



Children and Electronic Media

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Media and Risky Behaviors

Soledad Liliana Escobar-Chaves and Craig A. Anderson

Summary

Liliana Escobar-Chaves and Craig Anderson investigate two important trends among American youth and examine the extent to which the two trends might be related. First, the authors note that U.S. youth are spending increasing amounts of time using electronic media, with the average American youngster now spending one-third of each day with some form of electronic media. Second, the authors demonstrate that American adolescents are engaging in a number of unhealthful behaviors that impose huge societal costs.

Escobar-Chaves and Anderson detail the extent of five critical types of adolescent health risk behaviors identified by the Centers for Disease Control and Prevention—obesity, smoking, drinking, sexual risk taking, and violence. Obesity, the authors note, has become an epidemic among America's young people. Cigarette smoking among adolescents is one of the ten leading health indicators of greatest government concern. Alcohol abuse and alcohol dependence are widespread problems among the nation's youth and are the source of the three leading causes of death among youth. More than 20 percent of American high school students have sexual intercourse for the first time before they reach the age of fourteen. And twelve- to twenty-year-olds perpetrated 28 percent of the single-offender and 41 percent of multiple-offender violent crimes in the United States in 2005.

Escobar-Chaves and Anderson present and evaluate research findings on the influence of electronic media on these five risk behaviors among adolescents. Researchers, they say, have found modest evidence that media consumption contributes to the problem of obesity, modest to strong evidence that it contributes to drinking and smoking, and strong evidence that it contributes to violence. Research has been insufficient to find links between heavy media exposure and early sexual initiation.

The authors note the need for more large-scale longitudinal studies that specifically examine the cumulative effects of electronic media on risky health behavior.

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As children enter adolescence, many begin to engage in risky health behaviors. The U.S. Centers for Disease Control and Prevention (CDC) has identified six critical types of adolescent health risk behaviors—physical inactivity, poor eating habits, smoking, alcohol use, sexual behaviors, and violence—that contribute to the leading causes of death and disability in the United States among adults and youth. Not only are these behaviors likely to compromise the present and future health of adolescents, they also are likely to cut short their education, impair their employment prospects, and even lead to crime, thus seriously putting at risk other aspects of their well-being, both as adolescents and adults.¹

Adolescent health behaviors do not occur in isolation. They grow out of complex interactions at the individual, peer, family, school, community, and societal levels. Many observers have raised questions about whether one important source of the risk behaviors highlighted by the CDC could be adolescents' escalating exposure to electronic media. American youth aged eight to eighteen now spend an average of six to eight and a half hours a day using various forms of media, including television, videos, movies, radio, print media, computers and video games, and the Internet.²

Social science and health researchers have examined and written extensively about the possible connection between the high levels of media exposure in the United States and increased adolescent health risk behaviors. In this article, we present and evaluate the research findings on the links between adolescent exposure to electronic media and the risky behaviors cited by the CDC: obesity (which is in large part due to inactivity and

consumption of high-calorie foods), smoking, alcohol use, early sexual initiation, and violence.

Modern science distinguishes three types of risk factors. Risk factors of the first type have been shown through careful research to have a causal impact on health problems. For example, it is clear that heavy exposure to media violence causes an increase in the likelihood of future aggressive and violent behavior. Risk factors of the second type are believed to have a causal impact but researchers have not yet been able to confirm whether the effect is truly causal. Risk factors of the third type indicate a potential problem but are not believed to contribute causally to the problem. In this article we focus on what current scientific research has to say about the potential causal impact of various forms of media on the adolescent health risk behaviors noted earlier.

Another key scientific concept is “probabilistic causality.” Most major health problems are influenced by dozens of factors, some known and some unknown. They are not governed by a simple single-cause single-effect relationship. Thus, when modern science identifies a causal risk factor, it regards it as a probabilistic cause, one that increases the likelihood of, but does not guarantee, the negative health outcome. Even in the case of tobacco smoking and lung cancer, one of the strongest causal relationships in modern medicine, the causal link is probabilistic. Not everyone who smokes gets lung cancer, and some nonsmokers get lung cancer. When scientists say that smoking causes lung cancer, what they mean is that smoking causes an increase in the likelihood that a person will get lung cancer.

The research studies that address relationships between risk factors and health outcomes come in three main types, each with its

characteristic strengths and weaknesses. In experimental studies, researchers randomly assign participants to a treatment group and a control group, thus making sure that, on average, participants in the treatment group do not systematically differ from those in the control group. In a careful experiment, researchers try to control for other potentially important variables as well. To control for the sex of the participants, for example, researchers would randomly assign half the male participants and half the female participants to each of the two comparison groups. Experimental studies effectively rule out many alternative explanations of differences in outcomes between the randomly assigned groups and thus allow researchers to make strong causal statements. The primary weakness of the experimental design is that for many important questions it would be unethical or impossible to conduct a true experiment. Researchers cannot, for example, randomly assign newborn babies to a high- and a low-television watching household to see whether amount of television viewing during childhood influences adolescent obesity.

The second type of study, the longitudinal study, assesses the same participants two or more times over a period of time. For example, researchers might assess TV viewing habits, physical activity, and obesity in a large group of elementary school children every September for five consecutive years. Such a design makes it possible to see whether children who watch a lot of television in year one become more obese and less physically active in the following five years, even after researchers control statistically for how physically active and obese the children are at the beginning of year one. A careful longitudinal study also allows fairly strong causal statements, though it is difficult and expensive to conduct.

The third type, the cross-sectional study, also sometimes called an observational or correlational study, assesses the variables of interest (for example, television viewing, obesity, and physical activity) only once, usually at the same time. Such studies can test whether there is an association between two variables of interest; if they are done well, they may allow a test of some key alternative explanations. But it is risky to assume that the link they find is truly causal.

Because a study's overall quality depends on many other methodological factors, however, a well-designed cross-sectional study can yield more useful information than a poorly designed experimental or longitudinal study.³

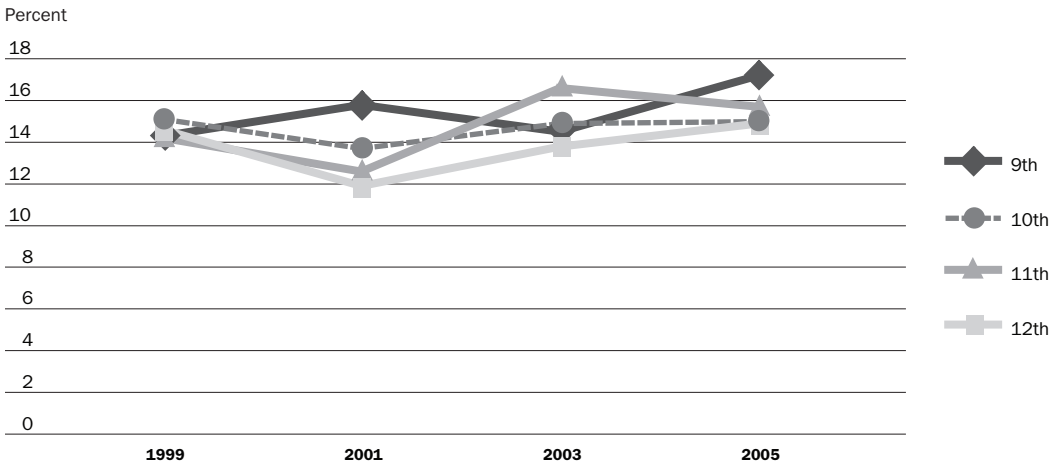
Obesity

Obesity and overweight among children are defined, based on the 2000 CDC growth reference for the United States, in terms of body mass index (BMI), or a person's weight in kilograms divided by height in meters squared.⁴ A person who is obese falls at or above the 95th percentile of BMI-for-age. A person who is overweight falls at or above the 85th percentile, but below the 95th percentile, of BMI-for-age.⁵

Obesity: The Scope of the Problem

U.S. adult obesity rates are among the world's highest and have increased for all age groups over the past three decades.⁶ Data from the National Health Examination Surveys for 1976–80 and for 2003–04 show that the prevalence of obesity for children aged six to eleven has increased from 6.5 percent to 18.8 percent, and for those aged twelve to nineteen from 5.0 percent to 17.4 percent.⁷ Approximately 35 percent of U.S. six- to nineteen-year-olds are overweight, and almost half of them are obese. All racial and ethnic groups have become heavier, but Mexican

Figure 1. Share of Students Who Were at Risk for Becoming Overweight, by Grade, 1999–2005



Source: Healthy Youth! YRBSS Youth Online: Comprehensive Results. <http://apps.nccd.cdc.gov/yrbss/QuestYearTable.asp?path=byHT&ByVar=C1&cat=5&quest=507&year=Trend&loc=XX> (accessed July 25, 2007). Overweight is defined as being at or above the 85th percentile but below the 95th percentile for body mass index.

