

# Social Interactions in Adolescent Television Viewing

Jason Fletcher, MS

**Objective:** To examine whether social interactions influence the television viewing choices of adolescents in grades 7 through 12.

**Design:** Data from a nationally representative cross-sectional survey were used to examine the association between individual-level and school-level television choices. An instrumental variables approach was used to solve the simultaneity problem found in models that examine the association between individual and aggregate choices.

**Setting:** In-home interviews in the United States collected in 1996.

**Participants:** A sample of 4532 students in grades 7 through 12 in 132 US public and private schools who participated in the National Longitudinal Study of Adolescent Health (Add Health).

**Main Exposure:** The reported television viewing choices of an individual's schoolmates.

**Main Outcome Measure:** The number of hours of television individuals reported viewing in a week.

**Results:** The number of hours of television that adolescents report viewing per week was associated with their peers' reported hours of television viewing. Adjusted for other covariates, a 1-hour increase in average school-level television viewing was associated with an increase in almost half an hour of television viewing at the individual level.

**Conclusions:** Evidence suggests that social interactions within schools influence the hours of television that adolescents report viewing. This finding is important for both future attempts at modeling the determinants of adolescent television viewing and suggestions for future policy interventions. The presence of social interactions implies that interventions that affect the social norms of television viewing within schools could also change individual television viewing. In reducing the number of hours of television watched, these interventions could also positively affect adolescent obesity, emotional problems, and academic achievement.

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**T**ELEVISION IS A UBIQUITOUS part of adolescents' lives, and its effects are controversial. Many studies have reported several negative consequences of television viewing, including increases in obesity, attentional problems and aggression, and decreases in several measures of academic achievement.<sup>1-4</sup> In contrast, other studies have shown that some types of programming are associated with positive developmental outcomes.<sup>5</sup> There have also been several randomized interventions aimed at reducing television as a means of decreasing negative outcomes.<sup>3,6</sup> This article examines the importance of social interactions in adolescent television choices. Social interactions follow the conceptual idea of the establishment of a social norm of television viewing within peer groups. The idea of interdependent choices, or social inter-

actions, across individuals, where individual choices are affected by the choices of peers, is becoming established in the social sciences as an important aspect of individual decision making. Current research examines potential social interactions in crime, school attendance, and unemployment.<sup>7-9</sup> For example, a student might choose to attend school on a particular day based on whether his or her friends will attend school. The intuitive reason for this interdependence in choices is that friends want to be involved in activities together whether the activities are pleasant (eg, skipping school to go to the mall) or unpleasant (eg, attending school).

This study tested whether social norms created by schoolmates influence individual choices in television viewing. In addition to contributing to conceptual models of the determinants of television viewing among adolescents, the results of

**Author Affiliation:** Department of Agricultural and Applied Economics, University of Wisconsin-Madison.

this study can be used to inform policies that seek to change television viewing choices. Evidence of social interactions suggests several new directions for potential interventions. If social norms are an important determinant of individual television viewing, interventions that seek to shape these norms within schools could be a valuable future direction for research. Some forms of social interactions also imply that interventions on a subset of individuals within a school will have a spillover effect on students who did not receive the intervention. Both implications of finding social interactions in television viewing choices represent new and interesting directions for future policy suggestions.

## METHODS

### DATA

Data for this study were drawn from the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a nationally representative study of adolescents in grades 7 through 12 and their outcomes in young adulthood, and was begun in 1994 under a grant from the National Institute of Child Health and Human Development, with co-funding from 17 other federal agencies. Data at the individual, family, school, and community levels were collected in 2 waves between 1994 and 1996. More information about the Add Health data are provided elsewhere.<sup>10,11</sup> The sample used in this study consists of all adolescents in grades 7 through 12 in the wave II public-use data collected in 1996. Of the 4532 observations available in wave II, 3594 adolescents have valid school identification codes, which are necessary to calculate school-level variables and place individuals in their school environments. The sample of students with valid school identification codes is similar to those students with missing codes across many of the covariates examined in this study, but they are slightly more likely to be white (0.72 vs 0.68) and have married parents (0.65 vs 0.54), less likely to be male (0.46 vs 0.55), and on average have a higher family income (\$48 300 vs \$43 500). Of the remaining sample, 3583 had valid television hours data and 3141 had complete covariate data after family income was imputed using single imputation techniques for 600 individuals. The use of this data set was preapproved by the University of Wisconsin Institutional Review Board, Madison.

### MEASURES

#### Outcome Variables

The primary outcome measure was self-reported hours of television viewing per week at the individual level.

