the other group had a “high frequency” of physical activity, such as skating, skateboarding and bicycling. This group of “skater/gamers” along with a third group that played sports with their parents, were least likely to have low self-esteem. (Interestingly, skater/gamers were also more likely to work outside the home, do housework, and get at least eight hours of sleep per night.) Overall, teens who worked up a sweat at least five times a week were less likely to drink, smoke or do other health-endangering things. Note that these data were collected between 1994 and 1996, before customizable “realistic” sports games were widely available.

Qualitative research supports a link between sports games and real-world sports

To explore potential effects of various video game play patterns on young adolescents, our research team at Massachusetts General Hospital’s Center for Mental Health and Media (MGH) conducted a series of qualitative and quantitative studies in 2004-2005 with children attending 7th and 8th grade in public middle schools. The qualitative research involved focus groups with an ethnically and socioeconomically diverse sample of 42 young adolescent boys from the greater Boston area (Olson, Kutner & Warner, 2008). Our initial emphasis was on the use, perceptions and potential influence of video games with violent content. But in discussions of favorite games, social aspects of games, and game effects, references to sports came up repeatedly, unprompted.

For example:

Researcher: "How do you think you'd be spending your time if you weren't playing, if videogames did not exist?"

Antonio: "Well, let's see. I wouldn't be playing any sports, so I'll say...I don't know."

Researcher: "You really think you wouldn't be into sports without videogames?"

Antonio: "Probably trying sports. But I wouldn't be as good as I am now, 'cause—"

Jared: "Like, you would have no one to introduce you to all the moves, and practice."

Some boys said they were inspired by games to try new sports.

Eric: "When I was younger, I only had Nintendo, and one of my favorites was the baseball game. And that's how I really got into baseball. I probably wouldn't have been so much in sports right now if I didn't play some of the videogames that I have."

Antonio: "Like he said, like with the baseball, I would have been like that if I didn't play, like, basketball games and stuff, and football games, and other games and stuff."

Researcher: "So, playing these games made you more interested in doing real-life sports?"

Antonio: "It made me, made me motivated to go try out for sports and stuff."

Matthew: "Yeah, that's definitely true."

Neil: "Like, in the games that are real, like, which are mostly the sports games, like, you see them do, like, amazing plays, and like, then if you were to go outside and try them, and keep practicing that, like, you could get better so you can end, like, sometime later on in life, you could probably, possibly do that."

Other boys were motivated to try new sports moves. They tried to imitate physical activities they saw in the games they played. Some felt that playing sports games improved their real-life coordination and timing.

Jared: "When I'm playing games, mostly sports games, I actually look into the sports. Like a roller-blading game that I play, Aggressive Inline, it showed me some cool tricks that you can do.... [My little brother and I] get in trouble 'cause we start jumping on the couches, imitating the people in the game. Then, my mom tells us to go outside and roller-blade, and then we try to imitate the tricks. I think that's how we get better and better, 'cause we actually want to be one of the people in the game."

Antonio: "Like in basketball, if you see them do a fancy crossover, whatever, you want to learn how to do the same thing. . . . With this game I have called Street Hoops, I figured out how to do some of the moves. Still working on it."

Again, these focus groups were designed to look at the use and influence of violent videogame content, not at sports videogames. But comments like these point to serious potential for sports videogames to create and foster a general interest in sports, as well as motivate children to try new sports and to spend time practicing, improving their skills and confidence in ways that keep them engaged.

Quantitative findings regarding sports games and physical activity

Our MGH quantitative research involved surveys of a diverse sample of 1,254 students attending grades 7 and 8 in Pennsylvania and South Carolina. (For more information on the sample and methods, see Olson et al., 2007). We assessed exposure to various types of game content (computer, console or handheld) by asking subjects to list “five games that you have played a lot in the past six months.”

