

# Television and Video Game Viewing and Its Association with Substance Use by Kentucky Elementary School Students, 2006

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## SYNOPSIS

**Objective.** We sought to determine if the number of hours elementary school students viewed television (TV) and video games is associated with substance use.

**Methods.** We distributed the California Healthy Kids Survey Elementary School Questionnaire to elementary schools in Kentucky in 2006. A total of 4,691 students, primarily fourth and fifth graders, completed the survey. The students provided responses to questions on topics such as drug use, alcohol use, TV and video game viewing time, and their home life. We analyzed the survey using Chi-square tests and logistic regression.

**Results.** Approximately one-third of respondents indicated substance use, which was defined as alcohol use, illegal drug use, smoking/tobacco use, or sniffing solvents. Significantly more children (28% of those watching  $\geq 3$  hours of TV/video games compared with 20% of those watching greater than zero but  $\leq 2$  hours of TV/video games) reported alcohol use ( $p < 0.05$ ). Similar results were seen for sniffing solvents, with 9% of those watching  $\geq 3$  hours of TV/video games reporting they sniffed solvents compared with 4% who watched TV/video games for greater than zero but  $\leq 2$  hours ( $p < 0.05$ ). The results of the logistic regression indicated that the odds of drinking alcohol (odds ratio [OR] = 1.48, 95% confidence interval [CI] 1.23, 1.79) and sniffing solvents (OR = 1.97, 95% CI 1.42, 2.75) were significantly higher for those watching  $\geq 3$  hours of TV/video games compared with those who watched TV/video games for greater than zero but  $\leq 2$  hours.

**Conclusions.** The hours of TV and video games viewed were associated with alcohol use and sniffing solvents for our sample. However, limitations exist due to the inability to separate TV viewing from video game viewing.

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According to the Kaiser Family Foundation Study "Generation M: Media in the Lives of 8–18 Year-olds," 99% of young people aged 8 to 18 years in the U.S. have a television (TV) in the home. This same study found the average amount of time children aged 8 to 10 years spent watching TV (defined as TV shows, prerecorded shows, and videos) was four hours and 10 minutes.<sup>1</sup> The American Academy of Pediatrics (AAP) recommends that children older than 2 years of age should watch a maximum of two hours of TV a day, which should be educational programming.<sup>2</sup> Over the course of a year, the hours of exposure of American children to TV exceeded the hours spent in school.<sup>3</sup> Media exposure has been linked to increased violence and aggressive behavior, alcohol and tobacco use, and accelerated onset of sexual activity.<sup>4</sup> Studies have found an association between hours of TV viewing and increased substance use, but many of these studies looked at middle school- and high school-aged children. However, these associations have not been studied as comprehensively in elementary school-aged children.<sup>5</sup>

Video game exposure has also been studied in children of various ages.<sup>6–8</sup> Eighty-three percent of young people have a video game console in the home, and this age group reported spending one hour and five minutes playing video games on a daily basis.<sup>1</sup> With the majority of children having at least one game console in their home and more than a third having one in their bedroom, this exposure has the potential to be significant in this population.<sup>6</sup> Although computer games are popular, it has been estimated that only 21% of boys aged 8 to 18 years—the group for whom gaming is most popular—play more than an hour a day,<sup>7</sup> which is much lower than the hours spent viewing TV across all age and gender groups.

A study of the content of E-rated video games (for "Everyone," meaning they are suitable for everyone) found five games, accounting for 0.7% of all E-rated games, that contained the use of tobacco and alcohol.<sup>6</sup> Another study by the same authors of T-rated video games (for "Teen," meaning they are suitable for those aged 13 years and older) found 12 games, accounting for 15.0% of all T-rated games, that depicted substance use, which included alcohol, tobacco, and drug use.<sup>8</sup> One study found that adolescents who indicated they played computer games reported significantly less substance abuse than those who indicated not playing computer games.<sup>7</sup> Another study of alcohol use in adolescents found that video and computer game use was not associated with the onset of drinking, but baseline TV viewing hours were associated.<sup>9</sup>

Alcohol use is frequently portrayed as positive in

TV ads and even in some programming.<sup>10</sup> Over the course of four years, the number of alcohol ads on programs where underage young people (i.e., aged 12 to 20 years) comprise more than a third of the audience grew by nearly 50%.<sup>11</sup> These ads are made to influence adult alcohol use, so it is also possible that they would have an effect on children's alcohol use as well. Though cigarette ads have been removed from TV, smoking is still common in music videos and TV shows, and sometimes in video games.

