

# Television and Music Video Exposure and Risk of Adolescent Alcohol Use

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**ABSTRACT.** *Objective.* Alcohol use is frequently portrayed in television programming and advertising. Exposure to media portrayals of alcohol use may lead to increased drinking. To address this issue, we examined prospectively the associations between media exposure and alcohol use in adolescents.

*Design.* Prospective cohort study.

*Setting.* Six public high schools in San Jose, California.

*Participants.* Ninth-grade students ( $N = 1533$ ; mean age = 14.6 years).

*Outcome Measures.* Students reported hours of television, music video, and videotape viewing; computer and video game use; and lifetime and past 30 days' alcohol use at baseline and 18 months later. Associations between baseline media exposure and subsequent alcohol use were examined with multiple logistic regression.

*Results.* During the 18-month follow-up, 36.2% of baseline nondrinkers began drinking and 50.7% of baseline drinkers continued to drink. Onset of drinking was significantly associated with baseline hours of television viewing (odds ratio [OR] = 1.09; 95% confidence interval [95% CI] = 1.01–1.18), music video viewing (OR = 1.31; 95% CI = 1.17–1.47), and videotape viewing (OR = 0.89; 95% CI = 0.79–0.99), controlling for age, sex, ethnicity, and other media use. Computer and video game use was not significantly associated with the subsequent onset of drinking. Among baseline drinkers, there were no significant associations between baseline media use and maintenance of drinking.

*Conclusions.* Increased television and music video viewing are risk factors for the onset of alcohol use in adolescents. Attempts to prevent adolescent alcohol use should address the adverse influences of alcohol use in the media. *Pediatrics* 1998;102(5). URL: <http://www.pediatrics.org/cgi/content/full/102/5/e54>; adolescents, alcohol use, media, television, music videos, videotapes, computer games, video games.

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ABBREVIATION. VCR, videocassette recorder.

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Alcohol use among adolescents is a significant public health problem.<sup>1</sup> Recent national data indicate that 25% of 8th-graders, 39% of 10th graders, and 51% of 12th-graders report drinking alcohol in the past month.<sup>2</sup> Adolescents and young adults are more likely than other age groups to incur negative consequences associated with the acute effects of alcohol consumption.<sup>3</sup> Alcohol is a major contributor to motor vehicle crashes and other injuries, homicide, and suicide, is the leading causes of death and disability among adolescents,<sup>1,4</sup> and is responsible for >100 000 US deaths per year.<sup>5</sup> Additionally, early onset of alcohol use is associated with continued alcohol use and progression to illicit drug use.<sup>6–8</sup> Consequently, it is important to understand the factors that influence the onset and maintenance of alcohol use by adolescents.

It has been suggested that television programs and advertisements depicting or advocating alcohol use may encourage drinking among adolescent viewers.<sup>9</sup> Alcohol use is frequently portrayed in both entertainment programming and advertising, and alcohol is the most common beverage shown on television. Portrayals of alcohol use are particularly prevalent in prime-time programming,<sup>10</sup> music videos,<sup>11</sup> and during television coverage of college and professional sports events.<sup>12</sup> Content analyses indicate that alcohol use is portrayed more frequently by more attractive, successful, and influential people in a positive social context, often associated with sexually suggestive content, recreation, or motor vehicle use. In contrast, alcohol use is rarely portrayed in an unattractive manner or is associated with negative consequences.<sup>10–12</sup> Exposure to such frequent positive portrayals of alcohol use in the absence of negative consequences may increase the likelihood of alcohol use.<sup>13</sup>

Few studies have examined associations between media exposure and actual drinking behaviors. As a result, it is not clear whether exposure to media alcohol portrayals leads to increased alcohol use in adolescents. The answer to this question has become even more important with the recent decision by the hard liquor industry to abandon its voluntary ban on television and radio advertising.<sup>14</sup> To address this issue, we examined prospectively the associations between exposure to four different types of media, two that frequently contain portrayals of alcohol use (television and music videos) and two that do not (videotapes and computer and video games), and reported alcohol use over the subsequent 18 months,

in a large, sociodemographically diverse sample of adolescents. We hypothesized that adolescents who watched more television and music videos would be at increased risk of subsequent drinking.