#### Independent Variables

The primary predictor of interest was the mean reported hours of television viewing of an individual's school. For each individual, this measure was the sample average of all individuals in the same school (except the individual). Several important covariates were also included in the analysis. The individual's sex was included because it is well documented that male students watch more television than female students do.<sup>12</sup> Likewise, race (white, black, or Hispanic) was included to capture known differences in television viewing across these groups.<sup>13</sup> Overweight status was included because it has consistently been shown to be highly correlated with television viewing.<sup>13</sup> An individual's grade in school and grade point average were in-

cluded because television viewing decreases as students age and academic achievement is likely to be negatively correlated with television viewing. Family income, rural status, and employment were included to control for availability of activities for adolescents that are substitutes for television. Finally, school-level characteristics (eg, racial composition and income) were included to capture differences in the school environment across individuals. Since geographic identifiers are unavailable in the data set, no variables that directly measure community access to television programming can be used in the analysis.

## STATISTICAL ANALYSIS

The analytical approaches included multivariate linear regression and 2-stage least squares regression using the Huber-White estimator of variance to account for the fact that more than 1 child was assessed in each school.<sup>14</sup> Wave II sample weights were also used to adjust for the complex sampling design in the data. The estimated regression model was of the following form:

$$Y_{is} = \beta \bar{X}_{is} + \delta \bar{X}_{-is} + \alpha \bar{Y}_{is} + \epsilon_{is}$$

where individual  $i$  in school  $s$  chooses television viewing level  $Y_{is}$  and has individual characteristics  $X$ . School-level variables are included in  $\bar{X}$  (with individual  $i$  omitted), and school-level television choices are included in  $\bar{Y}$  (with individual  $i$  omitted). The main parameter of interest is  $\alpha$ , which is the estimate of the importance of social interaction in individual television choices. Two-stage least squares regression is necessary in the empirical analysis because group behavior affects individual behavior and vice versa. This simultaneity in choices leads to the reflection problem first discussed by Manski<sup>15,16</sup> in the economics literature. The reflection problem occurs in most empirical research that attempts to demonstrate an association between individual-level and group-level behavior. Manski proved that most estimates of  $\alpha$  are not identified without using instrumental variables or other methods.<sup>16</sup> The instrumental variables approach solves the reflection problem by finding a variable that is related to the individual outcome at the individual level but not at the group level.<sup>17,18</sup> For this analysis, employment status was used to identify the relationship between group television viewing and individual television viewing. Intuitively, the assumption is that an individual's employment status is related (negatively) to the individual's television viewing, because individuals who are employed have less available time to watch television, but the proportion of employed students in an individual's school is not associated with the individual's choice of how much television to watch. The proportion of employed students is assumed to affect the individual's television viewing only through its affect on the school-level television viewing measure.

## RESULTS

**Table 1** gives descriptive statistics of the variables used in the study. The mean number of hours per week of television viewing was almost 15. The average number of children in the 131 schools in the sample was nearly 40. Students are exposed to a wide variety of school-level employment; the school-level proportion of students working varies from 0% to 95% of the sampled student body. Finally, the school-level average number of hours of television viewing varies between 2 and 32 hours per week.

**Table 2** gives the results of the regressions of the determinants of individual hours of television viewing. Before examining potential social interactions, ordinary least squares results showing the individual, family, and school-

**Table 1. Descriptive Statistics Wave II of the Add Health Data Set, 3189 Observations**

Variable	Mean (SD)	Minimum	Maximum
Outcome			
Television viewing, h/wk	14.63 (14.91)	0	160
Individual and family characteristics			
Male sex	0.49 (0.50)	0	1
White	0.65 (0.48)	0	1
Black	0.21 (0.41)	0	1
Hispanic	0.11 (0.31)	0	1
Grade point average	2.82 (0.76)	1	4
School grade	9.92 (1.45)	7	13
Rural	0.27 (0.44)	0	1
Urban	0.30 (0.46)	0	1
Overweight	0.23 (0.42)	0	1
Employed	0.58 (0.49)	0	1
Family income (\$10 000-\$10 999)	4.55 (4.36)	0	90
Married household	0.66 (0.47)	0	1
School-level characteristics			
No. of students per school	39.15 (17.14)	11	99
Overweight	23.02 (11.56)	0	58
Income	45.21 (18.62)	14	136
Hispanic	11.05 (19.12)	0	92
Black	20.42 (28.06)	0	100
Employed	57.94 (18.02)	9	95
Television viewing, h/wk	14.82 (5.28)	2	32

Abbreviation: Add Health, National Longitudinal Study of Adolescent Health.

level correlates of individual television hours are listed in column 1. Robust standard errors that allow for correlated errors at the school level are shown under the coefficients, and wave II sample weights are used. Male students report watching 2 hours of television per week more than female students. While black students report 5 more hours of television viewing than do white students, there was little difference between white and Hispanic students in television viewing time. As students age, they report watching less television. Employed students report watching television almost 2 hours less than unemployed students do. Students with higher grade point averages also report watching fewer hours of television. Finally, while family income had a small and statistically insignificant relationship with television viewing, students who attended schools with wealthier classmates report less television viewing.

