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DETERMINANTS OF SOCIAL VIOLENCE AMONG  
THE YOUTH AND THEIR RISKY HEALTH  
BEHAVIORS: POLICY IMPLICATIONS

by

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## **DETERMINANTS OF SOCIAL VIOLENCE AMONG THE YOUTH AND THEIR RISKY HEALTH BEHAVIORS: POLICY IMPLICATIONS**

### **SUMMARY**

We examine the relationship between alcohol and illicit drug use by the youth, and three types of violent behavior: (1) drunk driving, (2) riding in a car driven by someone who has been drinking, and (3) wearing no-seat belts. The results show that there is a strong positive relationship between risky health behavior (alcohol and illicit drug uses) and social violence (drunk driving, a ride in a car driven by a drunk driver, and wearing no-seat belts) among the youth. The results suggest that binge drinking, smoking habits, and illicit drug use will contribute to the escalation of habitual high-risk behavior, such as drunk driving, and no-seat belt use among the youth. Additionally, this tendency is quite similar to a multi-consumption of drink and drug abusers. The result suggests that the youth drunk driving attitude will become more sensitive to multi-consumption habits as age increases. Further, the youth are more likely to drive a car while there are intoxicated if they are apt to be companions of a drunk driver, or no-seat belt users.

### **KEYWORDS**

risky social behavior by the youth, social violence, alcohol&drug use, drunk-driving, no-seat belts

## INTRODUCTION

Each day, the youth faces risks of violence in different forms, such as alcohol and drug abuses (drugs mean illicit drugs hereafter), drunk-driving, and criminal activities. These types of violent behavior often lead to losses or reductions in human capital and health status.

Recent proposals for a stricter blood alcohol concentration (BAC) level in the uniform national standard for drunk-driving, alcohol prohibition, and the Clinton Administration's National Drug Control Strategies to target the youth have called for increased attention to the importance of economic and social consequences of risky health behavior.

Alcohol and drug abuses tend to result not only in social violence, but also lead to reduced health status and earnings with habitual behavior. Drunk driving, caused by alcohol and drug abuses, will lead to losses in human capital with traffic accidents. Habitual alcohol and drug abuses not only affect physical and mental health over the course of years or decades but also have important economic effects through their influences on public health and safety, productivity, family function and criminal activities.

Forty-five percent of the traffic accidents in the 14-18 age group is alcohol-related, even though it is illegal to drink and drive in the U.S. Alcohol is a leading factor in the cause of death of 15 to 20 year old youths who are involved in motor vehicle accidents. Drivers are less likely to use safety measures such as wearing seat belts with alcohol drinking. For example, 71% of all fatal crashes are the results of driving without seat belt use [1]. Drunk-driving has important effects on human capital and health status; it also results in private and social costs. Thus, under the recent Federal Highway Bill of 1999, by October 2001, states would have to adopt a stricter and more realistic blood alcohol concentration (BAC) limit of

0.08 grams per deciliter.

Alcohol consumption inflicts significant welfare costs to our society. Studies by Grossman [2], Grossman, Sindelar, Mullahy and Anderson [3], Yamada, Kendix and Yamada [4], Mullahy and Sindelar [5] and Cook and Moore [6,7] find that an excessive use of alcohol will lead to motor vehicle fatalities, public health risks, health care expenditures, lack of educational attainment, work losses, and future income losses. Previous studies by Wilkinson [8], Saffer and Chaloupka [9], Kenkel [10], Chaloupka, Saffer and Grossman [11], and Ruhm [12] not only focused on the impact of alcohol control policies on motor vehicle fatalities, but also examined the sensitivity of drunk-driving to macroeconomic conditions, which were done by Wagenaar and Streff [13] and Ruhm [14]. However, using individual or state level data, these studies failed to present clear cut evidence and consensus of the effects of public policies. Different specifications tended to produce different results emanating from public policy variables [10, 12, 13 and 15]. The minimum legal drinking age, which is now 21 in all states, and increased alcohol prices (due to beer taxes) are major factors which have reduced drunk-driving incidents and motor vehicle fatalities as studied by Chaloupka, Saffer and Grossman [11] and Saffer and Grossman [16, 17].

However, few studies have combined alcohol drinking with illegal drug use to analyze drunk-driving behavior. The federal drug control policy, an attempt to reduce drug abuse, pertains to alcohol-prevention programs as well. Recent studies, which have focused on the demand for alcohol and drugs by Yamada, Kendix and Yamada [4], on the habit formation by Moore and Cook [18] and Pacula [19], and on the price effects by Saffer and Chaloupka [20], have paid increased attention to the combined influence of alcohol and drug use on behavioral

activities. Based on these works, it seems that understanding risky health behavior, i.e. alcohol and drug use, is a more efficient approach to prevent drunk-driving.