## SUBJECTS AND METHODS

Ninth-grade students from six public high schools in San Jose, California, participated in a longitudinal study of health risk behaviors. All students were eligible to participate except those students not in mainstream classes (eg, Special Education) and those who met school district criteria for limited English language proficiency. The present analysis uses baseline and 18-month follow-up data from that study. At each time point, trained staff conducted paper and pencil assessments in each school. Baseline assessments were done in October 1994 and November 1994. Follow-up assessments were done in April 1996 and May 1996. Passive consent was used. Parents were informed by mail and given the opportunity to withdraw their child from participation at any time. Students could decline participation at each assessment. Confidentiality and tracking were achieved with study identification numbers. Questionnaires had two cover sheets: the first included the student's name and the second listed only the student's identification number. After receiving their questionnaires, students were instructed to tear off and discard the top cover sheet. School personnel did not participate in the data collection. The study was approved by the Stanford University Panel on Human Subjects in Medical Research.

### Measures

#### Media Use

Students reported, separately for "a usual school day" and "a usual weekend day," the number of hours they spent 1) "... watching television (not including watching videos in a videocassette recorder (VCR) or time spent watching music videos); 2) "... watching videos in a VCR (not including music videos); 3) "... playing computer games or video games"; and 4) "... watching music videos (like MTV, VH-1, and rental music videos)." Students responded to each of the eight items by circling an answer ranging from 0 hours to 12 hours or more, displayed in 1-hour intervals. School day responses were multiplied by 5 and weekend responses were multiplied by 2, then summed to produce weekly totals for each media type. In a random sample of 80 9th-grade students from the same school district 1 year before the study, test-retest reliabilities (range, 1-7 days) were high for each individual item (intra-class Spearman correlation coefficients  $r = .79-.93$ ).

#### Alcohol Use

Students responded to two items validated previously in Project SMART:<sup>15</sup> "How many drinks of alcohol have you had in your whole life?" and "How many drinks of alcohol have you had in the past month (30 days)?" Students were instructed that one drink of alcohol was equivalent to one can of beer, one glass of wine or one mixed drink, and responded on 8-point quantity scales ranging from "None" to "... 21 or more drinks." Test-retest reliabilities were high:  $r = 0.88$  for lifetime drinking and  $r = 0.84$  for drinking in the past month. Because the response distributions were skewed, the measures were dichotomized for use in the analysis. Lifetime drinking is defined as ever drinking at least part of one drink. At the 18-month follow-up, new onset of drinking was defined as the onset of lifetime drinking among baseline nondrinkers. Maintenance of drinking at follow-up, in baseline drinkers, was defined as an increase in the amount of lifetime drinking reported plus drinking at least once during the past month.

### Statistical Analysis

Comparisons between students with complete and incomplete data, and between the longitudinal sample and those lost to follow-up, were tested with  $\chi^2$  tests for categorical variables and  $t$  tests for continuous variables. Associations between media exposure and subsequent alcohol use were examined with logistic regression. The sample was divided first into baseline lifetime drinkers and nondrinkers, and the analysis was performed sep-

arately for the two groups. Among baseline nondrinkers, the dependent variable was onset of drinking between baseline and follow-up. Among baseline drinkers, the dependent variable was maintenance of drinking (follow-up report of increased amount of lifetime drinking plus drinking in the past month). To examine associations between exposure to each type of media and alcohol use, adjusted for exposure to other media types, age, sex, and ethnicity, all variables were regressed simultaneously on each dependent variable. No evidence for collinearity in any of the models was found. As effect sizes, odds ratios and 95% confidence intervals were calculated from the resulting parameter estimates and standard errors for an exposure unit of 7 hours per week, or an average of 1 hour per day, for each type of media use. All tests of statistical significance were two-tailed, with  $\alpha = 0.05$ .