Based on the focus group comments, we recoded our survey data, creating a new continuous variable based on the number of sports video games that participants listed to assess exposure to sports content. We limited this category to games depicting realistic sports potentially accessible to young players, including (in alphabetical order) ATV racing, baseball, basketball, bicycling, boxing, dancing, football, golf, hockey, horse riding, martial arts, motocross, rollerblading, skateboarding, snowboarding, volleyball, and wrestling. Games with unrealistic representations of sports in a violent or sexualized context (such as *Def Jam Vendetta*) were excluded.

Table 1 shows the most-played realistic sports games for the overall sample, by gender; 73.6% of boys and 46.7% of girls included at least one sports game on their list of five frequently played games.

Table 1

Percentage of Participants Who Played Popular Sports Games

Game Series	Boys	Game Series	Girls
Madden*	31.5%	Tony Hawk	8.7%
NBA**	19%	Dance Dance	8.4%

		Revolution****	
Tony Hawk***	15.4%	NBA	7.4%
NFL*	12%	Madden	5.4%
NCAA**	11.8%	SSX *****	4.3%

*Football; **Basketball; ***Skateboarding; ****Dancing; *****Snowboarding

Note: The lists of games in these series were collapsed; percentages reflect those participants who listed at least one game in the series.

Our survey also included questions about time spent on a variety of activities during a typical week, including whether subjects “play sports, run, walk, swim or get other kinds of physical exercise.” Boys reported engaging in more regular exercise (85.4% did so, for an average of 4 to 7 hours per week) compared to girls (77.6% did so, for 1 to 3 hours per week). Time spent on video game play and physical activity for our sample are in line with measurements of similar age groups in other studies from the same time period (e.g., Roberts, Foehr, & Rideout, 2005).

Neither game play in general, nor Mature-rated game play in particular, significantly predicted involvement in exercise for boys or girls. However, for boys, the number of realistic sports titles on their list of five frequently played games was positively correlated with time spent on real-world physical activities. We conducted hierarchical regression analyses to assess the predictive effects of game play in general and number of sports games played on activity involvement. We entered hours per week of video game play in the first step, and number of sports games in the second step. For boys, more sports games played predicted more time involved in physical activity (R^2

change=.041, $F(1, 532)=22.90$, $p<.001$, $B=.208$). However, this was not true for girls. (I'll discuss possible reasons for this difference later in the chapter.)

This research appears to provide the first evidence that realistic sports games have the potential to support involvement in real-world physical activity.

Based on research, what factors boost or ding real-world exercise participation for boys and girls?

Based on other research about youth and physical activity, how might sports video games act to influence sports participation? A number of researchers have studied factors that influence physical activity and how it changes during the course of childhood and adolescence. Sallis, Prochaska, and Taylor (2000) reviewed 108 studies of factors correlated with youth physical activity, and found a notable lack of consistency across studies. In the 54 studies of adolescents, a handful of related and modifiable variables came up in multiple studies, including an achievement orientation, perceived competence in the particular activity, intention to be active, sensation seeking (looking for physiological arousal, novelty or excitement), community sports participation, opportunities to exercise, support from parents and other significant people, and siblings' physical activity level.

In the longitudinal study of over 12,000 American youth by Kahn et al. (2008), baseline factors associated with physical activity included athletic and social self-esteem (but not global self-esteem), trying to look like people in the media, and personal and perceived peer attitudes about body shape and fitness. Parent attitudes about exercise, and parent exercise level, were also important. Other factors cited by researchers that may be

important influences on exercise include beliefs about whether peers are physically active, perceptions of peer expectations of one's own physical activity, and sharing physical activity with peers. However, more research is needed to see which of these factors can be used to predict changes in youth physical activity over time.

Studies consistently find lower sports and exercise participation in girls versus boys, but relatively few studies look at why this might be. This difference deserves more attention. Peer support, self-consciousness, self-confidence, and types of exercise options available may all play a role (Rees et al., 2006). In U.S. focus groups and interviews, both boys and girls tend to stereotype athletic girls as being overly aggressive “tomboys” (Vu, Murrie, Gonzalez & Jobe, 2006). A similar study found that girls are deterred by concerns about sweating, getting hurt, and otherwise being embarrassed, but are attracted to exercise by the desire to stay in shape (Grieser et al., 2006).