Americans and African Americans are particularly affected by the epidemic. Overall, the prevalence of being at risk for becoming overweight was higher among ninth graders (17.1 percent) than twelfth graders (14.8 percent) (see figure 1).⁸

Obesity in children increases the risk of poor health outcomes in adulthood. Health problems include type 2 diabetes, hypertension, high cholesterol, orthopedic disorders, and sleep disorders.⁹ Almost two-thirds (60 percent) of obese children have at least one additional cardiovascular risk factor, such as hypertension or hyperlipidemia.¹⁰ Obese children are also at higher risk of becoming obese adults.¹¹

In 1995, obesity-related spending in the United States was estimated to be \$99 million.¹² Most obesity-related health spending goes to treat type 2 diabetes, coronary heart disease, and hypertension.¹³ The costs of obesity now exceed those of tobacco use.¹⁴ It has been estimated that obesity-related morbidity

accounts for approximately 6 percent of U.S. health spending.¹⁵

Food advertising on TV features mostly high-calorie and low-nutrient foods and beverages; advertisements for healthful foods and beverages are limited.

Media Exposure and Obesity

Researchers hypothesize that the link between obesity and television use in children and adolescents is a result of young people’s decreased metabolic rates while watching TV, their decreased physical activity as a result of spending time in front of the screen, and their increased caloric intake, either because they eat while watching TV or because they eat in response to food advertisements on TV.¹⁶ Other media, such as video games, may be

linked to obesity through the same pathways.

Advertisers spend about \$1 billion a year marketing food to children and adolescents, who represent an important demographic market for three reasons: they are customers themselves, they influence purchases made by parents and households, and they are the future adult market.¹⁷ Television receives more advertising dollars than other media because it reaches a greater share of the targeted audiences.¹⁸

Food advertising is a big business in the United States. In 1997, advertisers spent \$1.4 billion to promote food products on network TV and \$1.2 billion to promote restaurants.¹⁹ More than 75 percent of the \$7 billion spent by food manufacturers for advertising in 1997 was allocated to television.²⁰ Food advertising on TV features mostly high-calorie and low-nutrient foods and beverages; advertisements for healthful foods and beverages are limited.²¹ Each day adolescents aged thirteen to seventeen see an average of thirty-five minutes of TV advertising, which includes an average of seventeen food ads.²²

We will examine evidence uncovered by researchers about possible links between obesity and television viewing, movies, video games, and the Internet.

Television Viewing and Obesity

A variety of research studies have found significant associations between obesity and TV viewing. Experimental studies, as noted, provide the strongest form of causal evidence. One such study, designed to prevent obesity by reducing third and fourth graders' use of television, videotapes, and video games, divided 192 children attending two public elementary schools in California into two groups, an intervention and a control group.

The children in the intervention group were taught an eighteen-lesson curriculum, after which they had a ten-day television turnoff (no TV, videotapes, or video games). Parents of children in the intervention group received motivational newsletters. As compared with the control group, the intervention group had significantly smaller increases in BMI and in three of four other measures of adiposity. The intervention group also reduced TV viewing by four to six hours a week and ate one fewer meal a week in a room with the TV on.²³

A longitudinal study examined two sets of data, one collected between 1963 and 1965 from a national sample of 6,965 children aged six to eleven and the other collected between 1966 and 1970 from a sample of 6,671 adolescents aged twelve to seventeen. Investigators measured TV viewing (hours) and fatness (triceps skinfold). Among both the younger children and the adolescents, those who watched more TV had a greater prevalence of obesity or super-obesity than those who watched less TV.²⁴

Several experimental studies grew out of efforts to fight childhood obesity by limiting television viewing. The Stanford GEMS pilot study used after-school dance classes and a family-based intervention to reduce TV and videotape viewing and video game use. Girls in the treatment group reduced BMI and waist circumference, increased after-school physical activity, and reduced television, videotape, and video game use.²⁵

Planet Health, a controlled field trial with five intervention and five control schools included a total of 1,295 youth (whose mean age was 11.7 years). The intervention included thirty-two classroom lessons, each forty-five minutes long, taught over a two-year period, and a two-week campaign to reduce TV viewing in

households. Both girls and boys in the intervention schools reduced TV watching; girls who reduced TV use reduced obesity, and all ate more fruits and vegetables.²⁶ However, not all interventions focusing on reduction of weight through increased activity, decreased electronic media exposure, and changed eating patterns have reported effects.

Other, less conclusive, studies have examined the link between exposure to TV and obesity in observational or cross-sectional fashion. For example, an observational study reported that among youth, increases in TV viewing were linked with increases in total energy intake and that the intake of foods commonly advertised on TV mediated this link.²⁷ A cross-sectional study found that among youth aged ten to fifteen, the odds of being overweight were nearly five times greater for those who viewed five hours of TV a day than for those who viewed two hours or less.²⁸ More recently, Carlos J. Crespo and several colleagues found that the prevalence of obesity among children aged eight to sixteen was lowest among those watching no more than one hour of TV a day and highest among those watching four or more hours of TV daily. Television watching was positively associated with obesity among girls. In other words, girls who watched more TV were more likely to be obese even after researchers accounted for other possible risk factors such as their age, race and ethnicity, family income, weekly physical activity, and energy intake.²⁹

In 2001, an experimental study among pre-school children showed that the effects of television advertising were the same for boys and girls, for children whose home language was English and whose home language was Spanish, and for children with varying levels of access to media. Preschoolers in the control group watched two animated shorts with

a 2.5-minute educational segment; those in the treatment group watched the same two animated shorts but edited into the middle and end were two segments of commercials for products frequently advertised on children's TV programs. The advertisements were for juice, sandwich bread, doughnuts, candy, a fast food chicken entrée, snack cakes, breakfast cereal, peanut butter, and a toy. Immediately after viewing the shorts, both groups of children were interviewed. Those who saw the advertisements preferred the advertised brand over a similar product with similar packaging, even if the advertised brand was unfamiliar and the alternate was a local favorite.³⁰

Each day adolescents aged thirteen to seventeen see an average of thirty-five minutes of TV advertising, which includes an average of seventeen food ads.

Self-reported data from a cross-sectional study among 400 fourth and fifth graders showed that children who viewed more television were less informed about the relative healthfulness of foods and beverages, regardless of their gender, race and ethnicity, reading level, parents' education level, and parents' occupation.³¹ More recently, Kirsten Harrison conducted a similar study among 134 children in grades one through three and concluded that advertising diet foods on television may confuse children, who may not understand the difference between weight-loss benefits and nutritional benefits. The study measured children twice, six weeks

apart, for beliefs about healthful food choices offered as pairs; two pairs were diet food items (fat-free ice cream versus cottage cheese and Diet Coke versus orange juice) and four were regular food items (celery versus carrots, rice cakes versus wheat bread, jelly versus peanut butter, and lettuce versus spinach). The more children watched television, the less accurate their choices for diet foods (both pairs had items likely to be advertised on television) but not for regular foods (only one of four pairs had items likely to be advertised on television).³²

Movies and Obesity

Researchers have conducted few studies of links between watching movies and children's obesity. Because movies do not typically include product advertisements, the marketing strategy most used in movies is product placement—that is, the use by popular actors and characters of a particular product in the movie itself.³³ The strategy is indirect and subtle, yet powerful.³⁴ It is also commonplace in movies aimed at children and adolescents.³⁵

Researchers conducted an experimental study of product placement in films among 105 children—forty-eight eleven- and twelve-year-olds and fifty-seven six- and seven-year-olds—in the United Kingdom. Half of the children, those in the treatment group, saw a 110-second clip from the film *Home Alone* that featured a character drinking Pepsi Cola. The other children, those in the control group, saw a similar clip from the same movie that did not include the Pepsi episode. After viewing the clips, investigators randomly took children to a separate interview room that had a table with cups and small cans of Coke and Pepsi. Children who saw the Pepsi branded clip were significantly more likely to choose Pepsi.³⁶

Video Games and Obesity

Food marketers also have sought to capitalize on the popularity of video games and the Internet among youth. Product placement is difficult to implement effectively in traditional console video games, where the placement must be part of the original programming and cannot be changed once the game is released.³⁷ New technology, however, is making it possible to insert specific brands into video games through the Internet and to track gamers' exposure to these product placements.³⁸

