REPORT OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH

Subject: Emotional and Behavioral Effects, Including Addictive
                  Potential, of Video Games

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Referred to: Reference Committee D
                  (Elizabeth P. Kanof, MD, Chair)

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1   This report responds to Resolution 421, adopted at the 2006 Annual Meeting, which (1) asks our
2   AMA's Council on Science and Public Health to work in conjunction with all appropriate specialty
3   societies to prepare a report reviewing and summarizing the research data on the emotional and
4   behavioral effects, including addiction potential, of video games; and (2) directs our AMA to
5   develop recommendations for physicians, parents, and legislators based on the findings of this
6   report.
7
8   METHODOLOGY
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10 The report is based on information from the scientific literature from 1985 to 2007 identified on
11 PubMed using the search terms "video games; behavior"; "video games/health"; and "video
12 games/addiction." Information on federal legislative initiatives was obtained from
13 Thomas.loc.gov. Additional studies and resources were identified from the materials reviewed.
14
15 BACKGROUND
16
17 Our AMA has been aware of and involved in the prevention of media violence since 1982, as
18 demonstrated by AMA Policy H-485.995, TV Violence (AMA Policy Database), which declared
19 the AMA's opposition to television violence and asked that physicians and parents be informed
20 about the potential harms of violent media on youth. Over the years, this stance broadened to
21 include multiple areas of entertainment media, and culminated in Policy H-515.974, Mass Media
22 Violence and Film Ratings. Recent research on the video game industry prompted specific
23 attention to this area as in directive D-515.991, Labeling of Video Game Content, and Resolution
24 421 (A-06), which focus on ensuring that video games are appropriately labeled to reflect their
25 actual content and on concerns about their potential harmful effects.
26
27 The video game (gaming) industry has existed for decades, beginning with William
28 Higinbothams's "tennis for two" oscilloscope, which debuted in 1958. Now approaching the 50-
29 year mark, gaming is a worldwide phenomenon, and has evolved into a multi-billion dollar
30 industry. In the United States alone, the sale of video games and related products reportedly
31 grossed between $7 and $10 billion in 2004.[1,2]
32
33 By definition, the term *video game* refers to an electronic game played by means of images on a
34 video screen and often emphasizing fast action.[3]   "Video game" is also used as a catch-all phrase
35 that encompasses computer games, console games, or games run by an arcade machine, along with
36 any game made for any other device, including, but not limited to mobile telephones, personal
37 digital assistants, and advanced calculators. In this report *video game* will refer to all of the above.

A *gamer* is a term used to describe a person who plays games. Historically, a gamer was someone who played role-playing games or war games, but more recently the term has come to include computer and video game players. Although the term technically includes those who do not necessarily consider themselves gamers (ie, casual gamers), it is a commonly used colloquial term to identify persons who spend as much of their leisure time as possible playing or reading about games. Video gaming has traditionally been a social experience, and most video games are playable by more than one person.   Multi-player video games can be played either competitively or cooperatively online by using multiple input devices, or by "hotseating."

The three largest markets for computer and video games are the United States, Japan, and the United Kingdom in that order, and they are producers of video games in that order as well. Other significant markets include Australia, Canada, Spain, Germany, South Korea, Mexico, France, and Italy. Both India and China are considered emerging markets in the video game industry and sales are expected to rise significantly in coming years.