The focus of this project is to find the determinants and to examine the effects of risky health behavior (alcohol and illicit drug use) on social violence (drunk driving) among the youth. Specifically, this study has three principal aims. First, we will examine the relationship between alcohol and drug use (i.e. risky health behavior), and violent behavior. We will investigate three types of violent behavior: drunk driving, riding in a car driven by someone who has been drinking, and wearing no-seat belts in a car. Second, we will analyze the habitual or systematic patterns between alcohol-related violent behavior and risky health behavior, i.e., binge drinking, smoking, marijuana use, cocaine use, and drinking with regular use of drugs, among the three different age groups (19-22, 16-18, and 12-15). Third, we will identify the characteristics of violent behavior among the youth holding risky health behavior constant. The behavioral differences among youth are influenced by surrounding socioeconomic and demographic factors, i.e., education, household income, race, role of gender in the family structure, etc. A failure to take account of the above-mentioned relationships may lead to an underestimation of the consequent aggravation of fatal motor vehicle accidents involving social violence, i.e. drunk-driving by the youth, and to an accelerated increase in economic and social losses caused by a rise in health and medical expenditures. A loss of human resources among the youth affects our future economic growth.

### **EMPIRICAL FRAMEWORK**

In this empirical analysis, we examine the effects of high-risk behavior among the youth that includes drunk-driving, riding in a car as a companion to a drinker, and driving

without wearing seat belts. In spite of a uniform drinking age of 21 in the United States, the underage youth still have access to beers, liqueur and other alcohol-related products, and they drive a car while intoxicated. Further, alcohol use may be closely related to a similar behavior of illicit drug consumption as studied by Pecula [19] and Kandel and Yamaguchi [21]. This kind of multi-consumption behavior, namely habits, tends to lead to drunk-driving, riding in a car driven by a drinker, and driving without wearing seat belts in a car.

There are three ways to affect drunk driving. First, the governments can raise alcoholic beverage taxes at the state and national levels. Legal enforcement of advertising and marketing at the state and national levels can limit the uses of alcohol products. The above policies directly affect alcohol consumption and indirectly influence drunk driving. Second, the laws can directly influence drunk driving behavior; the deterrence laws that prohibit drunk-driving must be implemented strictly. These are mandatory jail sentences or community services, authorizing against alcohol servers, suspending or revoking a driver's license, sobriety checkpoints, authorizing the police to administer breath tests, sanction against drivers who refuse alcohol tests, stricter level of blood alcohol concentration (BAC) limits, terms of 1st, 2nd and 3rd offenses, etc. Third, a national campaign may change public attitudes, social norms, and social and cultural beliefs that accept and encourage drunk driving and underage drinking. School and university policies on binge drinking must be effective. However, drunk driving remains a major cause of automobile related accidents among the youth, despite legislative initiatives and law enforcement.

The analysis here isolates the effects of taxes, legislative and law enforcement practices on drunk driving, on being a companion rider, and driving without seat belts. Since



the data do not contain information at the city, county and state levels, we are not able to incorporate our individual data with the cross-sectional level of state deterrence laws and alcoholic beverage taxes. Thus, it is impossible to detect some structural estimates of the impacts of deterrence laws and taxes on violent behavior. Given the data resources, one crucial issue is to detect the source of violent behavior among the youth by incorporating risky health behavior, e.g. binge drinking, smoking cigarette and marijuana, cocaine use, and combined drink and drug abuse, into related violence behavioral factors, in addition to socioeconomic and demographic factors.

Using individual subscripts for notational cases, we chose an empirical model of the following form for estimating parameters:

$$(1) DD = \alpha_0 + \alpha_1 VBF_1 + \alpha_2 RHB_2 + \alpha_3 AC_3 + \alpha_4 SEF_4 + \alpha_5 DF_5 + \epsilon_{DD},$$

$$(2) CDD = \beta_0 + \beta_1 VBF_1 + \beta_2 RHB_2 + \beta_3 AC_3 + \beta_4 SEF_4 + \beta_5 DF_5 + \epsilon_{CDD}, \text{ and}$$

$$(3) NSB = \gamma_0 + \gamma_1 VBF_1 + \gamma_2 RHB_2 + \gamma_3 AC_3 + \gamma_4 SEF_4 + \gamma_5 DF_5 + \epsilon_{NSB},$$