Researchers have not yet rigorously tested possible links between video gaming and obesity. Cross-sectional data from a study conducted among 2,831 children aged one to twelve showed that video game use was positively related to elevated weight status, but only for girls aged nine to twelve who played moderate amounts of games.³⁹ Some evidence suggests video game playing induces higher energy expenditure among children, even while sitting.⁴⁰ But analysts emphasize that the intensity of video game play should not substitute for regular physical exercise, because energy expended in playing video games is more stress-based than aerobic-based.⁴¹

Some anecdotal evidence suggests that interactive video games that require intense physical movement are making a positive difference. *Dance Dance Revolution*, a popular video game available for home use, is being tested by researchers at West Virginia University's School of Physical Education in school settings.⁴² Publicity pieces report that study participants show improvements in their aerobic capacity, blood vessel function, and fitness level.⁴³

The Internet and Obesity

Product placement on Internet-based games, easily incorporated and easy to change as product popularity ebbs and flows, has given rise to what is known as “advergimes” or “advertainment.”⁴⁴ Advergimes are Internet-based games with a commercial message, either subtle or overt, that can be found on product or brand websites. Most websites for popular children’s TV channels (Nick.com, Cartoonnetwork.com, 4Kids.tv, Disney.com) or toy products (Lego, Hasbro, Mattel) feature games that incorporate characters and products to build and extend brand loyalty. For example, SpongeBob SquarePants (Kraft) was the top-selling macaroni and cheese in 2002.⁴⁵ Increasingly, advergimes can be found on websites for foods marketed almost exclusively to children and adolescents. The McDonald’s, Kellogg’s, General Mills, and Hostess websites all have games for children featuring their products. Although advertainment has not been linked directly to childhood obesity, it certainly contributes to children’s choices about foods and beverages.

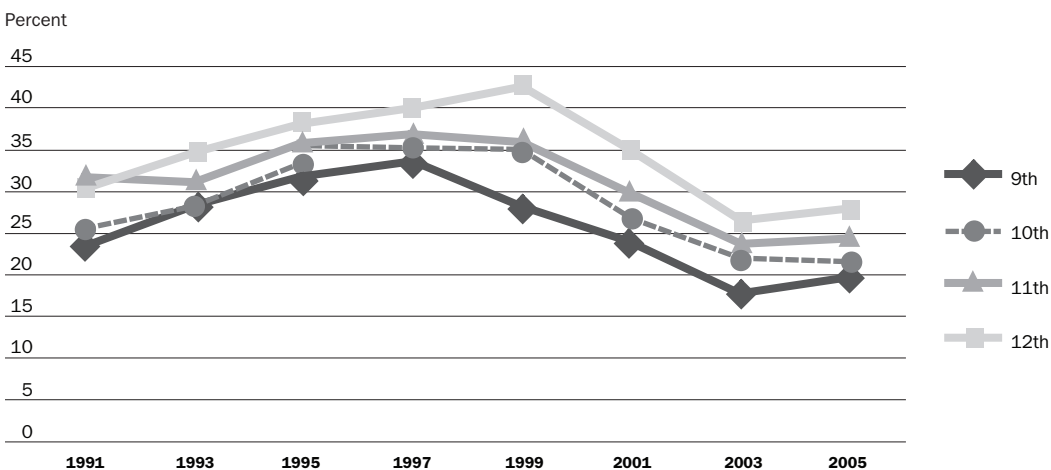
Obesity: Summary

The growing epidemic of childhood obesity has focused attention on the possible role that media consumption and food advertising may play in influencing body weight and eating behaviors. Current evidence, however, is not sufficient to determine the possible contribution of electronic media use, especially television and movies, to the obesity problem. Hence, additional research is needed before definitive causal conclusions can be made. Evidence is stronger for factors such as the lowered cost of food, the increase in calorie-dense foods, the large portion sizes, and the widespread availability of fast food restaurants.⁴⁶ However, advocates are taking steps to reduce the marketing of unhealthy foods to children and adolescents and to reduce time spent on passive electronic media.

Smoking

Cigarette smoking among adolescents is one of the ten greatest U.S. government health concerns.⁴⁷ Smoking is associated with such health problems as cough and phlegm

Figure 2. Share of Students Who Smoked Cigarettes on One or More of the Past 30 Days, by Grade, 1991–2005



Source: Healthy Youth! YRBSS Youth Online: Comprehensive Results. <http://apps.nccd.cdc.gov/yrbss/QuestYearTable.asp?cat=2&Quest=Q30&Loc=XX&Year=Trend&compval=&Graphval=no&path=byHT&loc2=&colval=Race&rowval1=All&rowval2=None&ByVar=C1&Submit2=GO> (accessed July 25, 2007).

production, an increase in the number and severity of respiratory illnesses, decreased physical fitness, unfavorable lipid profile, and potential retardation in the rate of lung growth and the level of maximum lung function.⁴⁸ Smoking is the leading cause of preventable death in the United States.⁴⁹ Daily smoking may lead to coronary heart disease and lung cancer, though usually among adults because these effects usually manifest themselves only after many years of exposure. In 1999, for each of the approximately 22 billion packs of cigarettes sold in the United States, the nation spent \$3.45 on smoking-related medical care and incurred \$3.73 in productivity losses.⁵⁰ During 1997–2001, cigarette smoking and exposure to tobacco smoke resulted in some 438,000 premature deaths annually, as well as 5.5 million years of potential life lost and \$92 billion in productivity losses each year.⁵¹

Smoking: The Scope of the Problem

The majority of new smokers are children and adolescents. In 2005, 63 percent of all new smokers were younger than eighteen. The 2.3 million adolescents aged twelve or older who smoked cigarettes for the first time during 2005 represented a 20 percent increase from 2002, but the overall trends in cigarette smoking among U.S. high school students show a decrease since 1997.⁵²

Nevertheless, according to the 2005 Youth Risk Behavior Survey (YRBS), nationwide more than half of students (54 percent) in grades nine to twelve had ever tried cigarette smoking (even one or two puffs); 23 percent had smoked cigarettes during the thirty days preceding the survey; 8 percent had used smokeless tobacco, such as chewing tobacco, snuff, or dip; and 14 percent had smoked cigars, cigarillos, or little cigars during the thirty days before the survey. Overall, the

prevalence of current cigarette use was higher among white (26 percent) and Hispanic (22 percent) than black (13 percent) students.⁵³ Twelfth-grade students reported the highest prevalence of current cigarette use (27.6 percent). (See figure 2.) Although cigarette smoking has been declining, a large share of U.S. students has tried cigarettes.

Media Exposure and Smoking

Among the external factors that can influence smoking initiation in adolescents are peer pressure, social norms, law enforcement regarding sales of cigarettes to minors, and advertising and promotion. Adolescents are flooded with promotional messages.⁵⁴ During 2003, cigarette companies spent \$15.2 billion to promote their products, including \$156.4 million on magazine advertising and \$32.6 million on outdoor advertising.⁵⁵ Outdoor advertising includes billboards; signs and placards in arenas, stadiums, and shopping malls; and any other advertisements placed outdoors, including those on cigarette retailer property no matter their size.⁵⁶

The scientific community has examined the extent to which cigarette advertising is a contributing causal factor to adolescent smoking. Because researchers cannot ethically conduct randomized controlled trials of the effects of advertising (they could not knowingly risk encouraging smoking), they must rely on other, less conclusive, forms of evidence.

John P. Pierce and several colleagues conducted a longitudinal study with a three-year follow-up (between 1993 and 1996) among 1,752 adolescents aged twelve to seventeen who had never smoked to evaluate the association between their receptiveness to tobacco advertising and promotion and their starting to smoke. The authors established three levels of receptivity: high, intermediate, and

minimal, depending on how the adolescent responds to a basic exposure to advertising (that is, does the adolescent have a favorite tobacco advertisement or recall a billboard or magazine tobacco ad). They categorized the study participants into four mutually exclusive categories: nonsusceptible never-smokers (those who responded negatively when asked whether they would try a cigarette soon, accept a cigarette offered by a friend, or were thinking about smoking during the next year), susceptible never-smokers (those who responded affirmatively when asked these three questions), experimenters (those who reported having smoked or tried even a few puffs of a cigarette), and established smokers (those who reported smoking at least 100 cigarettes in their life). Almost 50 percent of the nonsusceptible never-smokers progressed toward smoking within the three-year follow-up period. Sixteen- and seventeen-year-olds were twice as likely as younger participants to become susceptible never-smokers within the three-year follow-up.⁵⁷ Analysis of the data demonstrated that receptivity to tobacco advertising and promotion was a predictor of established smoking. Experimenters who were highly receptive to tobacco marketing were 70 percent more likely than those who were minimally receptive to become established smokers at follow-up.⁵⁸

Another longitudinal study examined the link between tobacco marketing and adolescent smoking among 529 youths aged twelve to fifteen. Analysts interviewed adolescents over the phone in 1993 and followed them up four years later. They asked participants if they had clothing or some other object with a tobacco brand name or logo on it and asked them to name the cigarette ad that had attracted their attention the most. Teens who were highly receptive to such forms of marketing in 1993 were more than twice as

likely as those with low receptivity to become established smokers by 1997. At the four-year follow-up, 21 percent of the adolescents had become established smokers (having smoked at least 100 cigarettes).⁵⁹

Several cross-sectional studies have examined the links between media advertising and adolescent smoking behavior. Although individually they cannot prove causality, all have found a significant correlation between cigarette advertising and adolescents' smoking initiation.⁶⁰

Researchers have conducted no studies on links between smoking and video games, music, and the Internet. We will review what is known about smoking and television viewing, including music videos, and movies.