Christenson et al. studied TV programs from 1998 to 1999 and found that tobacco was used less frequently in TVG-rated shows (6%) compared with TVPG-rated shows (20%) and TV14-rated shows (24%),<sup>12</sup> demonstrating that although substances are used less frequently in children's programming, they are still present. In addition, a longitudinal study looking at smoking initiation in the U.S. in 1990 found adolescents aged 10 to 15 years who watched more than five hours of TV had significantly higher odds of smoking initiation during follow-up than those who watched less than two hours of TV a day.<sup>13</sup> Additionally, cigarette billboards, logos, and banners can also be seen at sporting events on TV, even if cigarette commercials during these events are banned.

Other variables could influence a child's behavior in relation to substance use. Parental monitoring and gender have been shown to be important factors in substance use.<sup>14,15</sup> Teasing (i.e., whether the child was teased while at school) is known to sometimes affect children's behavior choices as well.<sup>16</sup>

Based on this information, the main objective of this analysis was to determine if the number of hours elementary school students in Kentucky spent viewing TV and video games was associated with substance use, including alcohol, illegal drug use, smoking/tobacco use, and sniffing. This research is important because underage and illegal substance use is a problem in the U.S., with about 45% of adolescents reporting alcohol use in 2007.<sup>17</sup> In Kentucky, underage tobacco use is of particular concern.<sup>18</sup>

## METHODS

We used the California Healthy Kids Survey (CHKS) Elementary Questionnaire<sup>19</sup> to examine the cross-sectional association between the hours of TV and video games viewed and substance use.

### Sample

Data for our study came from 31 schools that had been awarded Coordinated School Health Grants by the Foundation for a Healthy Kentucky. These grants are

awarded to Kentucky public school districts or private schools addressing the Foundation's focus to improve child and adolescent health. The CHKS is part of the evaluation of Coordinated School Health Grants and is funded by the Foundation for a Healthy Kentucky. The focus areas of this grant include fitness and nutrition for children and families, youth smoking prevention, youth substance abuse prevention, and initiatives to enhance access to health care for low-income and uninsured populations, health-care for rural populations, and integrated mental health and medical services.<sup>20</sup> Twenty-nine school districts (including one private school) received a grant, and 31 schools administered the CHKS questionnaire.

Data were collected from a cohort of 4,691 Kentucky elementary school students. The survey was self-administered in 2006 to all students who obtained consent from their parents. Teachers gave consent forms to parents and included information about the survey content, that it was voluntary and anonymous, how the survey would be administered, the potential risks, and where the parents could receive further information. Parents were then asked to either give consent for the child to participate or not, and return the signed form to their child's teacher. Data were not available on the number of children whose parents declined participation in the questionnaire. We analyzed the responses from students, who were primarily fourth and fifth graders. A small number of third and sixth graders in classrooms blended with fourth or fifth graders also participated. The elementary students provided responses to questions that included topics such as drug use, alcohol use, TV/video game viewing time, home life, and weight.

#### Substance use

The survey asked children about their substance use through questions such as "Have you ever smoked a cigarette?" and "Have you ever chewed tobacco or snuff (dip)?" Similar questions for alcohol, sniffing, marijuana, and illegal drugs were also included. Substance use was defined as answering "yes" to any question concerning alcohol use, cigarette smoking, tobacco chewing, sniffing, marijuana use, and illegal drug use. Sniffing was defined as the deliberate inhalation of volatile organic solvents from glues and paints that may result in symptoms ranging from mild euphoria to disorientation and coma. The students were also asked if they believed smoking, using alcohol, and using marijuana were bad for their health. They could respond to these questions by answering "no, not bad," "yes, a little bad," or "yes, very bad." For marijuana, there was also a choice of not knowing what marijuana was.