where DD is drunk-driving by a youth; CDD is the youth being a companion in a car driven by a drinker; NSB is a youth not wearing seat belts in a car. VBF represents violent behavioral factors; RHB represents risky health behavior; AC represents activities by a youth; SEF represents socioeconomic variables; finally, DF represents demographic variables.  $\epsilon_{DD}$ ,  $\epsilon_{CDD}$  and  $\epsilon_{NSB}$  are error terms. The variables included in the violence behavioral factors (VBF) were: drunk-driving, a companion with a drunk driver, without seat belts, and physical fights engaged in by the youth. The variables which were included in the risky health behavior (RHB) were: binge drinking, smoking, marijuana and cocaine use, and multivariables of drink and drug use.

## **DATA**

The data used for this project were drawn from the 1992 National Youth Risk Behavior Survey. The 1992 survey is the most comprehensive among other years' survey data because it includes more socioeconomic questionnaires. The survey was conducted jointly by the Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, and Center for Disease Control and Prevention. The target population consisted of all public and private school students in a nationally representative sample of children and the youth (12 through 22 years old) in the fifty states and the District of Columbia in the United States. The school response rate was 78% and the student response rate was 90%, with an overall response rate of 70%. A total of 16,296 students from 155 schools were included in the survey. The data included the following variables: unintentional and intentional injuries, cigarette and tobacco use, alcohol and illegal drug use, driving disorders, viz., drunk-driving, a ride in a car driven by someone who has been drinking, driving without wearing seat belts and helmets, physical activities, demographic factors, such as race, age, and gender, and socioeconomic factors that include education attainment level, household income, types of work, working status.

Table 1 presents the definition and descriptive statistics of all the variables, which include activities by the youth (AC), socioeconomic variables (SEF) and demographic variables (DF), for the sample used in this analysis.

## **EMPIRICAL RESULTS**

Table 2 presents our estimates using a logit method for the following models: Model (1): Drunk-driving (DD), Model (2): Companion in DD, and Model (3) No-seat Belts. Table

3-1 presents the marginal effects of a change in violent behavioral factors and risky health behavior on drunk driving by age groups: 19-22, 16-18, and 12-15. Table 3-2 summarizes the marginal effects of the same factors on a companion in a car driven by a drinker (henceforth, to be referred to as companion riders). Finally, Table 3-3 shows the effects of the variables on drivers and companions with no-seat belts (henceforth, to be referred to as no seat-belt users). Table 4 presents an average percent of violence and risky health behavior in each age group.

All estimated coefficients of violence behavioral factors in Table 2 are found to have statistically significant impacts on drunk-driving, on a companion rider, and on no-seat belt users. The youth are more likely to drive a car while drinking if they have been companions with a drunk driver. They are also expected to be no-seat belts users. According to the estimates, a 10 percent increase in a companion rider will lead to a 2.1 percent increase in drunk driving. The corresponding elasticity of no-seat belts users is 0.44 percent. Moreover, the estimates show that a 10 percent increase in drunk-driving will lead to a 0.9 percent rise in companion riders, and a 0.31 percent rise in no-seat belt users.

Table 2 also includes physical fights as an element of violent behavioral factors. Some behavioral differences among three types of high-risk behaviors are compatible with our *a priori* expectations. The youths who have experiences with physical fights in the past 12 months are significantly more likely to be drunk drivers themselves, to be companions of drunk drivers, or to be no-seat belt users, as compared to the youths who do not have physical fight experiences. The elasticity coefficients of the impacts of physical fights on drunk driving, companion riders and no-seat belt users are 0.28 percent, 0.72 percent, and 0.82 percent, respectively.

The importance of accounting for violent behavioral factors, such as drunk driving, companion riders, and no-seat belt users, is revealed by the positive and statistically significant estimated coefficients shown in Table 2. These results suggest that alcohol abuse, namely binge drinking, smoking habits, and illicit drug use will be responsive to the escalation of habitual high-risk behavior like drunk-driving, companion riders and no-seat belt users. A similar study of habitual development combining consumptions of beer and drugs was studied by Kandel and Yamaguch [21], though their study did not include drunk driving behavior. Our results for Companion in DD indicate that the youths who are companions of a drunk driver are very sensitive to binge drinking, to any form of illegal drug use, to smoking habits, and to drink-and-drug abuse.