## RESULTS

Of 3194 9th-graders in the six high schools at baseline, 2777 were eligible to participate. Ineligible students included 182 who did not attend mainstream classes and 235 classified with limited English language proficiency. A total of 2609 eligible students (94.0%) participated in the baseline assessment. Nonparticipating students included 15 parent and/or student refusals and 153 students who were absent on all assessment days. Of participating students at baseline, 1583 (61.0%) also participated in follow-up assessments 18 months later. Seventy-five students were excluded from the analysis because of inconsistent responses on reports of alcohol use. The analysis included 1533 students with complete data on both alcohol use and media exposure.

Baseline characteristics of the sample are shown in Table 1. Students with missing data were more likely to be boys, older, Latino, African-American, or other (all  $P < .001$ ). Students who dropped out between baseline and follow-up were more likely to be older ( $P < .0001$ ), drinkers ( $P < .001$ ), and Latino or African-American ( $P < .001$ ), and reported less computer and video game play ( $P < .0001$ ) and more music video viewing ( $P < .001$ ) at baseline. Correlations between hours of exposure to each media type were modest (Spearman  $r = .23-.34$ ).

During the 18-month follow-up, 325 (36.2%) of baseline nondrinkers began drinking and 322 (50.7%) of baseline drinkers continued to drink, reporting increased lifetime drinking and drinking at least once during the previous month at follow-up. Among adolescents who were nondrinkers at base-

TABLE 1. Baseline Characteristics of the Study Sample

	Non-drinkers at Baseline	Drinkers at Baseline
Number	898	635
Mean age $\pm$ sd (y)	14.6 $\pm$ 0.5	14.6 $\pm$ 0.4
Female (percent)	50.6	48.0
Ethnic distribution (percent)		
Latino	25.3	46.6
Asian/Pacific Islander	43.5	20.0
White	20.2	18.0
African-American	4.7	5.7
Other	6.4	9.8
Weekly media use (mean hours $\pm$ SD)		
Television	23.8 $\pm$ 14.4	24.0 $\pm$ 15.0
Music videos	8.3 $\pm$ 11.8	11.5 $\pm$ 13.4
Videos in a VCR	10.8 $\pm$ 11.6	10.9 $\pm$ 11.3
Computer or video games	8.2 $\pm$ 12.0	8.3 $\pm$ 12.9

**TABLE 2.** Associations Between Baseline Hours of Media Use and Onset of Drinking Over the Subsequent 18 Months (Baseline Nondrinkers)

	Odds Ratio (95% CI)*
Television	1.09 (1.01, 1.18)†
Music videos	1.31 (1.17, 1.47)‡
Videos in a VCR	0.89 (0.79, 0.99)†
Computer or video games	0.94 (0.84, 1.05)

\* Adjusted for age, sex, ethnicity, and hours of other media use.

†  $P < .05$ .

‡  $P < .0001$ .

line, hours of television, music video, and VCR video viewing at baseline were all independently associated with the subsequent onset of drinking (Table 2). The odds ratios indicate that, controlling for the effects of age, sex, ethnicity, and other media use, each increase of 1 hour per day of television viewing was associated with a 9% average increased risk of starting to drink alcohol during the next 18 months, each increase of 1 hour per day of music video viewing was associated with a 31% average increased risk of starting to drink alcohol during the next 18 months, and each increase of 1 hour per day of VCR video viewing was associated with an 11% average decreased risk of starting to drink alcohol during the next 18 months. Computer game and video game use was not significantly associated with the subsequent onset of drinking. Among adolescents who were drinkers at baseline, there were no significant associations between baseline media use and maintenance of drinking over the subsequent 18 months (Table 3).