A 2011 review by Craggs, Corder, van Sluijs, and Griffin focused on reasons why children start or stop exercising, again finding problems with study quality and inconsistent results and measures. They concluded that getting physically active in early childhood, and having high levels of exercise self-efficacy, seemed to lessen the drop in activity typically seen in early adolescence. For older teens, high perceived control over one's behavior, social support for exercise, and self-efficacy were consistently linked to limiting the decline in activity.

Biddiss and Irwin (2010) made recommendations for designing more effective exergames, based on self-determination theory and principles of behavioral economics, which may also have relevance for using sports games to promote exercise. In the real world, children are able to choose which video games they want to play, and whether to

start playing. Biddiss and Irwin posit that enjoyment, mastery and achievement predict whether people will start and stick with a particular behavior. They recommend that future active video games (and interventions that use such games) emphasize player personal choice, appeal to a range of ages and interests (including young children, to form early habits and expectations), provide immediate positive reinforcement (e.g., fun to play, earn points) as well as long-term reinforcement (e.g., indicators of growth in skills and progress toward goals), and be low-cost and simple to be attractive alternatives to sedentary activities. They also encourage study of whether incorporating plot development and stories, as well as group play options, could help sustain enthusiasm.

Studies by Mueller and colleagues (e.g., Mueller, Stevens, Thorogood, O'Brien and Wulf, 2007) detail creative ways to play “sports over a distance,” a.k.a. computer-supported collaborative sports, using sociability and competition as lures to physical activity. A review of research on barriers that prevent adolescents from exercising (Rees et al., 2006) reinforces the importance of choices, social aspects, fun and easy access.

Cox, Smith & Williams (2008) conducted a two-year study of factors affecting middle-school students' physical activity in and out of school, with the goal of helping physical education teachers encourage more free-time exercise. They stressed the importance of perceived competence at sports; perceived autonomy (having a say in what kinds of physical activities to do); relatedness, or feeling connected to others (in this case, other gym class members); self-determined motivation (exercising because it's fun and personally important, versus exercising to avoid being yelled at or feeling guilty); and enjoyment (having fun playing games in P.E. class). When modeling the results, the authors concluded that competence, autonomy and relatedness support motivation and

promote greater enjoyment. They suggest that physical educators who want to increase student activity focus on enhancing students' perceived autonomy and feeling of social connection to boost self-determined motivation.

Given all this: How might we use commercially available sports videogames to influence these variables, and help our kids get healthy?

Sports video games incorporate many of the above factors. They are exciting and fun; provide a large and expanding range of choices for all ages; are accessible, low-cost and not overly difficult to learn; provide opportunities to socialize, compete and receive reinforcement from peers; and offer immediate gratification as well as ongoing challenge and feedback on progress over time. Our research on young adolescents, as well as other studies of game play motivations (see Olson, 2010) found that video game play is often a focus for social activity, especially for boys. Competition, challenge and the opportunity to master skills are each important motivators for gaming.

Sports video games also offer the chance to “interact” with and imitate admired role models. The lack of a significant association between girls' sports video game play and exercise/sports participation in our studies may reflect the fact that at the time of the study, sports video game characters—especially in popular team-sport games—were overwhelmingly male. (Another potential limiting factor on the influence of sport-related games on girls' physical activity is the comparatively small amount of time girls spent on electronic game play. In our sample, roughly one-third of girls who played video games typically did so for less than an hour per week.)

Crawford (2005) found that female undergraduates who played sports-related games were more likely than males to choose games less associated with one gender,

including multi-sport games (such as track and field or skiing), and non-team-based games (such as golf and skateboarding) which sometimes allowed players to play as female characters.