Characteristics of Gamers

Although 70% to 90% of US youth play video games, a national survey conducted by the Entertainment Software Association (ESA) in 2005 identified the prototype gamer as a 30-year-old male who averages between 6.8 and 7.6 hours weekly playing video games.[4] However, results from the November 2005 Active Gamer Study, a survey of 2,000 regular gamers, suggested that the US games market is diversifying. Among males, who constitute the majority of players, the 15- to 25-year-old age group is expanding most significantly. For casual online puzzle-style and simple cellular telephone games, participation by gender is more or less equal. Females are being significantly attracted to playing certain online multi-user video games that offer a more communal experience, and a small group of young females are playing aggressive games that are usually thought of as "traditionally male" games.[5]

The ESA survey found that 75% of heads of households played video games, while 35% of gamers were under age 18 years.[4] Additionally, 9.1% of gamers play within the persistent multiplayer gaming universe or MMORPG (massive multiplayer online role playing game). For this report, heavy game use will be defined as those who play more than 2 hours per day.[6,7]

Potential Effects

A strong body of research evidence links children's exposure to media violence with subsequent increases in their aggressive and violent behavior.[8] Many of these studies were summarized in the 1972 Surgeon General's Scientific Advisory Committee on Television and Social Behavior report[9] and the National Institute of Mental Health's 10-year follow-up report.[10] However, the vast majority of this research focused on media other than video games (ie, television, music, movies, and arcade games). With the increasing focus on the amounts of time spent on video games by youth and recognition of the tendency toward high levels of violence depicted in the games marketed to youth, researchers have attempted to quantify the relationship of video game violence and aggressive behaviors (see below).

Potential Benefits: Within the extensive research on the health effects of video game usage, the discussion centers on negative effects. However, potential benefits of video game use have also have been noted. Technological aspects of video game use have been explored for decades. In 1980 the US Army commissioned an enhanced version of Battlezone (the first 3-dimensional first-

person game) for training purposes. More recently, virtual reality (VR) and video games have been shown to have beneficial effects as learning aids within the health care sector.[11,12,13] VR and video games have also been used for rehabilitation of stroke patients, to teach children about diabetes and asthma management, and as therapy in moderating certain phobias.[14,15] These media are being explored for a multitude of educational uses, from assisting students in learning about various surgical procedures, such as laparoscopy, to helping researchers learn about cognitive illnesses, such as attention deficit disorders.[16,17,18] However, the vast majority of games are developed solely for entertainment purposes, and with more widespread use, the detrimental health effects of gaming are most often the focus of research.

Potential Detrimental Health Effects

Physical Effects: Since 1983, much evidence has accumulated documenting the fact that gaming provokes epileptic seizures.[19,20,21,22] Prior to its release in the United States, Nintendo's Pokemon had to be reformatted due to its association with epileptic seizures in more than 700 Japanese viewers. In the United States, the Super Mario game has been found to disproportionately induce seizures in players as compared to the general population. In a population-based study, conducted in 1993 in Great Britain to estimate the number of seizures triggered by video games in individuals without a history of seizures,[23] the risk of "new onset" light-induced seizures was 1.5 per 100,000 in the population between ages 7 and 19 years, which is significant since this is the age group most susceptible to light-induced seizures.[24] This compared to an incidence rate of 1.1 per 100,000 in the overall population that had light-induced seizures. No studies have been conducted in the United States on the incidence of video game-triggered seizures, but based on the UK study, this reaction probably occurs in a very small part of the general population. In addition to epileptic seizures, other physical effects associated with gaming include musculoskeletal disorders of the upper extremities and increased metabolic rate.[25,26,27,28]

Behavioral Effects: Results from multiple small studies suggest an association between exposure to or playing violent games and negative actions such as aggressive thoughts and aggressive behaviors. In their 2001 meta-analysis, Anderson and Bushman quantified the effects of exposure to violent video games on five variables (aggressive behavior, aggressive cognition, prosocial behavior [ie, cooperation], aggressive affect, and physiological arousal) and found that short-term exposure to video game violence was significantly associated with temporary increases in aggression among all subjects.[29] In 2004, using an improved methodology, Anderson again concluded that a positive association exists between exposure to video game violence and aggression.[30] In a literature review, Gentile and Stone confirm an association between violent video games and aggressive behaviors, while noting that given the limitations of current studies, it is difficult to definitively conclude a causal effect on long-term aggressive behaviors.[31] Additional studies by other researchers have found that exposure to video game violence may promote increased aggressive behaviors and decreased prosocial behaviors in social interactions.[32,33]