Television and Smoking

Smoking on television remains widespread in prime-time programming. Little data exist about links between smoking as portrayed on television and in music videos and when adolescents begin to smoke. Pradeep Gidwani examined the relationship between television exposure in 1990 and smoking initiation between 1990 and 1992 among U.S. adolescents aged ten to fifteen. Among the sample, smoking increased from 4.8 percent in 1990 to 12.3 percent in 1992. The study found important associations between how much adolescents watched TV and when they began smoking. Adolescents who watched more than five hours of TV a day were almost six times more likely to start smoking than those who watched two hours or less a day. Those who watched more than four to five hours of TV a day were more than five times more likely to start smoking than those who watched two hours or less.⁶¹ Other studies have made similar findings: the more TV that adolescents watch, the more positive they feel about

smoking, the more likely they are to begin smoking, and the sooner they start smoking.⁶²

Many studies provide clear and strong evidence that youth are more susceptible to viewing smoking favorably and to becoming smokers as a result of exposure to smoking in the media.

Content analysis of 518 music videos shown on TV from May to June 1994 found that Music Television (MTV) had the highest share of videos (25.7 percent) with smoking-related behaviors, followed by Video Hits One (VHI), Country Music Television (CMT), and Black Entertainment Television (BET). Researchers have found that even moderate music television viewing results in significant exposure to portrayals of cigarette smoking.⁶³ These 1994 data are the most recent available.

Movies and Smoking

Analysts have used both short-term experimental studies and longitudinal studies to examine the link between exposure to smoking in the movies and both adolescents' views of smoking and their smoking initiation.

In 1998, the attorneys general and other representatives of forty-six U.S. states explicitly banned cigarette advertising to children and youth on billboards, any motion picture, television show, theatrical production or other live performance, commercial film or video, or video game. Despite the ban, movies in 2002 featured roughly as much smoking

as they did in 1950.⁶⁴ Advertisers know that many people, and especially younger people, are influenced by what they see in movies. An analysis of fifty G-rated animated movies released between 1937 and 1997 found that tobacco was used by at least one character in 68 percent of the films overall and in 56 percent of the films released in 1996 and 1997. Both good and bad characters smoked. Tobacco use in Disney films made before and after 1964 was similar despite the release in that year of the first surgeon general's report linking smoking to lung cancer.⁶⁵ In 2004, 78 percent of middle school students reported seeing actors using tobacco on television or in movies.⁶⁶

One experimental study divided 232 ninth graders into two groups, with one viewing a movie preview that portrayed smoking, the other viewing a preview that did not portray smoking. Study participants completed a written survey that measured beliefs about smokers and smoking. Those who viewed the smoking scenes had more positive views of smoking and smokers than those who did not.⁶⁷

One longitudinal study published in 2003 reported a strong link between exposure to movie smoking and smoking initiation among 2,603 adolescents aged ten to fourteen. The study measured exposure to smoking in movies by asking participants to indicate the films they had seen from a list of fifty. It found significant associations between exposure to movie smoking and smoking initiation after adjusting for age, sex, and school grade. Ten percent of the participants began smoking during the follow-up period. Researchers also assessed potential interactions between exposure to movie smoking and other smoking risk factors such as age, sex, and social influences (for example, smoking by a friend, sibling,

or parent). They found a significant interaction between exposure to movie smoking and parental smoking behaviors. For adolescents with nonsmoking parents, the risk of smoking initiation increased with greater exposure to movie smoking. Adolescents with smoking parents had an overall higher risk of smoking initiation. After controlling for all covariates, the researchers found that 52.2 percent of the smoking initiation in this cohort could be attributed to exposure to smoking in movies.⁶⁸ Similar results were found in a longitudinal study by Janet M. Distefan, who conducted a random-digit-dialing telephone survey in 1996 of 3,104 never-smokers aged twelve to fifteen. In a follow-up three years later among 67 percent of the adolescents (2,084), the study found that for adolescent girls who had never smoked, viewing their favorite stars smoking in movies significantly increased the risk of future smoking, independent of effects arising from other tobacco advertising and promotional practices. Moreover, adolescent girls whose favorite star smoked in movies released between 1994 and 1996, before the baseline survey, were more than 80 percent more likely to smoke by the time of the follow-up interview than those whose favorite star did not smoke in movies.⁶⁹ A more recent study of more than 2,600 nonsmoking fifth- to eighth-graders found that exposure to smoking in movies increased the likelihood of smoking onset eighteen months later in two different ways, both directly, through modeling and imitation, and indirectly, through increased affiliation with peers who smoke. Researchers found these effects even when they took into account other risk factors such as parenting style, rebelliousness and sensation seeking, school performance, parental smoking, sibling smoking, and several demographic variables.⁷⁰

Smoking: Summary

The media bring billions of impersonations of glamorized smoking to millions of youths through TV, movies, video games, music, the Internet, and advertisement in general. Longitudinal, experimental, and cross-sectional studies provide clear and strong evidence that youth are more susceptible to viewing smoking favorably and to becoming smokers as a result of exposure to smoking in the media. Additional research is needed on the effects of portrayals of smoking on the Internet and in video games and music.

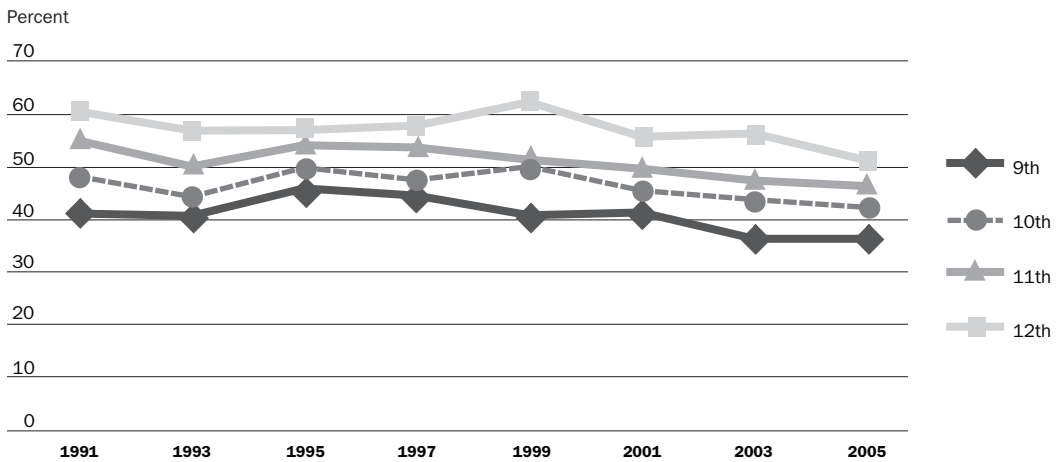
Alcohol Use

Alcohol use by children and adolescents continues to be a problem. It brings several negative consequences at the personal, familial, and societal levels. It affects school performance and induces high-risk behaviors. Alcohol plays an important role in the three leading causes of death among youth: unintentional injuries (including motor vehicle fatalities and drowning), suicides, and homicides.⁷¹

Alcohol Use: The Scope of the Problem

Alcohol abuse and alcohol dependence are widespread problems among U.S. adolescents. Results from the YRBS 2005 of a nationally representative sample of students in grades nine through twelve showed that 74 percent had had at least one drink of alcohol on more than one day during their life; 43 percent had had at least one drink of alcohol in the thirty days preceding the survey. Overall, the prevalence of current alcohol use was higher among white (46 percent) and Hispanic (47 percent) students than among blacks (31 percent), and higher among twelfth graders (50.8 percent) than ninth, tenth, and eleventh graders. (See figure 3.) Moreover, 26 percent of students had had five or more drinks of alcohol in a row (that is, within a couple of hours) on one or more