#### Hours of TV/video games viewed

The CHKS provided information about the student's TV and video game viewing based on self-report. The students were asked the question, "Yesterday, how much time did you spend watching TV or playing video games?" to which they could respond "none," "less than one hour," "about one hour," "about two hours," or "three or more hours." Because the AAP recommends that children watch two hours of TV or less daily, children responding that they watched less than one hour, about one hour, and about two hours were grouped together. These students were not grouped with those responding that they watched no TV or video games because when the groups were compared individually, those in the "none" group responded differently from those in the "less than one hour," "about one hour," and "about two hours" groups.

#### Sociodemographic variables

We controlled for several factors including the child's age and gender, parental factors, and teasing. The parental questions asked the students about their life at home and the relationships with those in their life. Some of these questions included, "Does a parent or some other grown-up at home care about your school work?", "Does a parent or some other grown-up at home want you to do your best?", and "Does a parent or some other grown-up at home listen when you have something to say?". The only question inquiring about teasing asked the students if other kids at school ever teased them about what their body looks like.

#### Analysis

We analyzed the CHKS responses using SAS<sup>®</sup> version 9.1.<sup>21</sup> We used Chi-square tests to analyze categorical outcomes and the Student's *t*-test to analyze continuous outcomes. We performed logistic regression analysis, with the main outcome being substance use (either alcohol use, cigarette smoking, chewing tobacco, sniffing, marijuana use, or illegal drug use), to determine the relationship between TV and video game viewing and substance use, controlling for age, gender, parental factors, and teasing. We used a significance level of 0.05 for all statistical tests.

#### RESULTS

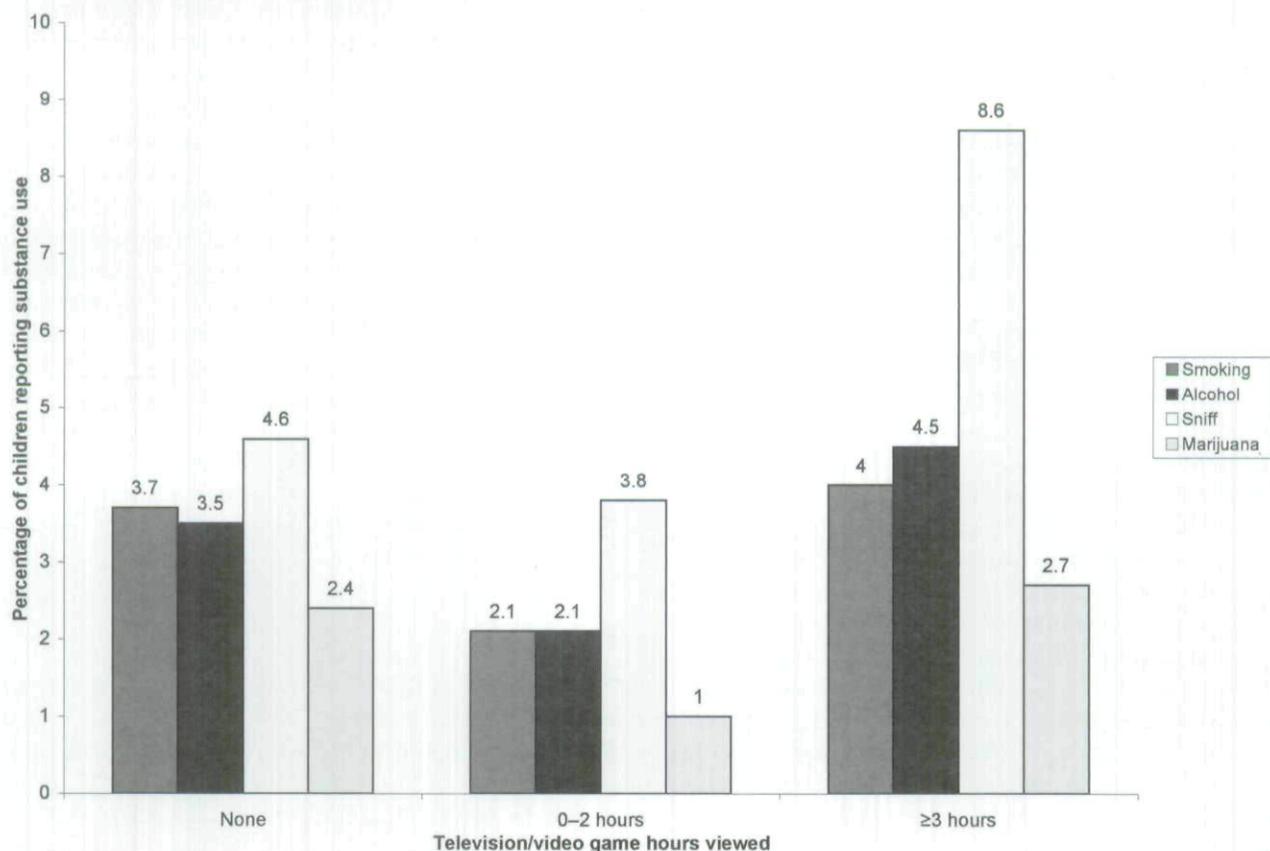
The majority of the students who completed the survey were 10 years of age (47.8%) with about half of the children being in the fourth grade (49.9%) and the other half being in the fifth grade (48.8%). Equal proportions of female (50.1%) and male (49.9%) students completed the survey. The Figure shows