Not surprisingly, the video game industry's own research has concluded that there is no causal relationship between video game violence and aggression.[34] Additionally, researchers such as VanEenwyk and Bensley[35] and Griffiths[36] found that the most compelling evidence for a positive association between video game violence and aggressive behavior in youth occurs in children younger than age 10 years, but when older children were evaluated, the evidence was not as strong. Research by Huesman and Taylor supports short-term increases in aggression but cannot document a demonstrable long-term effect.[37]

1   In spite of the research on the relationship of video game exposure and aggressive behavior, there
2   is little evidence of a substantial link between exposure to violent interactive video games and
3   serious violence or crime.[38] However, the preponderance of research from both sides of the debate
4   does support, without controversy, the conclusion that exposure to violent media increases
5   aggressive cognition, affect, and behavior, and decreases prosocial behavior in the short term.[36,37]
6   There also appears to be agreement that definitive long-term studies are lacking.
7
8   Psychosocial Effects: *Internet addiction* and *video game addiction* are perhaps the most widely
9   recognized negative psychosocial terms associated with gaming. Although not an actual
10 *Diagnostic and Statistical Manual of Mental Disorders* (DSM)-IV classification, the term *Internet*
11 *addiction* has been used to describe the phenomenon of Internet and video game overuse, or
12 excessive time spent using these media. This term seems to have been coined in the 1990s when
13 researchers were attempting to describe a constellation of behaviors observed in persons using the
14 Internet to such an extent that it began to cause other aspects of their lives to become
15 dysfunctional.[39] The DSM-IV disorder most similar to the pattern of behaviors observed with
16 overuse of video games is pathological gambling.[40] Presumably, the more colloquial term
17 *addiction* was derived from the similarities to gambling addiction. For this report, this pattern of
18 heavy video game playing is referred to as "video game overuse."
19
20 Although video game overuse can be associated with any type of video game, it is most commonly
21 seen among MMORPG players, who represent approximately 9% of gamers.[4] This is consistent
22 with prior research on Internet addiction that suggests Internet use involving interactive, real-time
23 applications has the most potential for overuse.[38] MMORPGs are simultaneously competitive and
24 highly social, and provide interactive real-time services. Researchers have attempted to examine
25 the type of individual most likely to be susceptible to such games, and current data suggest these
26 individuals are somewhat marginalized socially, perhaps experiencing high levels of emotional
27 loneliness and/or difficulty with real life social interactions.[41,42] Current theory is that these
28 individuals achieve more control of their social relationships and more success in social
29 relationships in the virtual reality realm than in real relationships.
30
31 Symptoms of time usage and social dysfunction/disruption appear in patterns similar to that of
32 other addictive disorders.[43,44,45,46] Dependence-like behaviors can also occur in minors, and include
33 preoccupation and family/school disruption. It is not clear whether withdrawal symptoms are
34 associated with video game overuse; some excessive users do not exhibit "cravings" for the games
35 if they are unavailable, while other users insist they cannot reduce the time they spend on the
36 games.[40,47] Dependence-like behaviors are more likely in children who start playing video games at
37 younger ages.[48]
38
39 The percentage of players affected by video game overuse varies. Many researchers believe that
40 video game addiction occurs only in a small minority of players, while others disagree.
41 Researchers at Nottingham University in the United Kingdom polled 7000 gamers and found an
42 addiction rate of 12% by World Health Organization criteria.[49] Research in the United States has
43 estimated that anywhere from a small minority to as much as 10% to 15% of players may be
44 affected.[45] However, as with findings on long-term aggression, there is currently insufficient
45 research to definitively conclude that video game overuse is an addiction.