The findings show the relationship binge drinking I (drinking five or more drinks on a single occasion for 1-9 days in the past 30 days) have with drunk-driving. The results indicate that a 10 percent increase in binge drinking will lead to a 1.1 percent rise in drunk driving, a 0.7 percent rise in companion riders, and a 0.2 percent rise in no-seat belt users. Those who have experiences with binge drinking are more likely to become drunk drivers. In addition, they also have a similar tendency to become drink-and-drug abusers. The resulting elasticities are 5.6 percent for drunk driving, 3.0 percent for a companion riders, and 0.9 percent for no-seat belt users, and a 10 percent increase in drink-and-drug users. The results suggest that the youth drunk-driving attitudes are more likely to lead to multi-consumption habits as age increases. Our finding is congruent with similar conclusions made by Moore and Cook [18] and Pecula [19]. The key issues then seem to be stricter law enforcement to curb illicit drug uses and to control consumption of alcoholic beverages among early teens by imposing higher

taxes on those items.

For the socioeconomic and demographic factors in Table 2, a male youth is more likely to have high-risk behavior, like drunk-driving and no-seat belt usage, than a female youth is. On the other hand, a female youth is more sensitive to being a companion rider with a drunk driver. The youths, who live with highly educated and responsible parents, who maintains longer residency in the same place, and who have no siblings, have a lower tendency to become drunk drivers, companion riders, and no-seat belt users.

The most striking feature of the results in Table 3-1 is that the marginal effects show higher and higher influences of violent behavioral factors and risky health behaviors as age increases on drunk driving among the youth. Our results suggest that an environment conducive to early stage of alcohol and drug use among the youths is indeed an important factor in the resulting high-risk behavior. This would also contribute to habitual behavior with age and/or experiences. The College Alcohol Study in 1993 by the Harvard School of Public Health also found that the students (age 23 or younger) who binged in high school had higher binge drinking rates compared with other students who did not have similar binge drinking exposures. Unlike the results for the age groups in Table 3-1, Tables 3-2 and 3-3 show that an increase in age does not show any systematic stronger and higher impact of violent behavioral factors and risky health behavior on a companion rider and on a no-seat belt user. Yet many of the violent behavioral factors and risky health behavior are positive and statistically significant in these two tables. In Table 3-2, the marginal effect of drunk driving on a companion rider is strongest in the 12-15 age group. Interestingly, the marginal effect of drunk driving on no-seat belt users is also highest in the 12-15 age group, as shown

in Table 3-3. The same age group of 12-15 shows a similar response pattern for binge drinking and smoking.

Since drunk-driving behavior is more likely to be a habitual behavior, a restriction on alcohol and illicit drug accessibility to the younger teens might help reduce violent and risky health behavior. However, there is no clear cut evidence that a reduction of companion riders and a reduction in the number of no-seat belt users would have such obvious impacts in reducing violent and risky health behavior.

Table 4 shows the average percent of violent and risky health behavior of each age group. Almost fifty percent (49.9%) of the youth (16-18 years old) and about seventy percent (66.4%) of the youth (19-22 years old) have experienced alcohol and regular drug use together (drinks&drugs) in the past 30 days. The large increase in the percentages of drunk driving and a companion rider in the 16-18 age group is attributable to the legal age for a driver's license issuance by the motor vehicle agencies. For binge drinking, the large increase in Binge I seems to be consistent with the drinking environments of high school (for 16-18 years old) and colleges (for 19-22 years old).

### **POLICY IMPLICATIONS AND SUMMARY**

This analysis accounts for the effects of violent and risky health behavior on drunk driving, companion riders, and no seat belt users. We report conclusive evidence that any specific form of illicit drug use and smoking habits result in a high incidence of drinking and driving, and companion riders. The most striking finding is that the youths who drink and use illicit drugs together tend to be high-risk drunk drivers, companion riders and no-seat belt users. We also observe some interdependencies among consumption of alcohol and drug use

and habitual development in this study.

The results of this research will help to understand the risky health behavior among youths and to promote comprehensive policies to deter drunk driving and companion riding, and to raise seat-belt usage. The key issues then, seem to be stricter law enforcement to control illicit drug use and the setting of higher prices on alcoholic beverages through taxes. Both these measures are expected to reduce consumption at the "early teens." The marginal effects show the development pattern of a larger influence of violent behavioral factors and risky health behaviors on drunk driving among the youth as age increases. A reduction of alcohol and illicit drug use at an early age is indeed an important determinant in lowering risky health behavior.