children's responses to the smoking, sniffing, alcohol, and marijuana use variables by TV/video game viewing time. This trend shows that children watching no TV/video games behave differently from those watching two hours or less of TV/video games, so the children's reported viewing hours were grouped as no hours, those watching greater than zero but  $\leq 2$  hours [ $0 < \text{hours} \leq 2$ ], or  $\geq 3$  hours for this analysis. Table 1 shows the associations between the substances used and the hours of TV/video games viewed. Students responding that they did not know what marijuana was (9.0%) were not included in the marijuana use analysis. Of all the students who completed the questionnaire, 446 (9.9%) reported they had smoked, 319 (7.1%) reported they had chewed tobacco, 957 (21.2%) reported they had drunk alcohol, 217 (4.8%) reported they had sniffed solvents, 72 (1.6%) reported they had used marijuana, and 58 (1.3%) reported they had used illegal drugs. Bivariate analysis showed that as the hours of TV/video games viewed increased, participants were significantly more likely to respond "yes" to drinking alcohol, sniffing, and use of any substance.

We performed an additional analysis to determine if the students' views about substance use were related to the hours of TV/video games they watched. As shown in Table 2, this analysis showed that as the hours of TV/video games viewed increased, participants were significantly less likely to respond that alcohol use was "bad for their health." Although not statistically significant, children watching  $\geq 3$  hours of TV/video games were less likely to believe that smoking and using marijuana were "very bad" for their health.

As shown in Table 3, from the logistic regression, we determined that viewing  $< 3$  hours of TV/video games was associated with decreased alcohol use and sniffing when controlling for the other variables in the model. There was a 63% increase in odds of alcohol use for those watching  $\geq 3$  hours of TV/video games compared with those watching no hours of TV/video games. A similar effect was seen for those watching  $0 < \text{hours} \leq 2$  of TV/video games compared with those who watched  $\geq 3$  hours of TV/video games. In addition, children who watched  $\geq 3$  hours of TV/video games had significantly increased odds of sniffing solvents when compared

**Figure. Percentage of children using substances by television/video game hours viewed, Kentucky elementary school students, 2006**



**Table 1. Associations between television/video game viewing hours and substance use, Kentucky elementary school students, 2006 (n=4,691)**