Figure 3. Share of Students Who Had at Least One Drink of Alcohol on One or More of the Past 30 Days, by Grade, 1991–2005



Source: Healthy Youth! YRBSS Youth Online: Comprehensive Results. <http://apps.nccd.cdc.gov/yrbss/QuestYearTable.asp?cat=3&Quest=Q41&Loc=XX&Year=Trend&compval=&Graphval=no&path=byHT&loc2=&colval=Race&rowval1=All&rowval2=None&ByVar=C1&SubmIt2=GO> (accessed: July 25, 2007).

of the thirty days preceding the survey.⁷²

People who begin drinking at age fourteen or younger are approximately four times as likely to become alcohol dependent as are those who begin drinking at age twenty or older.⁷³ Moreover, underage drinking is associated with greater risk of motor vehicle crashes, problems in school, fighting, and crime. Indeed, some 5,000 youth under age twenty-one die each year in the United States from alcohol-related injuries involving underage drinking.⁷⁴ The cost to society of underage drinking is estimated to be \$3 per illegal drink.⁷⁵

Media Exposure and Alcohol Use

Alcohol advertising is ubiquitous in sporting events and broadcast media and is also present on the Internet. Each year the alcohol industry spends more than \$1 billion on television, radio, print, and outdoor advertising.⁷⁶ The alcohol industry's voluntary advertising codes provide that alcohol advertising should not be overtly directed to underage consumers.⁷⁷ The electronic media, however, still show alcohol

use as a normative and harmless behavior.⁷⁸

Alcohol advertising is designed to appeal to children and adolescents. It sells images of success, sexuality, fun, and love, and it can be found in movies (no matter the rating), television, magazines, billboards, and radio.⁷⁹

Over a three-week period in 2003, the Center on Alcohol Marketing and Youth reviewed seventy-four websites operated by alcohol companies and found widespread use of features catalogued as potentially attractive to underage youth. Nearly 700,000 in-depth visits to fifty-five alcohol websites during the last six months of 2003, for example, were initiated by underage youth.⁸⁰

When analysts examined alcohol advertising in magazines from 1997 to 2001 to see whether placement of the ads was associated with adolescent readership, they found that the number of beer and distilled spirits ads tended to increase with a magazine's youth readership. For each additional 1 million magazine readers aged twelve to nineteen,

they found 1.6 times more beer advertisements.⁵¹ Alcohol advertisements are often more concentrated in media directed to youth than in media directed to adults.⁵²

Accumulating evidence suggests that alcohol advertising may contribute to adolescent drinking.

Accumulating evidence suggests that alcohol advertising may contribute to adolescent drinking.

No research exists on links between adolescents' alcohol use and alcohol advertising in video games, music, and the Internet. We will review what is known about alcohol use on television, including music videos, and in movies.

Television Advertising and Alcohol Use

Alcoholic drinks are the beverages most commonly advertised on TV.⁵³ From 2001 to 2005, alcohol companies spent \$4.7 billion on 1.4 million advertisements for alcoholic beverages on television. Youth overexposure to alcohol is more often found on cable since cable networks usually have more narrowly defined and concentrated viewers than broadcast networks. From 2001 to 2005, youth overexposure to alcohol advertising on cable increased from 60 percent to 93 percent.⁵⁴ In the spring of 2000, researchers recruited 2,998 seventh graders from Los Angeles for a longitudinal study to look at how televised alcohol commercials might have influenced their alcohol consumption one year later. Participants indicated the number of times during the past month that they

watched programs drawn from a list of twenty popular TV series. They also responded to psychosocial, behavioral, and alcohol-related questions. The study found a strong association between exposure to television beer ads in grade seven and alcohol consumption in grade eight, even after taking into account other risk factors such as prior alcohol use, intentions, peer and adult alcohol use, peer norms, and sports participation.⁵⁵

A recent longitudinal study of 1,786 middle school children in South Dakota measured exposure during sixth grade to television beer advertisements, alcohol ads in magazines, in-store beer displays, and beer concessions; radio listening time; and beer promotional items such as T-shirts, hats, and posters. The study then measured drinking intentions and subsequent behavior during seventh grade. Findings supported a positive link between alcohol-related media exposure during sixth grade and beer drinking and drinking intentions in seventh grade. After making statistical adjustments for psychosocial factors and drinking in sixth grade, the study found that children who had high exposure to overall alcohol advertising during sixth grade were 50 percent more likely to drink during seventh grade than children who had low exposure.⁵⁶

In New Zealand, a longitudinal study of 667 youths examined the association between their recall of alcohol advertising at ages thirteen and fifteen and their alcohol consumption at age eighteen. Boys who recalled more commercial advertisements at age fifteen reported consuming more beer three years later. The study found no association between girls' drinking and advertising exposure.⁵⁷

Phyllis L. Ellickson conducted a longitudinal study of the relationship between exposure to

different forms of alcohol advertising—televised sports and late night programs that air beer commercials, magazines that advertise alcohol, beer concession stands, and in-store beer displays—and drinking behavior in a sample of 3,111 early adolescents in South Dakota. Adolescents were assessed three times, in seventh, eighth, and ninth grades. Nondrinking students in seventh grade who reported higher exposure to in-store beer displays were more likely to drink alcohol by grade nine. Students who were drinking in seventh grade and who reported exposure to magazines with alcohol advertisements and to beer concession stands at sports or music events reported increased frequency of drinking in grade nine. Exposure to television beer ads, however, was not significantly linked to drinking in ninth grade for either drinkers or nondrinkers.⁸⁸

A longitudinal study conducted in California examined the relationship between students' exposure to different types of media (TV, music video, and videotape viewing; computer and video game use) and their alcohol use eighteen months later. At the eighteen-month follow-up, students reported increased lifetime drinking (36 percent of baseline nondrinkers began drinking and 51 percent of baseline drinkers continued to drink). The study found a strong link between watching TV and music videos and subsequent onset of alcohol use. For each extra hour of TV viewing a day, the risk of starting to drink over the next eighteen months increased an average of 9 percent; for each extra hour a day of viewing music videos, the risk increased an average of 31 percent.⁸⁹

Movies and Alcohol Use

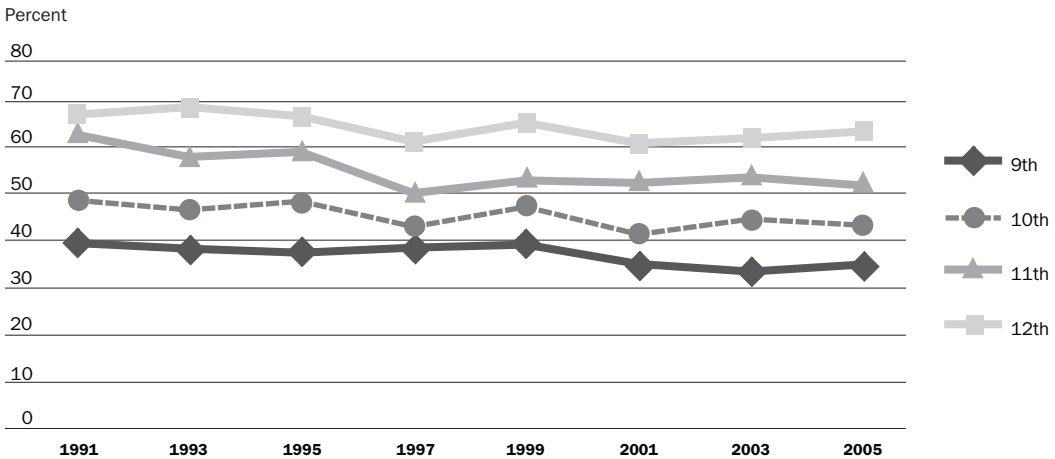
Although movies do not feature advertisements for alcohol, even animated films frequently depict alcohol use. Of eighty-

three G-rated animated movies available on videocassettes for purchase or rental before October 31, 2000, forty-six contained scenes of alcohol use. Of the characters shown drinking in these films, 39 percent drank wine, 24 percent beer, 20 percent champagne, and 17 percent hard liquor or mixed drinks.⁹⁰

Alcohol use was portrayed in nineteen of thirty-three Walt Disney animated movies available from 1937 through 1997.⁹¹ Of a sample of 110 top-grossing American films released between 1985 and 1995, at least one lead character used alcohol in 79 percent.⁹² Of the 200 most popular movie rentals for 1996 and 1997, 93 percent showed a character drinking alcohol. In 9 percent of these movies, 22 percent of the characters who drank alcohol appeared to be younger than eighteen.⁹³

James D. Sargent and colleagues conducted a school-based cross-sectional survey among adolescents aged ten to fourteen, with a follow-up of 2,406 never-drinkers thirteen to twenty-six months later to assess whether drinking in movies was related to early-onset drinking. They found that 92 percent of movies in a pool of 601 popular contemporary films depicted alcohol use. They estimated exposure to these movies by asking participants whether they had ever seen any films from a set of fifty titles randomly selected from the pool. Alcohol initiation was assessed by the question: "Have you ever had beer, wine, or other drink with alcohol that your parents didn't know about?" Researchers found that 50 percent of the participants were exposed to eight or more hours of movies and that movie exposure was related to a significantly higher likelihood of early-onset alcohol use even after controlling for age, self-esteem, rebelliousness, sensation seeking, and parenting style.⁹⁴

Figure 4. Share of Students Who Ever Had Sexual Intercourse, by Grade, 1991–2005



Source: Healthy Youth! YRBSS Youth Online: Comprehensive Results. <http://apps.nccd.cdc.gov/yrbss/QuestYearTable.asp?cat=4&Quest=Q57&Loc=XX&Year=Trend&compval=&Graphval=no&path=byHT&loc2=&colval=Race&rowval1=All&rowval2=None&ByVar=CI&Submit2=GO> accessed July 25, 2007).