One viable option is to restrict alcohol and illicit drug use to reduce the incidences of drunk driving, being a companion rider, and no-seat belt usage. In addition to the current strict enforcement of drunk driving, we would recommend paying more attention to control underage drinking at an early stage to reduce habitual attitude of alcohol and illicit drug use later. Thus, paying attention to the timing of the initiation to alcohol and drugs use of teens, especially at the high school age is a crucial issue. The development and/or change in social norms and beliefs that accept and encourage underage drinking that lead to drunk driving are important elements to deter this early alcohol and drug use initiation among the youth.

The educational system and public information efforts are able to create environments that reject alcohol and drug abuse especially in high schools and colleges. Our results show that the youth, who are likely to be companion riders, are highly likely to become drunk drivers themselves. Some punitive laws currently exist to address the problems of drunk

driving. Some strict law enforcement toward a companion rider is possible and desirable.

Further public attitudes toward underage drinking play an important role in determining underage drinking habits. Retailers, advertising/promotions agencies, schools and universities can shoulder some responsibilities to discourage habitual consumption of drugs and alcohol that lead to drunk driving by offering clear and better choices like constructive group activities.

We are not able to incorporate taxes and prices of alcohol beverages in our empirical study because of the nature of our individual data. However, theoretical economics suggest that raising taxes create consumer losses by raising the welfare cost for consumers. The tax policy also produces external social benefits to society by decreasing alcohol and drug uses which will result in enhanced health status and reduced medical and health care expenditures, and reduced harmful social effects, like second hand smoking.

The increases in tax revenues from alcoholic beverage taxes may be used for the prevention efforts on alcohol and drug abuse. Educational curriculum and public awareness information at the local community levels might succeed in achieving that goal. Part of the increased tax revenues may also be utilized to employ more alcohol and drug abuse specialists to work in treatment programs that may reduce drunk driving in the long run. We, however, need to have evaluation efforts to effectively use the limited resources in the programs of prevention, intervention, treatment and educational services.

Our study shows that drunk driving, being a companion of a drunk driver, and wearing no-seat belt among the youth are significantly related to substance abuse, alcohol, cigarette smoking and drug use. The tendency to develop higher level of drug use and habitual



attitude accelerate drunk driving among the youth. Effective early interventions to prevent violent and risky health behaviors would result in a higher quality of living for the society as a whole.

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Table 1 Definition of Variables and their Descriptive Statistics

Variable	Mean (m); Standard Deviation (s.d.) and Definition
<b>Violence Behavioral Factor</b>	
Drunk driving(DD)	m=0.107; s.d.=0.309 binary variable: 1=if youth drove a car while drinking in the past 30 days
Companion in DD	m=0.237; s.d.=0.425 binary variable: 1=if youth was in a car driven by a drinker in the past 30 days
No-seat belt use:	m=0.173; s.d.=0.378 binary variable: 1=if youth never or rarely wore seat belts in a car in the past 30 days
Physical fights	m=0.406; s.d.=0.537 binary variable: 1=if youth experienced physical fights in the past 12 months
<b>Risky Health Behavior</b>	
Binge I	m=0.225; s.d.=0.418 drinking five or more drinks on a single occasion for 1-9 days in the past 30 days
Binge II	m=0.020; s.d.=0.142 drinking five or more drinks on a single occasion for 10 days or more in the past 30 days
Smoking I	m=0.101; s.d.=0.302 smoked cigarettes from one to nine days in the past 30 days
Smoking II	m=0.165; s.d.=0.371 smoked cigarettes from ten or more days in the past 30 days
Marijuana I	m=0.075; s.d.=0.263 smoked marijuana one to nine times in the past 30 days
Marijuana II	m=0.028; s.d.=0.164 smoked marijuana ten or more times in the past 30 days
Cocaine I	m=0.048; s.d.=0.214 took any form of cocaine one or two times in the past 30 days
Cocaine II	m=0.008; s.d.=0.090 took any form of cocaine three or more times in the past 30 days
Drinks&Drugs	m=0.432; s.d.=0.495 multiple variable: drank for one or more days in the past 30 days and regular use of any form of illegal drugs
<b>Activities</b>	
House work	m=2.914; s.d.=2.349 number of days of house/yard work for at least 30 minutes in the past week
Bicycling&walking	m=2.540; s.d.=2.568 number of days of bicycle/walk for at least 30 minutes in the past week
Jogging&swimming	m=1.935; s.d.=2.322 number of days went jogging and swimming in the past week
<b>Socio-Economic Factors</b>	
Education:junior high	m=0.317; s.d.=0.465 number of years of education: 9-11 years, high school
Education:senior high	m=0.171; s.d.=0.377 number of years of education: 12 years, high school graduate
Education:college	m=0.128; s.d.=0.334 number of years of education: 12 and more, including college graduate
Education:parent	m=13.012; s.d.=2.767 number of years of schooling (0-18 years) of a responsible parent