Parameter	Total number of responses (percent)	No hours N (percent)	0 < hours ≤ 2 N (percent)	≥ 3 hours N (percent)
Smoked cigarette				
No	4,058 (90.1)	837 (90.2)	2,504 (90.9)	717 (87.4)
Yes, 1–2 puffs	320 (7.1)	57 (6.1)	193 (7.0)	70 (8.5)
Yes, whole cigarette	126 (2.8)	34 (3.7)	59 (2.1)	33 (4.0)
Chewed tobacco				
No	4,178 (92.9)	855 (92.2)	2,585 (93.9)	738 (90.3)
Yes	319 (7.1)	72 (7.8)	168 (6.1)	79 (9.7)
Drank alcohol <sup>a</sup>				
No	3,558 (78.8)	755 (80.9)	2,214 (80.1)	589 (71.9)
Yes, 1–2 sips	829 (18.4)	145 (15.5)	491 (17.8)	193 (23.6)
Yes, full glass	128 (2.8)	33 (3.5)	58 (2.1)	37 (4.5)
Sniffed solvents <sup>a</sup>				
No	4,267 (95.2)	884 (95.4)	2,637 (96.2)	746 (91.4)
Yes	217 (4.8)	43 (4.6)	104 (3.8)	70 (8.6)
Smoked marijuana				
No	4,031 (89.4)	829 (89.1)	2,487 (90.1)	715 (87.1)
Yes	72 (1.6)	22 (2.4)	28 (1.0)	22 (2.7)
Don't know what it is	407 (9.0)	79 (8.5)	244 (8.8)	84 (10.2)
Illegal drug use				
No	4,363 (98.7)	892 (98.2)	2,676 (99.0)	795 (98.1)
Yes	58 (1.3)	16 (1.8)	27 (1.0)	15 (1.9)
Any substance use <sup>a</sup>				
No	2,856 (66.7)	606 (68.2)	1,801 (68.9)	449 (57.5)
Yes	1,425 (33.3)	282 (31.8)	811 (31.1)	322 (42.5)

<sup>a</sup>Comparisons were significant at  $p < 0.05$  for non-zero correlation.

with those watching no hours or 0 < hours ≤ 2 of TV/video games. Watching ≥ 3 hours of TV/video games also was associated with a significant increase in the odds of marijuana use and tobacco chewing when

compared with those watching 0 < hours ≤ 2 of TV/video games. Females also had lower odds of substance use for all substances, excluding marijuana, when compared with males. Also, “parents not caring about your

**Table 2. Associations between television/video game viewing hours and health views, Kentucky elementary school students, 2006 (n=4,691)**

Parameter	Total number of responses (percent)	No hours N (percent)	0 < hours ≤ 2 N (percent)	≥ 3 hours N (percent)
Smoking is bad for health				
No, not bad	119 (2.7)	34 (3.7)	60 (2.2)	25 (3.1)
Yes, a little bad	263 (5.9)	48 (5.2)	147 (5.4)	68 (8.4)
Yes, very bad	4,102 (91.5)	843 (91.1)	2,539 (92.5)	720 (88.6)
Alcohol is bad for health <sup>a</sup>				
No, not bad	133 (3.0)	36 (3.9)	65 (2.4)	32 (4.0)
Yes, a little bad	693 (15.5)	118 (12.8)	434 (15.8)	141 (17.5)
Yes, very bad	3,646 (81.5)	771 (83.4)	2,240 (81.8)	635 (78.6)
Marijuana is bad for health				
No, not bad	158 (3.5)	38 (4.1)	92 (3.3)	28 (3.4)
Yes, a little bad	149 (3.3)	31 (3.3)	79 (2.9)	39 (4.8)
Yes, very bad	3,582 (79.3)	740 (79.5)	2,218 (80.1)	624 (76.2)
Don't know what it is	629 (13.9)	122 (13.1)	379 (13.7)	128 (15.6)

<sup>a</sup>Comparisons were significant at  $p < 0.05$  for non-zero correlation.