## DISCUSSION

The results indicate that television and music video viewing are independent risk factors for the onset of alcohol use in adolescents. In contrast, adolescents who spend more time watching videos in a VCR are at lower risk of starting to drink alcohol. In addition, media use appears to influence the onset of drinking but not continued alcohol use.

Although causal inferences cannot be drawn from a nonexperimental study, a number of criteria have been suggested to help judge whether an epidemiologic risk factor may be causally related to a specific outcome. They include temporal sequence, strength of the association, exposure response, specificity, consistency, experimental evidence, and plausibility and coherence.<sup>16,17</sup> A review of these criteria, with the results of this study, supports the argument that exposure to portrayals and promotion of alcohol use

**TABLE 3.** Associations Between Baseline Hours of Media Use and Maintenance of Drinking Over the Subsequent 18 Months (Baseline Drinkers)

	OR (95% CI)*
Television	1.01 (0.93–1.11)
Music videos	1.05 (0.95–1.17)
Videos in a VCR	0.97 (0.86–1.10)
Computer or video games	1.00 (0.89–1.12)

\* Adjusted for age, sex, ethnicity, and hours of other media use.

in the media may be causally linked to the onset of adolescent drinking.

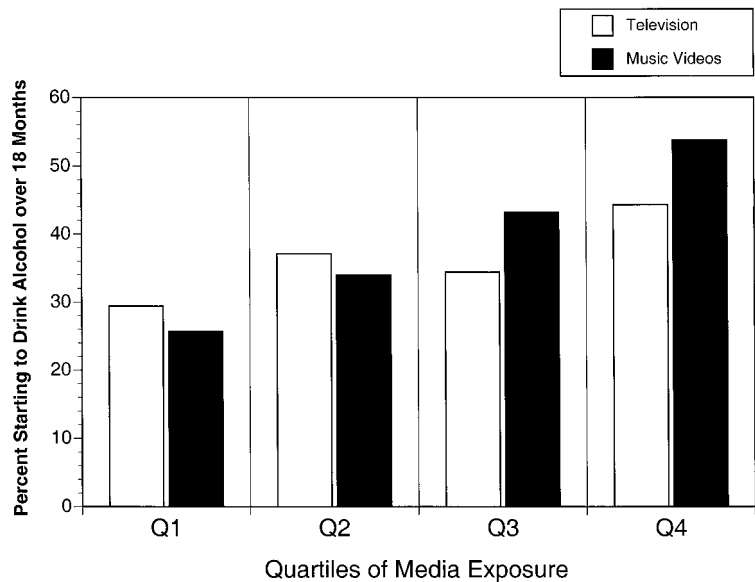
Temporal sequence refers to whether the exposure precedes the outcome. Cross-sectional studies are unable to make this distinction and can only identify nondirectional associations. In this study, media exposures were measured before the onset of the outcome behaviors, specifying the direction of the relationship. The strength of the association between television and music video exposures and subsequent onset of alcohol use was also found to be quite large. One extra hour of television viewing per day was associated with an average 9% increase in the risk of starting to drink over the next 18 months. Similarly, 1 extra hour of music video viewing per day was associated with an average 31% increase in the risk of starting to drink over the next 18 months. Because we assessed total media exposure and could not assess specific exposure to alcohol representations, the strength of these associations is even more impressive. These associations also demonstrate a graded exposure–response relationship, in which the risk of starting to drink increases as exposure increases, as illustrated in Fig 1.