(Table 1 continued)

Currently working	m=0.223; s.d.=0.416
binary variable: 1=if youth worked in the past 2 weeks	
Government job	m=0.016; s.d.=0.127
binary variable: 1=if youth works for local or state or federal government	
Household income	m=\$25,676.31; s.d.=\$20,165.50
household income	
Income dummy	m=0.156; s.d.=0.363
income dummy for unknown	
Residence:5-14 years	m=0.038; s.d.=0.190
from five to 14 years in state of current residence	
Residence:15+years	m=0.029; s.d.=0.168
fifteen years and more in state of current residence	
Residence dummy	m=0.669; s.d.=0.471
residence dummy for unknown or refused to answer	

**Demographic Factors**

Age	m=16.512; s.d.=2.970
age of youth at the time of interview	
Gender	m=0.483; s.d.=0.499
binary variable: 1=if youth is male	
White (race)	m=0.805; s.d.=0.396
if youth is white	
Black (race)	m=0.155; s.d.=0.361
if youth is black	
Hispanic (race)	m=0.173; s.d.=0.378
if youth is of hispanic origin	
No siblings I	m=0.512; s.d.=0.499
if youth does not have siblings with both parents	
No siblings II	m=0.326; s.d.=0.469
if youth does not have siblings with a single parent	
West (region)	m=0.236; s.d.=0.424
youth lives in west	
Midwest (region)	m=0.242; s.d.=0.428
youth lives in midwest	
South (region)	m=0.335; s.d.=0.472
youth lives in south	
Population (1m+)	m=0.239; s.d.=0.426
geographic distribution MSA size 1 million population or more	
Population (.9-.25m)	m=0.404; s.d.=0.491
geographic distribution MSA size 250,000-999,999 population	
Population (.24-.1m)	m=0.267; s.d.=0.443
geographic distribution MSA size 100,000-249,999 population	

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The total sample size is 8905: 2740 (19-22 years old), 2479 (16-18 years old), 3686 (12-15years old). The means and standard Deviations are based on total sample. The statistical summary of each age group may be requested from the authors.

**Table 2 Violent and Risky Health Behavior**

Independent Variable	Drunk driving(DD)		Companion in DD		No-seat Belts	
	Estimate	(t)	Estimate	(t)	Estimate	(t)
<b>Violent Behavioral Factors</b>						
Drunk driving(DD)	---	---	1.644a	17.22	0.388a	3.85
Companion in DD	1.693a	17.32	---	---	0.346a	4.52
No-seat belt use	0.485a	4.50	0.343a	4.46	---	---
Physical fights	0.133	1.45	0.340a	5.64	0.270a	4.73
<b>Risky Health Behavior</b>						
Binge I	0.937a	8.50	0.569a	7.22	0.109	1.19
Binge II	1.418a	6.76	1.401a	6.39	0.447b	2.38
Smoking I	0.258b	1.98	0.410a	4.47	0.065	0.65
Smoking II	0.219c	1.94	0.216b	2.51	0.367a	4.23
Marijuana I	0.372a	3.07	0.440a	4.25	0.055	0.50
Marijuana II	0.379b	2.08	0.417b	2.43	0.370b	2.30
Cocaine I	0.078	0.53	0.290b	2.19	0.528a	4.19
Cocaine II	0.592c	1.96	0.584c	1.70	0.177	0.65
Drinks&Drugs	2.463a	9.66	1.329a	16.11	0.269a	3.17
<b>Activities</b>						
House work	-0.033	-1.47	0.02E-2	0.01	-0.021	-1.53
Bicycling&walking	-0.099a	-4.87	-0.006	-0.47	-0.023c	-1.84
Jogging&swimming	-0.006	-0.23	-0.018	-1.19	-0.022	-1.50
<b>Socio-Economic Factors</b>						
Education:junior high	0.821a	4.18	0.068	0.67	-0.152	-1.59
Education:senior high	0.926a	4.00	0.071	0.48	-0.312b	-2.20
Education:college	1.164a	4.51	0.183	1.07	-0.969a	-5.51
Education: parent	0.030	1.39	-0.031b	-2.29	-0.063a	-4.88
Currently working	0.261b	2.27	-0.056	-0.60	0.021	0.22
Government job	-0.478c	-1.68	-0.088	-0.39	-0.157	-0.59
Household income	0.1E-4a	2.70	0.1E-5	0.21	-1E-5a	-5.33
Income dummy	0.144	0.91	0.187c	1.77	-0.269a	-2.66
Residence:5-14years	-0.260	-1.41	-0.055	-0.36	-0.376b	-2.10
Residence:15+years	-0.388c	-1.81	-0.137	-0.80	-0.342c	-1.75
Residence dummy	0.160	1.02	-0.015	-0.13	-0.041	-0.36
<b>Demographic Factors</b>						
Age	0.258a	6.65	0.003	0.11	0.024	1.06
Gender	0.325a	3.28	-0.472a	-7.16	0.296a	4.68
White (race)	0.736b	2.42	0.061	0.35	-0.038	-0.22
Black (race)	0.587c	1.75	0.335c	1.74	0.303c	1.64
Hispanic (race)	0.179	1.22	0.172c	1.81	0.130	1.42
No siblings I	-0.164	-1.23	-0.092	-1.03	-0.151c	-1.79
No siblings II	-0.073	-0.52	-0.005	-0.05	-0.307a	-3.37
West (region)	0.747a	4.77	-0.033	-0.33	-0.732a	-7.57
Midwest (region)	0.750a	5.03	0.209b	2.21	-0.122	-1.40
South (region)	0.919a	6.35	0.220b	2.43	-0.521a	-6.08
Population (1m+)	0.010	0.06	-0.189	-1.64	0.242b	2.08
Population (.9-.25m)	-0.224	-1.43	-0.178	-1.60	0.027	0.23
Population (.24-.1m)	-0.265c	-1.65	-0.230b	-2.02	-0.044	-0.37
Constant	-13.05a	-14.33	-2.249a	-4.38	-0.711	-1.47
Number of observations	8905		8905		8905	
R-squared	0.412		0.314		0.088	
Log likelihood	-1602.6		-3519.2		-3727.4	