**Table 3. Adjusted ORs<sup>a</sup> for substance use by hours of television/video games viewed per day, gender, teasing, and parental factors: Kentucky elementary school students, 2006**

Parameter	Smoking OR point estimate (95% CI)	Drinking alcohol OR point estimate (95% CI)	Marijuana use OR point estimate (95% CI)	Tobacco chewing OR point estimate (95% CI)	Sniffing solvents OR point estimate (95% CI)	Illegal drug use OR point estimate (95% CI)
Television hours (≥3 hours vs. no hours)	1.286 (0.927, 1.783)	1.631 (1.288, 2.066) <sup>b</sup>	1.169 (0.595, 2.296)	1.109 (0.775, 1.589)	1.859 (1.220, 2.834) <sup>b</sup>	1.107 (0.492, 2.491)
Television hours (≥3 hours vs. 0< hours ≤2)	1.252 (0.964, 1.627)	1.482 (1.229, 1.785) <sup>b</sup>	2.474 (1.312, 4.665) <sup>b</sup>	1.411 (1.049, 1.898) <sup>b</sup>	1.974 (1.420, 2.745) <sup>b</sup>	1.752 (0.862, 3.561)
Gender (male vs. female)	1.585 (1.275, 1.970) <sup>b</sup>	1.541 (1.323, 1.796) <sup>b</sup>	1.641 (0.942, 2.861)	3.012 (2.90, 3.963) <sup>b</sup>	1.812 (1.341, 2.449) <sup>b</sup>	4.234 (1.942, 9.233) <sup>b</sup>
Teased about body (yes vs. no)	1.915 (1.548, 2.369) <sup>b</sup>	1.582 (1.359, 1.843) <sup>b</sup>	1.454 (0.858, 2.466)	1.606 (1.256, 2.054) <sup>b</sup>	1.634 (1.225, 2.180) <sup>b</sup>	1.147 (0.623, 2.112)
Parents care about school work (no vs. yes)	1.566 (1.034, 2.371) <sup>b</sup>	1.544 (1.103, 2.163) <sup>b</sup>	3.707 (1.674, 8.209) <sup>b</sup>	1.993 (1.266, 2.054) <sup>b</sup>	1.741 (1.008, 3.007) <sup>b</sup>	1.501 (0.549, 4.105)
Parents believe you can do a good job (no vs. yes)	1.383 (0.859, 2.227)	1.081 (0.726, 1.611)	2.961 (1.139, 7.697) <sup>b</sup>	1.162 (0.670, 2.017)	1.405 (0.733, 2.691)	2.826 (0.985, 8.111)
Parents want you to do your best (no vs. yes)	1.484 (0.851, 2.589)	1.585 (1.004, 2.501) <sup>b</sup>	1.207 (0.423, 3.443)	1.781 (0.958, 3.314)	1.927 (0.939, 3.954)	4.396 (1.421, 13.599) <sup>b</sup>
Parents listen when you have something to say (no vs. yes)	1.873 (1.414, 2.481) <sup>b</sup>	1.242 (0.991, 1.556)	0.902 (0.426, 1.910)	1.532 (1.099, 2.136)	1.209 (0.808, 1.808)	0.851 (0.364, 1.991)

<sup>a</sup>Adjusted for age

<sup>b</sup>Significant values are those with CIs that do not include 1.00.

OR = odds ratio

CI = confidence interval

school work" was found to be associated with increased odds of substance use for all substances. Children who were teased about their weight had increased odds of responding that they used all substances, excluding marijuana and illegal drug use, compared with those who were not teased.

## DISCUSSION

Based on this sample, alcohol use and sniffing solvents were associated with the hours of TV and video games watched, controlling for other factors. The odds of alcohol use, sniffing, marijuana use, and tobacco chewing were highest for those watching more than the recommended two hours of TV or video games. We also found a significant association at the bivariate level between TV and video game viewing hours and the children's beliefs about whether alcohol was bad for their health; however, this association was not found to be significant at the multivariate level.

There was no significant difference between TV and video game viewing and students' beliefs about cigarettes and marijuana being bad for their health, but it was consistent with the trend. This might be because drinking is more likely to be portrayed positively on TV and in commercials than cigarette and marijuana use. Children are also less likely to see ads or TV shows with a positive depiction of marijuana use because it is an illegal substance. In addition, many of the children reported that they "did not know" what marijuana was. This also might have had an impact on the results seen. The results of our study are consistent with those found in other studies of older children showing an association between TV viewing and substance abuse.