Specificity of the relationship is demonstrated in two ways: first, by the differing associations between onset of drinking and previous exposures to the four different media, and second, by the association between television and music video use and onset of drinking but not maintenance of drinking. Because we assessed exposure to four types of media, we are able to compare media containing high prevalences of alcohol portrayals (television and music videos) and those containing few or no portrayals of alcohol (videos in a VCR and computer and video games). Only greater television and music video exposures were associated with increased risk of alcohol use. These findings would be expected based on the varying levels of alcohol portrayals in these media. For example, in one study of prime-time television programs, alcohol appeared in approximately two thirds of all programs, at an average rate of 8.1 drinking references per hour.<sup>10</sup> Similarly, alcohol use was portrayed in >20% of 518 music videos broadcast on four networks in 1994.<sup>11</sup> Alcohol also is commonly advertised on television. For example, in a survey of televised college and professional sports events from 1990 through 1992, alcohol-related commercials accounted for 77% of all beverage commercials, at an average rate of 1.5 alcohol advertisements per hour.<sup>12</sup> In contrast, alcohol is portrayed less frequently in popular movies,<sup>18</sup> and alcohol advertising is absent when viewing videos in a VCR. Alcohol use and alcohol advertising also are unlikely to be encountered in computer and video games played by adolescents.

Television and music video exposure also appears to be linked specifically to the onset of drinking but not to continued alcohol use in adolescents. This finding is consistent with a social cognitive theory explanation.<sup>13</sup> In the absence of personal experience, frequent media representations of alcohol use can shape adolescents' preferences and beliefs about likely outcomes of drinking. In fact, children and



**Fig 1.** Exposure–response relationships between television viewing (white bars) and music video viewing (black bars) and the risk of onset of drinking over 18 months. Exposures are defined in quartiles, from lowest exposure (Q1) to highest exposure (Q4).



adolescents with increased exposures to mass media portrayals of alcohol have more favorable beliefs about drinking and increased intentions to drink.<sup>19,20</sup> After the onset of drinking, however, personal experiences would be expected to provide the strongest inputs to adolescents’ beliefs and expectations about drinking.<sup>21</sup>

These results also are consistent with a range of previous research. This study is one of the first to examine prospectively the associations between media exposure and alcohol use. One other prospective study in New Zealand found that 13- to 15-year-old girls’ total TV viewing and 15-year-old boys’ familiarity with alcohol commercials were associated with the quantity of alcohol they consumed at age 18.<sup>22</sup> Several cross-sectional studies also have found associations between drinking rates and exposure to alcohol advertising<sup>19,23,24</sup> or television viewing.<sup>25</sup> Most of these previous studies have focused on the amount of alcohol subjects consume rather than on the onset of drinking, probably because of the limitations of their cross-sectional designs. However, as noted above, media representations may be more likely to influence the onset of alcohol use than the quantity of alcohol use.

There have been few experimental studies of the effects of media alcohol portrayals on attitudes and behaviors. Experiments in which preadolescents were exposed to brief alcohol portrayals on television have demonstrated short-term increases in pro-alcohol attitudes and actions.<sup>26,27</sup> In experiments on actual drinking behaviors, exposing college students to alcohol advertisements has produced variable increases in short-term alcohol consumption.<sup>28,29</sup>

A causal relationship is clearly plausible, and coherent with a number of theoretic perspectives.<sup>9,30</sup> The frequent and positive nature of portrayals of alcohol use in television programming and advertising and the near absence of negative portrayals and displays of adverse consequences lead to the creation of positive beliefs and expectations about drinking among young viewers.<sup>20,30,31</sup> Through modeling and

vicarious incentives, media portrayals of alcohol use may shape beliefs about drinking and create positive outcome expectations and motivation to start drinking among adolescents. The influence of observational learning on behavior is well documented in experimental laboratory and field studies.<sup>13</sup>

An alternative explanation is that higher-risk adolescents—those who are predisposed to become future drinkers—also are those who are more attracted to television and music videos. In fact, Klein and associates found that music video viewing was cross-sectionally associated with an index of multiple risky behaviors, including alcohol use, in a large sample of adolescents in the Southeastern United States.<sup>32</sup> This may be a plausible explanation for the inverse associations between VCR video viewing and onset of alcohol use. Spending more time watching videos in a VCR, to some extent, may be a proxy for generally low-risk adolescents. However, this explanation is not consistent with the finding that greater television and music video viewing is associated with initial onset of alcohol use but not with continued use. Higher-risk adolescents would be expected both to start drinking earlier and to continue to drink after starting. This has been a consistent finding in longitudinal studies of adolescent substance use.<sup>6</sup> Therefore, although this explanation may account for a small amount of the association between media use and drinking, it is unlikely to explain the large effects that were found.