**(Table 2 continued)**

Note: t stands for t-statistics. Significance is indicated by the following: "a" at the 1% level, "b" at the 5% level, and "c" at the 10% level.

**Table 3-1 Drunk Driving: 19-22 years old, 16-18 years old, and 12-15 years old**  
Marginal Effects

Independent Variable	19-22 years old		16-18 years old		12-15 years old	
	Estimate	(t)	Estimate	(t)	Estimate	(t)
<b>Violent Behavioral Factors</b>						
Drunk driving(DD)	---	---	---	---	---	---
Companion in DD	0.180a	13.7	0.106a	8.98	0.026a	4.85
No-seat belt use	0.043a	2.79	0.033a	2.66	0.005c	1.87
Physical fights	0.029b	2.18	-2E-8c	-2E-6	-0.006b	-2.02
<b>Risky Health Behavior</b>						
Binge I	0.098a	6.62	0.049a	3.66	0.021a	3.51
Binge II	0.161a	5.19	0.069a	2.88	0.027a	3.29
Smoking I	0.038b	2.01	-0.2E-3	-0.01	0.013a	3.13
Smoking II	0.027c	1.66	0.004	0.32	0.008b	2.08
Marijuana I	0.037b	2.05	0.012	0.83	0.006c	1.79
Marijuana II	0.037	1.51	0.029	1.26	0.015b	2.44
Cocaine I	0.009	0.50	0.023	1.04	-0.007	-0.83
Cocaine II	0.091b	2.01	-0.010	-0.23	0.003	0.52
<u>Drinks&amp;Drugs</u>	<u>0.301a</u>	<u>6.76</u>	<u>0.192a</u>	<u>7.02</u>	<u>-0.010</u>	<u>-1.59</u>
Number of observations	2740		2479		3686	
R-squared	0.409		0.305		0.421	
Log likelihood	-889.4		-561.0		-84.3	

Note: t stands for t-statistics in the logit regressions. Significance is indicated by the following: "a" at the 1% level, "b" at the 5% level, and "c" at the 10% level. Name of regressors, which are included in the model, are shown in Table 2.