1   *Efforts to Control Video Game Content*
2
3   <u>Development of Video Game Ratings</u>**:** The video game industry is no stranger to controversy.
4   Outcry against video game violence and concerns about the appropriateness of video game content
5   for children has existed almost from the beginning. In 1976, "Death Race 2000" was the first video
6   game to receive national attention due to violent content and was removed from the market due to
7   public complaints. In 1993, Senators Joseph Lieberman and Herbert Kohl launched an
8   investigation into video game violence, fueled, in part, by the games "Mortal Kombat" and "Night
9   Trap" . This led to the creation of the Entertainment Software Rating Board (ESRB), which, in
10   turn, developed an industry-wide rating system in 1994. By the end of 1997 most software featured
11   these ratings on the packaging.
12
13   The ESRB ratings have two equal parts: *rating symbols* suggest age-appropriateness for the game
14   and *content descriptors* indicate elements in a game that may have triggered a particular rating
15   and/or may be of interest or concern. There are seven ratings in all: EC-Early Childhood; E-
16   Everyone; E10+- Everyone 10 plus; T-Teen; M-Mature; AO-Adults Only; and NR-not rated.[50]
17
18   The reliability of the rating system in identifying inappropriate content varies by user age. Thus,
19   there is high concordance between the ESRB and outside raters (eg, parents, researchers) in
20   determining which games qualify for an "M" rating for children. However, significantly less
21   consistency exists between the group ratings for the content of games marketed to adolescents.[51,52]
22   Additionally, the work of Thompson and Haninger repeatedly found that many games labeled "T"
23   and "E" had violent content that was not reflected by the ESRB label.[53,54] These investigators
24   demonstrated that for "T"-labeled games, the entertainment software industry was able to change
25   the rating from violent to nonviolent simply by removing the pixels that were red (and indicated
26   blood) and substituting another color such as green. Furthermore, programmers at times change
27   the natural consequences of violent acts (eg, shooting leading to bloodshed) to downplay the real-
28   life consequences of violent actions.
29
30   <u>Federal Legislative Efforts</u>: Congress has made several attempts over the past several years to enact
31   legislation to better control the sale of inappropriate video games to minors. The Protect Children
32   from Video Game Sex and Violence Act, introduced in 2002, would have amended Title 18 of the
33   US Code to prohibit the sale or rental of adult video games to minors. The bill (H.R. 4645) was
34   referred to the House Subcommittee on Crime, Terrorism, and Homeland Security, but failed to
35   pass. It was re-introduced in 2003 (H.R. 669), but again failed to pass. Other legislation has also
36   been attempted without success. Most recently, the Truth in Video Game Rating Act (S68) was
37   introduced in February 2007. This bill, which would prohibit deceptive conduct in the rating of
38   video and computer games, is currently in the US Senate's Commerce, Science, and Transportation
39   committee.
40
41   <u>State Legislative Efforts</u>: Concern about the effects of video game content also led to attempted
42   regulation at the state level. Recognizing the increasing popularity of video games, in 1997 a bill
43   was proposed in Arizona making it a misdemeanor to display violent material or distribute the
44   material to minors. The bill contained specific definitions of violence as "graphic, bloody
45   depictions of torture, sexual assault, cannibalism, mutilation, murder, and urination or defecations
46   that occurs in a morbid or violent context." It was not approved.

1   In 1998, two Florida senators proposed a bill to prevent minors from viewing violent games in the
2   state. This bill also was not approved. However, in the same year, Wal-Mart stores banned more
3   than 50 arcade games that were "considered inappropriate by Wal-Mart standards."