Alcohol Use: Summary

Overall, the research strongly suggests that exposure to alcohol advertising and to electronic media that portray alcohol use increases adolescents’ alcohol use. Additional research is needed for video games, the Internet, and music, but the existing studies, especially longitudinal ones, strongly support a causal link between alcohol portrayal in TV and movies and later alcohol use.

Early Sexual Initiation

Early sexual initiation has been associated with an increased risk of sexually transmitted infections (STIs) and teen pregnancy.⁹⁵ Youth who initiate sexual intercourse at age thirteen or younger (about 6 percent of youth this age) are more likely to report having multiple lifetime sexual partners, engaging in frequent sexual intercourse, using alcohol or drugs before sex, and having sex without a condom.⁹⁶ Adolescent STIs including HIV are serious public health problems. In 2000, youth between the ages of fifteen and twenty-four accounted for 9.1 million (48 percent)

of all new STI cases at an estimated medical cost of \$6.5 billion.⁹⁷

Early Sexual Initiation: The Scope of the Problem

Adolescents are engaging in sexual risk-taking behaviors at an earlier age, often before they are developmentally ready to deal with the potential outcomes. Data from the 2005 YRBS indicate that 6.2 percent of high school students engage in sex before the age of thirteen.⁹⁸

According to data from the 2003 Middle School Youth Risk Behavior Surveillance Survey, 6 percent of sixth graders and 9 percent of eighth graders have engaged in sexual intercourse (implicitly, vaginal intercourse).⁹⁹ In 2005, a total of 47 percent of ninth- to twelfth-grade students had had sexual intercourse, with the prevalence higher among black (68 percent) than white (43 percent) and Hispanic (51 percent) students. Figure 4 shows the share of students in ninth, tenth, eleventh, and twelfth grade who have ever had sexual intercourse.

Media Exposure and Early Sexual Initiation

Children and adolescents are exposed to indirect as well as to explicit, sexually oriented media marketing that sells everything from soda to candy to male body products. Still, virtually no attention has been given to the ways in which the sexual content of advertising may shape adolescent sexual behavior. According to one study, the share of undressed women in advertisements has changed little over the past forty years, whereas that of undressed men has increased significantly, especially since the early 1980s. The impact of these increased portrayals of nude men remains unexamined.¹⁰⁰ Likewise, few studies have addressed the question of whether the exposure of children and adolescents to sexual talk and sexual content in the media might influence adolescent sexual behavior.¹⁰¹ We found only one relevant piece of evidence, a cross-sectional study of the link between sexual content of movies and adolescent sexual behavior. That study found that among adolescent black females, exposure to X-rated movies was associated with more sexual behavior, although it is difficult to say much from one cross-sectional study.¹⁰²

No research exists on links between sexual behavior and video games and the Internet. We will examine research on the association between sexual behavior and sexual content on television, including music videos on television, and music.

Television and Early Sexual Initiation

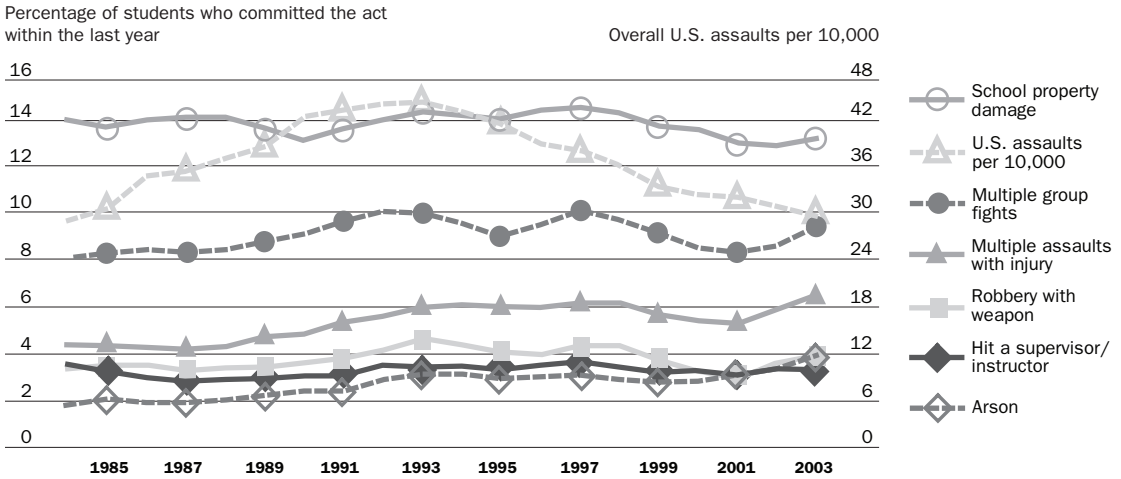
Roughly two-thirds of TV programs contain sexual content, yet few studies have examined the association over time between exposure to TV and sexual behaviors in adolescents.¹⁰³ A longitudinal study conducted by James Peterson and colleagues suggested a positive link between amount of television watched and

early initiation of sexual intercourse, but the effect size was not statistically significant.¹⁰⁴ Rebecca Collins and several colleagues presented findings from a recent longitudinal study that took into account other risk factors, such as age, race and ethnicity, social environment, religiosity, deviant behavior, mental health, and sensation seeking, and still found a significant association between the amount of sexual content viewed by adolescents and their sexual behavior one year later. Watching TV that featured sexual content had the effect of artificially aging youths: those who watched more such content than average behaved sexually as if they were nine to seventeen months older and watched only average amounts of such content. Exposure to talk about sex was associated with the same risk as exposure to more visually explicit programming.¹⁰⁵

Virtually no attention has been given to the ways in which the sexual content of advertising may shape adolescent sexual behavior.

Several cross-sectional studies have shown a link between sexual exposure on TV and sexual behavior among adolescents. These studies suggest that high school students who watch television shows with high sexual content are more likely to be sexually active than those viewing television shows with less sexual content and that adolescents' sexual media consumption is significantly related to their sexual experience and intentions to be sexually active.¹⁰⁶ Other studies suggest that adolescents who view more television with sexual content tend to overestimate the

Figure 5. Overall U.S. Assault Rates and Six Twelfth-Grade Violence Prevalence Rates, 1982–2003



Source: Criminal Victimization in the United States, 2005, U.S. Department of Justice. Downloaded July 1, 2007 from: <http://www.ojp.usdoj.gov/bjs/abstract/cvusst.htm>. Bureau of Justice Statistics, Sourcebook of Criminal Justice Statistics 2003, 31st Edition, U.S. Department of Justice. Downloaded on June 29, 2007 from: <http://www.albany.edu/sourcebook>.

frequency of certain sexual behaviors and to have more permissive attitudes toward premarital sex.¹⁰⁷ One study found that youth who were exposed to portrayals of sexual relations outside of marriage were less likely to view nonmarital sex negatively than youth exposed to portrayals of sexual relations within marriage or to scenes of nonsexual relations.¹⁰⁸

In a small 1986 study on television music videos, adolescents who had just watched an hour of MTV videos were more likely to report approval of premarital sex than those who had not.¹⁰⁹ A decade later, a larger study found that among adolescent girls the link between exposure to music videos and permissive attitudes toward premarital sex was stronger than it was among adolescent boys and stronger for girls with low rather than high family satisfaction.¹¹⁰ The data cannot determine a causal relationship, and the sample size and study design do not allow taking into account extraneous and potentially confounding variables.