**Table 3-2 Companion in DD: 19-22 years old, 16-18 years old, and 12-15 years old**  
Marginal Effects

Independent Variable	19-22 years old		16-18 years old		12-15 years old	
	Estimate	(t)	Estimate	(t)	Estimate	(t)
<b>Violent Behavioral Factors</b>						
Drunk driving(DD)	0.264a	13.84	0.211a	9.07	0.309a	4.46
Companion in DD	---	---	---	---	---	---
No-seat belt use	0.031	1.58	0.062a	3.27	0.034a	2.80
Physical fights	0.047a	2.82	0.037b	2.49	0.036a	4.03
<b>Risky Health Behavior</b>						
Binge I	0.096a	5.21	0.113a	5.82	0.009	0.58
Binge II	0.221a	4.50	0.253a	5.09	0.075	1.30
Smoking I	0.044c	1.86	0.077a	3.44	0.031b	2.10
Smoking II	0.005	0.28	0.058a	2.87	0.030c	1.65
Marijuana I	0.062b	2.47	0.041c	1.78	0.064a	2.92
Marijuana II	0.085b	2.41	0.008	0.20	0.111b	1.97
Cocaine I	0.051b	2.04	0.046	1.17	0.124b	2.40
Cocaine II	0.130c	1.69	0.027	0.32	0.033	0.46
<u>Drinks&amp;Drugs</u>	<u>0.174a</u>	<u>7.69</u>	<u>0.132a</u>	<u>6.43</u>	<u>0.150a</u>	<u>12.69</u>
Number of observations	2740		2479		3686	
R-squared	0.325		0.286		0.240	
Log likelihood	-1291.8		-1089.6		-1082.6	

Note: t stands for t-statistics in the logit regressions. Significance is indicated by the following: "a" at the 1% level, "b" at the 5% level, and "c" at the 10% level. Name of regressors, which are included in the model, are shown in Table 2.



**Table 3-3 No-Seat Belt Use: 19-22 years old, 16-18 years old, and 12-15 years old**  
Marginal Effects

Independent Variable	19-22 years old		16-18 years old		12-15 years old	
	Estimate	(t)	Estimate	(t)	Estimate	(t)
<b>Violent Behavioral Factors</b>						
Drunk driving(DD)	0.060a	3.10	0.067a	2.91	0.057	1.25
Companion in DD	0.027	1.57	0.057a	3.16	0.048a	2.88
No-seat belt use	---	---	---	---	---	---
Physical fights	0.043a	2.96	0.043a	3.03	0.020c	1.83
<b>Risky Health Behavior</b>						
Binge I	0.020	0.99	-0.019	-0.88	0.051b	2.25
Binge II	0.060c	1.65	0.031	0.72	0.149b	2.10
Smoking I	0.020	0.87	-0.051b	-2.01	0.034c	1.69
Smoking II	0.020	1.14	0.039b	1.96	0.105a	4.55
Marijuana I	-0.009	-0.37	0.030	1.29	-0.020	-0.63
Marijuana II	0.045	1.56	0.095b	2.47	-0.099	-1.32
Cocaine I	0.101a	4.83	0.029	0.81	0.075	1.15
Cocaine II	0.035	0.71	0.062	0.82	-0.031	-0.39
Drinks&Drugs	-0.006	-0.31	0.056a	2.79	0.031c	1.80
Number of observations	2740		2479		3686	
R-squared	0.118		0.111		0.076	
Log likelihood	-1166.2		-1057.7		-1451.7	

Note: t stands for t-statistics in the logit regressions. Significance is indicated by the following: "a" at the 1% level, "b" at the 5% level, and "c" at the 10% level. Name of regressors, which are included in the model, are shown in Table 2.

**Table 4 Average Percent of Violent and Risky Health Behavior:**  
19-22 years old, 16-18 years old, and 12-15 years old

	19-22 years old	16-18 years old	12-15 years old
	%	%	%
<b>Violent Behavioral Factors</b>			
Drunk driving(DD)	23.0	11.4	1.1
Companion in DD	35.0	27.1	13.0
No-seat belt use	18.7	18.7	15.3
Physical fights	27.7	40.4	50.3
<b>Risky Health Behavior</b>			
Binge I (1-9days)	36.9	27.4	8.7
Binge II (10+days)	3.6	2.7	0.5
Smoking I (1-9days)	11.4	11.7	8.2
Smoking II (10+days)	27.4	20.7	5.6
Marijuana I (1-9times)	10.6	10.7	3.0
Marijuana II (10+times)	5.3	3.3	0.5
Cocaine I (1-2times)	11.8	3.6	0.5
Cocaine II (3+times)	1.5	0.7	0.4
Drinks&Drugs (drinks and regular use of drugs)	66.4	49.9	21.4
Sample size	2740	2479	3686

Note: The average of each experience is based on the past 30 days. Categories and measures for alcohol and drug use are referred to Grossman (1989), and Grossman, Chaloupka, Saffer and Laixuthai (1993).