4

5   In 2000, Sears and Montgomery Ward department stores decided to stop selling mature-rated
6   games after an Illinois sting operation demonstrated that 32 children were able to purchase "M"-
7   rated games.   This also prompted Wal-Mart and Kmart to institute the requirement that purchasers
8   of games must show identification.   Also in 2000, Indiana became the first state to pass a law that
9   prevented minor children from playing arcade games that depict graphic violence or sexual content.
10

11   *Emerging Research*

12

13   Areas of research on potential health effects of video games that are receiving increasing attention
14   include attention deficit/hyperactivity disorders (ADHD) and neurology.   The health effects of
15   video gaming on ADHD remain controversial, with some research pointing to video game usage as
16   a risk factor, and other research suggesting video games as a useful treatment.[54,55] In neurological
17   research, literature review suggests that differences in brain functioning are associated with
18   exposure to media violence; however, the relationship of these differences with thinking, behavior,
19   and other areas of performance has yet to be definitively established.[56,57] This is an important area
20   for future research.

21

22   CONCLUSIONS

23

24   Video games have been a part of American culture since the late 1950s. Despite their initial
25   marginalization, these games have rapidly evolved to become part of mainstream American
26   culture. Their prominent role in the lives of American youth has led to increased public scrutiny of
27   the effects and potential harms of video game usage. As with most other forms of media, video
28   games do have a potentially positive role, especially in the health care and health education sectors.
29   However, parallel to the trend of most other media forms, the largest and potentially most lucrative
30   use of video games is in the form of entertainment. Unfortunately, the industry's predisposition
31   toward age-inappropriate imaging and marketing techniques has led to concerns about untoward
32   side effects, ranging from physical symptoms such as seizures and tendonitis, to socially
33   maladaptive behaviors such as increased short-term aggressiveness and overuse syndromes.
34   Although there are some indications of a connection between the content of video games and
35   aggressive and addictive behaviors, more research is needed in this area.

36

37   Federal and state governments have attempted to regulate access to age-inappropriate content.
38   Legislation has the potential to be a powerful tool in this arena; however, the history of legislative
39   attempts to control depiction of violence in video game has been largely unsuccessful, with much
40   of the proposed legislation stalled or failed entirely secondary to potential infringements on First
41   Amendment rights as well as aggressive lobbying from the entertainment industry. Lastly,
42   although a rating system has been developed by the ESRB, concern continues about how effective
43   this system is in alerting parents about the violent nature of video games marketed to children and
44   adolescents.

45

46   RECOMMENDATIONS

47

48   The Council on Science and Public Health recommends that the following statements be adopted
49   and that the remainder of this report be filed:

1. That our American Medical Association (AMA) urge agencies such as the Federal Trade Commission as well as national parent and public interest organizations such as the Entertainment Software Rating Board, and parent-teacher organizations to review the current ratings system for accuracy and appropriateness relative to content, and establish an improved ratings systems based on a combined effort from the entertainment industry and peer review. (Directive to Take Action)

2. That our AMA work with key stakeholder organizations such as the American Academy of Pediatrics and the American Academy of Family Physicians to (a) educate physicians on the public health risks of media exposure and how to assess media usage in their pediatric populations; and (b) provide families with educational materials on the appropriate use of video games. (Directive to Take Action)

3. That our AMA, in accordance with the position of the American Academy of Pediatrics, support the recommendation of 1 to 2 hours of total daily screen time, and that the total time allotted to playing video games should be included in that 1 to 2 hour allotment. (Directive to Take Action)

4. That our AMA support increased awareness of the need for parents to monitor and restrict use of video games and the Internet and encourage increased vigilance in monitoring the content of games purchased and played for children 17 years old and younger. (New HOD Policy)

5. That our AMA encourage expanded research by organizations such as the Centers for Disease Control and Prevention, the National Science Foundation and the National Institutes of Health to fund research on the long-term beneficial and detrimental effects not only of video games, but use of the Internet by children under 18 years of age. (Directive to Take Action)

6. That our AMA strongly encourage the consideration and inclusion of "Internet/video game addiction" as a formal diagnostic disorder in the upcoming revision of the *Diagnostic and Statistical Manual of Mental Disorders*-IV. (Directive to Take Action)

Fiscal Note: $25,000

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