Music and Early Sexual Initiation

Radio, CDs, and tapes make up 17 percent of teens' total daily media exposure. On average, adolescents listen to music between 1.5 and 2.5 hours a day depending on their age.¹¹¹ Yet only one study has examined the relationship over time between exposure to music and sexual behaviors in adolescents. Steven Martino and several colleagues conducted a national longitudinal telephone survey in 2001, 2002, and 2004 of a sample of adolescents aged twelve to seventeen. Interviewers asked about media use; about sexual knowledge, attitudes, and behavior; and about demographic and psychosocial variables known to predict sexual behavior or media use. They found that adolescents who spent more time listening to music with degrading sexual content were more likely to initiate sexual intercourse and to progress in their noncoital activity than those who spent less time. That finding held up even when researchers took into account eighteen other predictors of sexual behavior.¹¹²

Early Sexual Initiation: Summary

Although the media are ubiquitous and although scientific studies have demonstrated their influence on other behaviors such as smoking, relatively few studies have examined their relationship with child and adolescent sexual initiation. Most of the studies have examined the association in a cross-sectional fashion, which does not permit inferences to be made about a causal connection but does allow assessments of whether media is at all associated with sexual early initiation. Those few studies, however, suggest that media exposure can increase early sexual behavior.

Aggressive and Violent Behavior

Aggression is usually defined by behavioral scientists as behavior that is intended to harm another person. Common forms of aggression are physical (for example, punching), verbal (for example, saying or writing hurtful things to another person), and relational (for example, intentionally and publicly not inviting someone to a party to harm his social relationships). Violence usually is conceived as more extreme forms of physical aggression that are likely to result in physical injury. The most extreme form of violence is homicide, but any form of aggressive behavior that is likely to result in an injury serious enough to warrant medical attention is considered violence. Thus, fights involving weapons as well as fistfights by adolescents old enough to be able to inflict serious injuries are considered acts of violence.

The relation of these terms to violent “crime” requires some comment. The vast majority of media violence research focuses on aggressive and violent behavior as defined earlier. Violent crime is a much more restrictive category and is applied only in cases where someone has been arrested for a crime classified by police as a major crime against persons, such as

murder, rape, and assault. There are at least two reasons for the discrepancy between the behavioral scientists’ focus and the criminologists’ focus. First, the criminological focus is based more heavily on the consequences of a specific action, whereas the behavioral science focus is almost exclusively based on the intention behind the action. Understanding the causes of violent behavior requires this focus on intentions rather than on whether the person succeeded in harming the individual and was subsequently caught. Second, not only is it much more difficult and expensive to do research on violent crime because it is

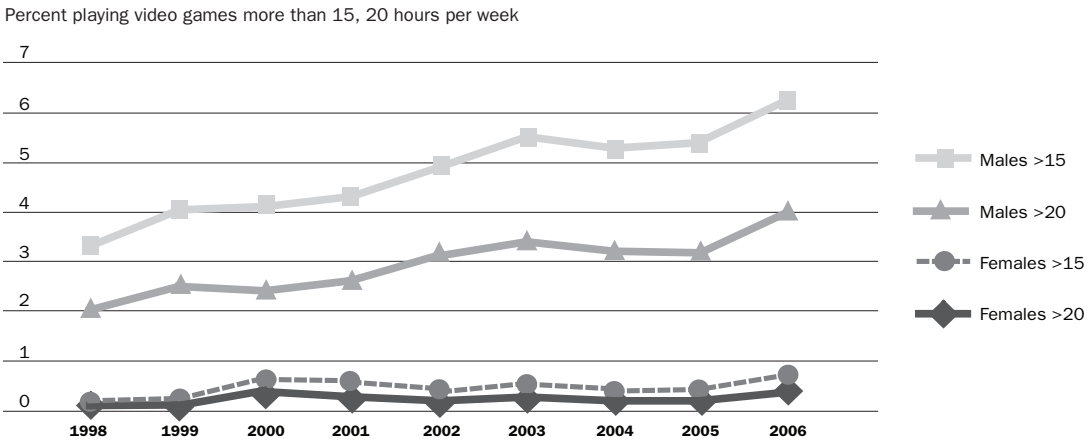
Despite many reports that exposure to violent media is a causal risk factor, the U.S. public remains largely unaware of these risks, and youth exposure to violent media remains extremely high.

relatively rare (thereby requiring huge sample sizes), but also certain types of research, such as experimental studies, would be unethical. For these reasons, we focus on aggressive and violent behavior, though we cite violent crime data where useful.

Violent Behavior: The Scope of the Problem

Youth violence resulting in deaths and injuries has direct and indirect costs in excess of \$158 billion each year. Only accidental injury (frequently auto accidents) consistently leads homicide as the cause of death of U.S. youths

Figure 6. Share of College Freshmen Reporting Having Played Video Games More Than 15 and More Than 20 Hours Per Week During 12th Grade, by Year and Sex, 1998–2006



Source: Cooperative Institutional Research Program Survey results, 1998–2006. Higher Education Research Institute, University of California–Los Angeles.

between one and twenty-four years of age.¹¹³ For youths between the ages of ten and twenty-four, homicide is the leading cause of death for African Americans, the second leading cause for Hispanics.¹¹⁴

Young people not only suffer but also commit a disproportionate share of violence. Although twelve- to twenty-year-olds made up about 13 percent of the U.S. population in 2005, they were responsible for some 28 percent of the single-offender and 41 percent of multiple-offender violent crimes.¹¹⁵ Figure 5 displays the overall U.S. assault rates and six twelfth-grade violence prevalence rates between 1982 and 2003. U.S. assault rates rose dramatically from the early 1980s to the early 1990s and then, just as dramatically, fell. Other overall rates for violent crime, such as homicide, show the same pattern. One factor that likely contributed to this rise and fall was changes in the share of the U.S. population in the high-violence age range.

Although rates of youth violence also increased during the late 1980s and early

1990s, they have not fallen in recent years. In fact, the youth violence indicators in figure 5 show considerable stability over time; several appear to be increasing.¹¹⁶

Media Exposure and Aggressive and Violent Behavior

The extent to which media violence causes youth aggression and violence has been hotly debated for more than fifty years. Despite many reports that exposure to violent media is a causal risk factor, the U.S. public remains largely unaware of these risks, and youth exposure to violent media remains extremely high. Among the public advisories that have been generally ignored are congressional hearings in 1954, U.S. surgeon general reports in 1972 and 2001, a National Institute of Mental Health report in 1982, and a Federal Trade Commission report in 2000. In addition to government studies, reports have been issued by scientific organizations such as the American Psychological Association (in 1994, 2000, and 2005), the American Academy of Pediatrics, the American Academy of Child and Adolescent Psychiatry, the

American Medical Association, the American Academy of Family Physicians, and the American Psychiatric Association.

The most recent thorough review of the research on media violence, by an expert panel convened by the U.S. surgeon general, concluded, “Research on violent television and films, video games, and music reveals unequivocal evidence that media violence increases the likelihood of aggressive and violent behavior in both immediate and long-term contexts.”¹¹⁷ Hundreds of original empirical studies of the link between media violence and aggression have been conducted, and numerous reviews of those studies—both narrative and statistical—have come to the same conclusion. Indeed, one analysis found clear evidence that exposure to media violence increases aggressive behavior as early as 1975.¹¹⁸

The newest form of media violence—violent video games played on computers, video game consoles, handheld systems, the Internet, and even cell phones—also is the fastest growing. Although most youth still spend more time each week watching TV, including movies, than playing video games, the time they spend with video games is increasing rapidly, and a growing share of youth is spending many hours playing video games. For example, about 90 percent of U.S. youth aged eight to eighteen play video games, with boys averaging about nineteen hours a week.¹¹⁹ Annual surveys of college freshmen over time reveal that as twelfth graders they spend ever-increasing amounts of time playing video games. The finding is especially true for boys, as shown in figure 6.¹²⁰

We review evidence on the link between youth violence and violence on television and film and on video games. We could find no

studies on the effects of violence in advertising on aggressive or violent behavior, but the effects of such violent content are likely to be similar.

Television and Movie Violence and Violent Behavior

Television and movie violence are the most extensively researched forms of media violence. Studies using all three major research designs have all reached the same conclusion—exposure to television and movie violence increases aggression and violence.

Experimental studies have shown that even a single exposure increases aggression in the immediate situation. For example, Kaj Bjorkqvist randomly assigned one group of five- to six-year-old Finnish children to watch violent movies, another to watch nonviolent ones. Raters who did not know which type of movie the children had seen then observed them playing together in a room. Children who had just watched the violent movie were rated much higher on physical assault and other types of aggression.¹²¹ Other experiments have shown that exposure to media violence can increase aggressive thinking, aggressive emotions, and tolerance for aggression, all known risk factors for later aggressive and violent behavior.