Column 2 lists results for 2-stage least squares analysis. To estimate this empirical model, an instrumental variable must be chosen. Without an instrumental variable, the coefficient of interest ( $\alpha$  in the equation) is not identified. The instrumental variable must meet 2 criteria for the estimation results to be valid. First, the variable must be strongly related to the school-level average of television hours. This criterion was met because the (unreported) first-stage relationship between school-level employment and school-level television hours had a *t* statistic of almost 17. Second, the variable must be uncorrelated with the unobserved error term. Because it was impossible to document that this criterion is satisfied, in practice it must be assumed. Suggestive evidence that school-level employment was uncorrelated with the unobserved

**Table 2. Television Regression Results\***

Dependent Variable	Television Hours	
	Ordinary Least Squares Analysis	2-Stage Least Squares Analysis
Individual and family characteristics		
Male sex	2.001 (0.644-3.357)†	2.027 (0.653 to 3.401)†
Black	5.317 (3.339-7.295)†	4.634 (2.060 to 7.208)†
Hispanic	0.138 (-1.924-2.200)	0.755 (-1.002 to 2.512)
Grade point average	-1.394 (-2.130-0.657)†	-1.227 (-1.982 to -0.472)†
Married household	-0.865 (-2.161-0.431)	-0.804 (-2.077 to 0.469)
Family income	0.008 (-0.107-0.124)	0.014 (-0.100 to 0.29)
Rural	-0.502 (-1.813-0.810)	-0.451 (-1.711 to 0.810)
Urban	-0.321 (-1.822-1.180)	-0.317 (-1.793 to 1.160)
Overweight	0.584 (-0.650-1.819)	0.531 (-0.715 to 1.778)
School grade	-0.667 (-1.152-0.182)†	-0.545 (-0.904 to -0.186)
Employed	-1.939 (-3.236-0.643)†	-1.969 (-3.283 to -0.654)†
School-level variables		
Income	-0.092 (-0.133-0.052)†	-0.045 (-0.101 to 0.010)
White	-0.021 (-0.059-0.017)	
Employment	-0.022 (-0.077-0.032)	
Television viewing, h		0.441 (0.064 to 0.817)‡
Constant	31.782 (25.467-38.097)†	18.680 (8.487 to 28.874)†
No. of observations	3141	3141
R <sup>2</sup>	0.105	0.106

\*Unless otherwise specified, values indicate number, with robust 95% confidence interval in parentheses.

†Significant at 1%.

‡Significant at 5%.

error can be found in the result from column 1 that school-level employment was uncorrelated with the individual choice of television hours.

The results in column 2 for individual and family variables change little from the results in column 1. The main result was that the level of school television viewing was positively related to individual hours. The results suggest that a 1-hour increase in school-level hours increases the individual's television viewing by almost half an hour per week (95% confidence interval, 0.06-0.82).

### COMMENT

This analysis has produced evidence that individual choices of how many hours to watch television are determined, in part, by choices by schoolmates. The inclusion of potential confounding variables and the use of instrumental vari-

ables suggest that these associations may be causal; not only are television choices correlated within school, but decisions by peers of how much television to watch affects television choices at the individual level. However, since this framework can only show the existence of social influences on individual decisions and not the mechanism underlying the process, why and how the social influences affect individual decisions are unclear. It could be that individuals in the same school watch similar amounts of television so that they can discuss television during school. The data set contained information only on hours of television watched and not specific content, which does not allow the hypothesized mechanism to be tested explicitly.<sup>19</sup> Further examinations of the mechanism through which social interactions shape individuals' television choices are an important area for future research.

Several important limitations of this research require elaboration. It is possible that the ability of parents to choose schools for their children account for some portion of the relationship. If parents who do not actively monitor their children's television viewing send their children to similar schools, a portion of the results could be spurious. This unobserved parental trait would have to be inadequately controlled for in the covariates for this to be a substantive concern. Including a variable that measures the frequency of parental participation in parent-teacher association events was not significant when included in the regression analyses. While this variable was not available for all students, it does allow some confidence that the results are likely not significantly affected by unobserved parental characteristics.

An additional potential weakness of this research has been the reliance on measures of self-reported television viewing rather than actual viewing.<sup>20-23</sup> This problem is not unique to this research but might be particularly concerning if self-reported measures of television viewing are affected by social norms within schools. Examination of this issue would require additional data that are unavailable.

With these caveats in mind, overall the results suggest the presence of social interactions in adolescents' television choices. The importance of this finding for policy makers is that social interactions imply that policies that shape social norms in schools could be an effective direction for interventions to reduce television viewing. In addition, interventions on a subset of students within schools are likely to have a spillover effect on students in the same school who did not receive the intervention. Both types of interventions represent interesting areas for future efforts to decrease television viewing among adolescents.

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**Correspondence:** Jason Fletcher, MS, Department of Agricultural and Applied Economics, 427 Lorch St, University of Wisconsin-Madison, Madison, WI 53706 (jmfletcher@wisc.edu).

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