### Limitations

This study had several limitations. First, the data were self-reported, and the children were young, increasing the chance for information bias. However, because the survey asked the students about their TV/video game use "yesterday," the children should have been able to recall and answer more accurately. A second limitation was that students may not have understood all the questions. The results did show discrepancies in the children's responses when they were asked about marijuana use. When asked about their marijuana use (Table 1), 9.0% of the children responded that they did not know what marijuana was, but when asked about whether they believed marijuana was bad for their health (Table 2), 13.9% reported they did not know what marijuana was—a difference of almost 5.0% in the number of children reporting whether they knew what marijuana was. This could have affected our results by

either over- or underrepresenting the number of children using marijuana because it is unclear how many children truly know what marijuana is.

Third, because the survey asked about the students' TV viewing "yesterday," we had to assume that the number of hours of TV watched "yesterday" was typical. In addition, we had to assume that the questionnaires were given out on the same day in every school, so that the same day was being reported on for all children vs. different days (Sunday for some and Wednesday for others, for example).

A fourth limitation was that schools selected to participate in the survey were not a random sample of Kentucky elementary schools, but rather schools that received a grant, making the selection process nonrandom; therefore, these students may not be representative of other Kentucky elementary school students. Without the ability to compare children in schools receiving the grants with children in schools not receiving the grants, it is difficult to say whether the children in our survey are the same as other Kentucky elementary school students; therefore, these results may not be generalizable to all Kentucky elementary school students. As these grants were focused on substance abuse prevention, the schools in our survey might have substance abuse prevention programs that are not available at schools not receiving grants. These programs could influence the hours of TV/video games children watch and their views about substance use, resulting in either over- or underestimation of our results. In addition, no data were collected on the children whose parents chose not to give consent for their children to participate in the questionnaire, meaning it is not possible to know if those students completing the questionnaire actually are a good representation of the children in their schools.

Combining TV and video game viewing into one variable was also a limitation. It would have been interesting to perform separate analyses on TV viewing and video game viewing to determine if the results were the same for both. As previously stated, in other studies, video game viewing was not associated with substance use in older children, so more research needs to be conducted to determine if this is true for younger children as well.

Finally, this study offered no information on the substance use practices of the parents of the children completing the questionnaire. If further research is done in this area, these data should be collected because children living in a home with a smoking parent might have different views about smoking than children living in the home with a nonsmoking parent. Further research also would be needed to determine

if the relationship seen is causal. The data collected were from a cross-sectional study design, so a causal relationship could not be determined. Further research should include a longitudinal study design, possibly looking at young children's TV viewing and whether substance use occurs in the future.

## CONCLUSIONS

This study indicates that elementary school-aged children who watch more TV and play video games have greater odds of reporting alcohol use and sniffing solvents. Although these results are consistent with those seen in older children, further research needs to be done longitudinally to determine if elementary children who report high TV and video game viewing hours and report substance use continue to do so when they are older. Future studies need to look further into the content of the TV shows that the children are watching and the video games they are playing to determine the true nature of the relationship between TV/video game viewing and substance use. It is unknown whether the problem is the actual hours spent in front of the TV/playing video games or the content seen. In addition, more research needs to be done on a larger population to determine if these results still hold true, considering these results are only from a small sample of children in Kentucky. However, if it is determined that the content of TV shows affects children's substance use, then an intervention will be needed.

Based on the results from this study, parents' and children's beliefs about substance use might be a place to begin interventions. Children who reported they believed their parents cared about their school work were significantly less likely to report substance use. This finding shows that the parental relationship could be critical in keeping younger children from substance use. In addition, interventions should focus on changing children's beliefs about substance use. This analysis showed that children who watched less TV were more likely to believe smoking, alcohol, and marijuana were bad for their health. Although changing beliefs can be difficult, interventions should try to demonstrate to young children that these substances are bad for their health.

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