Choices for game character customization are now much more varied and complex. In many games for the Nintendo Wii console, such as *Wii Sports* and *Wii Fit* games, players create a cartoon-like avatar called a Mii, which performs activities onscreen. Your Mii can be male or female, with a range of customizable physical characteristics. This personalization may attract children whose physical characteristics are not typically represented in sports video games. More recent games, such as *EA Sports* soccer, tennis and golf games (for Xbox 360 and PS3 consoles, and personal computers), take customization a step further, allowing a player to upload a photo of his or her own face to create a realistic-looking, digitally customized playable character (see <http://www.easports.com/gameface>).

Crawford and Gosling (2005) noted that sports games in the early years of the 21st century were not marketed toward female players. This has changed dramatically in recent years. For example, in 2011, a 14-year-old ice- and video-game-hockey player, Lexi Peters, wrote to Electronic Arts complaining of the lack of female characters in their popular *NHL* game series (ABC News, 2011). EA responded by using photos of her to create a default customizable female character for *NHL 12*.

Boys in focus groups described feeling motivated by the ability to customize their player's appearance and abilities, and by creating a link to real teams or players they admire. For example:

Jared: “Yeah, like, say if you were good at lay-ups. You would put your lay-ups to a certain level [in your game character]. Like, you wouldn’t put it all the way up, cause you know that you are not that good. You would actually want to try to be like you, but you can make the facial appearance and the body appearance, you can put your own jersey. Like, say, the Los Angeles Lakers, you can actually put your person on that team.

Researcher: “What do you like with that? How is that a good thing?”

Jared: “It makes you think you can actually be in the NBA, like you actually have a chance.”

Matthew: “So it gives you, like, a goal to reach.... It’s good to have goals so when you play games, you can put yourself into the games so you’re like, ‘Okay, I’m going through this all day. I’m going to try my hardest. I’m not going to let anything stop me.’”

And unlike most exergames, sports games have the potential for motivating through narratives. Baranowski, Buday, Thompson and Baranowski (2008) wrote about the potential of video game stories for health promotion, noting the power of story to capture attention, motivate and emotionally engage the player, and citing research that learning in a fantasy context improves knowledge transfer. Other researchers (e.g., Schneider, Lang, Shin and Bradley, 2004) have described the power of story and identification with game characters to increase immersion and involvement—which could translate into a greater desire to carry a realistic sports-game scenario into real-world playful exercise.

Self-efficacy related to exercise, or feeling confident in one's ability to learn and do well at a sport, came up repeatedly in research reviews as an important factor in starting and sticking with physical activity. (See Klimmt and Hartmann [2006] for a review of self-efficacy as it relates to video game play.) The focus group comments above suggest that sports video games inspire a feeling of "I can do this" that encourages real-world imitation of sports moves. We need to know more about this. Aside from some research showing benefits of action videogames on visual-spatial skills, we know little about whether videogames can teach skills that are directly transferable to real-world sports or other physical activity (Staiano and Calvert, 2011). Our MGH video game survey did find that "I like the challenge of figuring the game out" was a common motivator for both boys and girls. Interactive games are an ideal way to test new behaviors and roles in a safe environment and build an empowering sense of mastery.

Where do we go from here? Suggestions for additional research

This chapter raises more questions than it offers answers. To confirm that commercially available sports videogames have the potential to offer meaningful health benefits for children—and before we can think about using those games deliberately to help more kids happily form exercise habits—we need to know much more about the players and the games.

First, we need basic "epidemiological" data: the who, what, when, where and whys of sports videogame play. For example, what do we know about those preteens and teens who are already playing realistic sports or dance games, and those who aren't? What got those players interested in sports videogames? Given what we know about the attractions of videogames in general, we might look at motivations such as being

sociable, the challenge of competing and winning, and the opportunity for creative expression. Another “who” question is, who introduced players to sports videogames, and with whom do they typically play (e.g., alone, with an older sibling, a parent, or group of same-gender friends)?