Interpretations of these results should acknowledge several limitations. First, this study involved students from six public high schools in a single urban area. Students not attending school, not eligible, or lost to follow-up are not included in the sample. Although the sample was ethnically and socioeconomically diverse, generalization of results beyond the study population is always cautioned. Second, it is possible for attrition to introduce biases. As is typical in school-based samples, dropouts tended to represent a higher-risk group than did students remaining in the sample.<sup>33</sup> Dropouts were

more likely to be drinkers and spent more time watching music videos at baseline. However, losing these high-risk adolescents from the sample would be expected to reduce the magnitude of the associations between media exposure and alcohol use, not exaggerate them. Third, our data were limited to self-reports, and we cannot rule out the possibility that measurement error influenced our results. To maximize the validity of self-reports, we used well-established, previously validated measures of alcohol use,<sup>15</sup> and made extensive efforts to assure confidentiality. Self-reports had high test-retest reliabilities, and reports from this sample were similar to rates of alcohol use and onset<sup>2</sup> and hours of television viewing (Nielsen Media Research, New York, NY) from age-matched, nationally representative samples. These comparisons strengthen confidence in both the validity of self-reports and the generalizability of the results. Finally, this study did not assess other established risk factors for alcohol use or the specific media content to which adolescents were exposed. It is possible that television and music video viewing represent proxy measures for other, more important risk factors for alcohol use. However, as noted above, the differential relationships found with onset of alcohol use and maintenance of drinking are inconsistent with this explanation.

The findings of this study have important health and public policy implications. Television viewing and music videos, with their high content of positive alcohol portrayals and advertising, are particularly strong risk factors for the onset of drinking in adolescents. Based on the results of this study, reduced exposure to positive representations of alcohol use in television and music videos might be expected to delay and decrease adolescent drinking substantially. In this context, the hard liquor industry's recent decision to abandon its voluntary ban on television and radio advertising<sup>14</sup> and the introduction of alcohol promotions appealing to children and adolescents on the Internet<sup>34</sup> are steps in the wrong direction.

Advertising bans, restrictions, and anti-alcohol counteradvertising all have been suggested.<sup>4,9</sup> The feasibility of these measures is unknown, however, and the long-term effects of banning tobacco advertising from television were unclear.<sup>35</sup> In addition, any new regulations would need to be enforceable to be effective. There is evidence that beer producers often violate their own voluntary advertising code, and the effectiveness of their "responsible drinking" campaigns is questionable.<sup>36</sup> As a result, regulation and counteradvertising efforts need to be under the control of the public health community rather than of the alcohol industry. In terms of programming, attempts to influence television writers and directors to portray alcohol use more realistically have been reported,<sup>37</sup> although their effectiveness and generalizability is unknown. Similarly, these results suggest that school-, community-, and family-based alcohol use prevention programs for young adolescents should include resistance skills training to counter the positive portrayals of alcohol use in the media. These

approaches have been effective in smoking prevention.<sup>38,39</sup>

Finally, additional research is needed to replicate these findings and to provide a greater understanding of the mechanisms linking television and music video exposure and onset of alcohol use. There have been few experimental studies of the effects of media alcohol portrayals on children and adolescents. In addition, researchers have devoted much more attention to alcohol advertising than to alcohol use in programming. The results of this study suggest that in young adolescents, overall exposure to media that contain representations of alcohol use is associated with increased risks of starting to drink. In addition, the large magnitudes of these associations between hours of television viewing and music video viewing and the subsequent onset of drinking demand that attempts to prevent adolescent alcohol use should address the adverse influences of alcohol use in the media.

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Thomas N. Robinson, Helen L. Chen and Joel D. Killen

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