Many cross-sectional studies have examined whether people who view many violent TV shows and movies also tend to behave more aggressively. Such studies generally find significant positive correlations. For example, one group of researchers studied the links between “aggressive behavioral delinquency,” such as fighting and hitting, and TV violence viewing in samples of Wisconsin and Maryland high school and junior high school students. They found significant positive links between TV violence exposure and aggression

for both boys and girls.¹²² Another research team reported 49 percent more violent acts in the past six months by heavy viewers of TV violence than by light viewers.¹²³

Researchers also have used longitudinal studies to investigate television violence effects, using time periods that range from less than one year to fifteen years. One research team studied a group of six- to ten-year-olds over fifteen years. They found that both boys and girls who viewed television violence committed more aggression (physical, verbal, and indirect) during young adulthood. The study found the same link when the outcome examined was outright physical violence, such as punching, beating, choking, threatening, or attacking with a knife or gun. This media violence study is one of the few to include measures of violent crime. Because it is a well-conducted longitudinal study, it lends considerable strength to the view of media violence as a causal risk factor for aggression, violence, and violent crime. Interestingly, although frequent exposure to TV violence during childhood was linked to high levels of adulthood aggression, high aggressiveness during childhood did not lead to frequent viewing of television violence in adulthood.¹²⁴

Violent Video Games and Violent Behavior

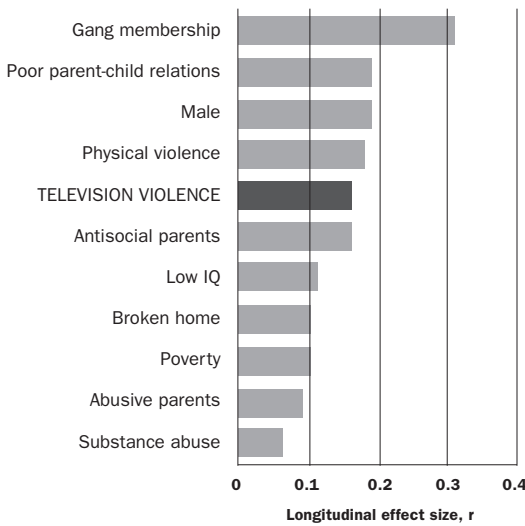
The most popular video games played by youth contain violence. Even children's games (as designated by the industry-sponsored Entertainment Software Ratings Board) are likely to contain violence. More than 30 percent of games rated "E" (suitable for everyone) contain a violence descriptor; more than 90 percent of "E10+" games (suitable for those ten years and older) contain a violence descriptor.¹²⁵ About 70 percent of fourth to twelfth graders report playing "Mature"-rated games (suitable for those

seventeen and older), which contain the most graphic violence of all.¹²⁶

Research on video game violence is less extensive than that on TV and film violence, but the findings are essentially the same. Experimental studies in field and laboratory settings generally find that brief exposure to violent video games increases aggressive thoughts, feelings, and behavior. For example, one laboratory study assigned children and college students randomly to play either a children's video game that involved shooting cartoon-like characters or a nonviolent children's video game. Later, all participants completed a standard laboratory task that measures physical aggression. Those who had played the violent children's game displayed a 40 percent higher aggression rate than those who had played a nonviolent game. The effect was the same for both elementary school children and college students.¹²⁷ In a field experiment, children were randomly assigned to play either a violent or nonviolent video game and then were observed by trained coders during a free-play period. The children who had played the violent game displayed significantly more physical aggression than those who had played a nonviolent game.¹²⁸

To date, the only published longitudinal study that clearly delineates the possible influence of violent video games used a relatively short time span of six months. The researchers conducting the study assessed the media habits and aggressive tendencies of elementary school children, as well as a host of control variables, twice within a school year. The children who were heavily exposed to video game violence early in the school year became relatively more physically aggressive by the end of the year, as measured by peers, teachers, and self-reports.¹²⁹ Cross-sectional

Figure 7. Risk Factors for Youth Violence, Based on Longitudinal Evidence



Source: U.S. Department of Health and Human Services. *Youth Violence: A Report of the Surgeon General* (Rockville, Md.: U.S. Government Printing Office, 2001); L. Rowell Huesmann and others, "Longitudinal Relations between Children's Exposure to TV Violence and Their Aggressive and Violent Behavior in Young Adulthood: 1977-92," *Developmental Psychology* 39 (2003): 201-221.

studies have also found positive correlations between exposure to violent video games and various forms of aggression, including violent behavior and violent crimes.¹³⁰

All three types of studies have also linked violent video games to a host of additional aggression-related cognitive, emotional, and behavioral outcomes. Outcomes include more positive attitudes toward violence, increased use of aggressive words or solutions to hypothetical problems, quicker recognition of facial anger, increased self-perception as being aggressive, increased feelings of anger and revenge motives, decreased sensitivity to scenes and images of real violence, and changes in brain function associated with lower executive control and heightened emotion.¹³¹

Violent Behavior: Summary

The research evidence shows clearly that media violence is a causal risk factor for aggressive and violent behavior. There is considerably less evidence concerning violent crimes, but the few cross-sectional and longitudinal studies that included violent crime measures also found similar links with media violence. The size of the media violence effect is as large as or larger than that of many factors commonly accepted by public policymakers and the general public as valid risk factors for violent behavior. Figure 7 illustrates the current best estimates of several risk factors for youth violence.

The figure does not include the longitudinal violent video game effect because the one relevant study did not include a specific measure of violence that is comparable to the other factors. However, several studies have directly compared video game and TV violence using the same participants and the same measures; they generally find a somewhat larger effect for video games. Thus, we expect that the effect of violent video games on long-term violence will be larger than that of TV violence and smaller than that of gang membership. Furthermore, it is likely that overall media violence exposure has a somewhat larger effect than any individual type of media violence. In any case, the figure makes clear that media violence exposure has a larger effect on later violent behavior than does substance use, abusive parents, poverty, living in a broken home, or having low IQ.¹³²

Conclusions

Media have a very powerful influence on health behavior. The leading causes of youth morbidity and mortality today are the outcomes of health risk behaviors that have been linked with media exposure, including excessive caloric intake, physical inactivity, smoking, underage drinking, early sexual initiation, and

violent behavior. The largest and most well developed research literature concerns the effects of one type of media content on one type of risky health behavior —the effect of media violence on aggressive and violent behavior. That link is very strong, clearly causal, and surprisingly large. The links between media consumption and smoking and alcohol use also are strong and there is good evidence that they are causal. Although there are good theoretical reasons to expect media exposure effects on obesity and on early sexual initiation, and although there is some supportive research for each of these risky health behaviors, there currently is too little high-quality research to make it possible to say whether the links are causal.

To better understand the effect of the media on youth risk behavior, researchers will have to develop comprehensive explanatory models that include socioeconomic and cultural variables. One promising model, the prototype-willingness model of risk behavior, assumes two primary pathways to risk behaviors, one that is reasoned and one that is more spontaneous and opportunistic. Analysts have long understood the reasoned pathway, which involves a person's carefully considered expectations of the likely outcome of the risk behavior and the value placed on the likely outcome. The unique aspect of the model is the second, more spontaneous pathway, which indeed seems to be a common route traveled by youths on their way to the onset of risky health behaviors. Work on this second pathway has yielded three key insights. First,

much risk behavior involves a reaction to favorable social circumstances rather than a preplanned event. Second, because these circumstances are social and public, they are associated (in the minds of youths) with clear images of what the behavior is, what the risks and benefits are, and what kinds of people engage in the behavior. Third, these images have a huge impact on the spur-of-the-moment decision to engage (or to refuse to engage) in the risk behavior.¹³³ Researchers have applied this model successfully to a number of adolescent risk behaviors, including smoking, alcohol consumption, and sexual behaviors. Of particular importance for our purpose is that a major source of the risk behavior images in this model is likely to be media exposure to the behaviors. One need only recall the impact of the image of the Marlboro Man or Joe Camel to get an intuitive feel for how media images can influence snap decisions to engage in risky behavior.

Finally, we note that what may be part of the problem could instead become part of the solution. As noted by Douglas Evans in his article in this volume, electronic media have been used in positive ways, leading to positive health behavior outcomes. Therefore, channeling creative energy into positive mass media content could well help to reduce the health risk behavior rates, particularly among adolescents. A thorough understanding of the nature of the media impact on health and well-being is a vital component of the public health agenda in the United States.

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