An important “when” question: At what age did sports videogame players typically start engaging with these games? Different games, and different co-players, may be more appealing to different age groups. (Think about games such as *Backyard Baseball* for younger children [Humongous Entertainment].) We know that the early teens is a critical period when sports participation starts to decline; does that suggest an important time window when exposure to sports videogame play could change that trajectory? Is exposure to the idea of sports videogames as a fun way to spend time important for younger kids, and the chance to practice skills or compete critical for older teens?

Moving on to “where”: We’ve seen evidence that children are more likely to use “exergames” in social settings at gyms than alone at home. Does the setting of realistic sports game play make a difference? For example, does having immediate access to a basketball hoop in the driveway or down the block make a basketball videogame more likely to motivate exercise?

More qualitative studies with children can help answer important “why” questions. For example, we can build on the research described earlier in this chapter to understand why and how children feel that a videogame helps them gain mastery over the sport in real life. We’ve already speculated about why girls typically get less exercise than boys. Now that some sports videogames are aimed at both genders, there is more

opportunity to see what types and features of games might especially encourage girls to be physically active. For example, might girls be motivated by different sports than boys? Perhaps some are more likely to find inspiration in skateboarding or dance than traditional team sports. As we've seen, there's at least anecdotal evidence that encouraging the trend toward female playable game characters in the mix might make a difference.

We've also seen that although sports videogames are a very popular genre, many young teenagers never play them. Why are some children not attracted to sports videogames? Is there something about the way they are advertised or packaged that non-players interpret as signaling, "This game is not for you?" Are there aspects of gameplay that could be made less confusing or discouraging to newbies—perhaps by adding a humorous tutorial for absolute beginners? We also need research on why boys and girls might *try* sports videogames (and related real-world sports) but not make them a habit.

Once we know more about these basics, we can start to collect evidence that sports videogames really can have the hoped-for effects described in this chapter. We need quantitative studies confirm whether exposure to age- and interest-appropriate sports videogames can lead children to try a new sport, or to increase their weekly hours of exercise. We also need studies to show whether sports videogames can lead to gains in skills specific to a sport, or that translate across sports.

Can researchers and game developers collaborate to help each other and help our kids?

With this proof-of-concept evidence in hand, we can start to look at ways to manipulate some of the motivating factors discussed earlier. How might game developers

tweak the features of sports videogames to increase their appeal and boost their ability to motivate exercise (e.g., more real athletes as role models, emotionally engaging characters or stories, detailed and realistic depictions of sports moves, opportunities to test strategies or “manage” a team, or customization options)? What might parents, physical education teachers and coaches say or do to encourage children’s interest in sports games? Can researchers or developers provide guidelines to help parents and coaches choose games most likely to get children of various ages, interests or health conditions (including overweight children or those with developmental delays) to try, or stick with, new sports?

Researchers might consult to game developers on ways to apply state-of-the-art knowledge to make sports videogames more motivating. This might include:

- the idea of self-efficacy, and how to encourage it around specific sports skills;
- aspects of a sports videogame that could influence expectations about participating in the real-world sport, such as players’ beliefs about how much fun a sport or activity would be; how peers or parents would view them if they played that sport; how physical activity would affect their health, body, or appearance; and how to manage temporary discomfort or injuries.
- ways to change children’s views about whether a sport is “for someone like me,” such as providing role models that a range of children can relate to and want to be like; and
- adding elements to the game that implicitly or explicitly encourage players to try strategies or moves from the game in the real world.

An important next step is to open a dialogue between sports videogame designers, researchers and players, to share ideas and spread best practices. It’s not clear whether

commercial game developers are aware of the potential power of their creations. Without compromising sales (and perhaps even enhancing them), they have the power to make a significant difference in the health of generations of youth, by showing them the fun, challenge and social rewards of sports and exercise. Given the urgent need to get kids moving, this is a golden opportunity to highlight benefits of videogames and improve the image of the industry.

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