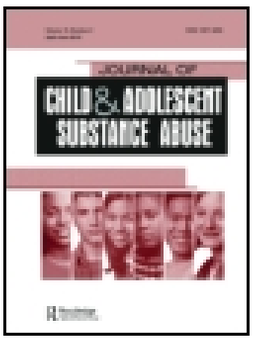

Routledge
Taylor & Francis Group

Journal of Child & Adolescent Substance Abuse

ISSN: 1067-828X (Print) 1547-0652 (Online) Journal homepage: http://www.tandfonline.com/loi/wcas20

Social Interactions in Alcohol-Impaired Driving

Rosa Duarte, José-Julián Escario & José-Alberto Molina

To cite this article: Rosa Duarte, José-Julián Escario & José-Alberto Molina (2015): Social Interactions in Alcohol-Impaired Driving, Journal of Child & Adolescent Substance Abuse, DOI: 10.1080/1067828X.2014.896760

To link to this article: http://dx.doi.org/10.1080/1067828X.2014.896760

JOURNAL OF CHILD & ADOLESCENT SUBSTANCE ABUSE
2016, VOL. 0, NO. 0, 1–8
http://dx.doi.org/10.1080/1067828X.2014.896760

Routledge
Taylor & Francis Group

Social Interactions in Alcohol-Impaired Driving

Rosa Duarte[a], José-Julián Escario[a] and José-Alberto Molina[a,b]

[a]University of Zaragoza, Zaragoza, Spain; [b]Institute for the Study of Labour-IZA, Bonn, Germany

ABSTRACT

This study attempts to analyze the existence and magnitude of social interactions in alcohol-impaired driving among Spanish adolescents. Using a wave of data collected from 25,473 Spanish students between 14 and 18 years old, we estimate the cross-sectional association between alcohol-impaired driving and several predictors. We examine the prevalence of this behavior among classmates, which requires the use of two-stage least squares to deal with the endogeneity of the peer variable. The alcohol-impaired driving behavior of classmates is associated with a higher probability of being involved in the same behavior, and we find that this behavior is positively associated with the father drinking.

KEYWORDS

adolescents; alcohol; driving; social interactions

Introduction

Alcohol abuse is a major global contributing factor to death, disease, and injury. Thus, although alcohol consumption varies widely around the word, it appears as the third largest risk factor for disease and disability, with the greatest risk being found in middle-income countries, according to the World Health Organization (WHO, 2011). This organization has established that "harmful use of alcohol results in approximately 2.5 million deaths each year" (p. x).

It has long been widely accepted that the consumption of alcohol and other drugs has serious consequences for health, with special relevance to adolescence, a life stage during which individuals develop their habits of living and consumption. According to Hawkins, Catalano, and Miller (1992), drug and alcohol abuse undermines motivation, interferes with cognitive processes, contributes to mood disorders, predicts antisocial behaviors, and increases the risks of accidental injury or death.

An important death risk related to alcohol appears when individuals drive after drinking. This has been recognized by the WHO (1995) in the "European Charter on Alcohol," which established 10 health promotion strategies for action on alcohol. According to the third strategy, governments should "Establish and enforce laws that effectively discourage drunk-driving" (WHO, 1995, p. 4). Among European adolescents, traffic accidents are the main cause of death (Anderson & Baumberg, 2006). In this line, there is an increasing interest in how to promote prevention in order to avoid traffic accidents caused by drugs and alcohol (Dols et al., 2010).

The phenomenon of adolescents driving under the influence of alcohol has received increasing attention in recent decades (some recent references are Barlés, Escario, & Galbe, 2014; Bina, Graziano, & Bonino, 2006; Calafat et al., 2009; Delcher, Johnson, & Maldonado-Molina, 2013; Dunlop & Romer, 2010; Labrie, Kenney, Mirza, & Lac, 2011; Maldonado-Molina, Reingle, Delcher, & Branchini, 2011; Maldonado-Molina, Reingle, Jennings, & Prado, 2011; Ramos et al., 2008). The influence of friends has been pointed to as an important explanatory factor, and several studies (Chen, Grube, Nygaard, & Miller, 2008; Delcher et al., 2013; Kim & Kim, 2012; Maldonado-Molina, Reingle, Delcher, et al., 2011; Maldonado-Molina, Reingle, Jennings, et al., 2011) have analyzed the influence of alcohol and marijuana consumption by friends on impaired driving. However, only a few studies have analyzed how the individual decision to drive under the influence of alcohol depends on the prevalence of impaired driving among friends (Chen et al., 2008; Kim & Kim, 2012), which is nearer to the concept of "peer effects" or "social interactions," understood as how the behavior of the individual varies with the same behavior of the group (Manski, 1993).

In this context, our aim is to contribute to the "peer effects" literature on driving under the influence of alcohol. Our measure of peer behavior differs from prior studies in that it provides a complementary analysis. Thus, while Chen and colleagues (2008) and Kim and

CONTACT José-Julián Escario jescario@unizar.es Department of Economic Analysis, University of Zaragoza, Gran Vía 2, 50005 Zaragoza, Spain

Kim (2012) use the perceived prevalence of impaired driving reported by the adolescent, we use the prevalence of impaired driving among the classmates. Our estimation technique also differs, in that we feel it is more appropriate to follow the recommendations of Manski (1993) in order to estimate peer effects.

In an influential article, Manski (1993) pointed out the difficulty of estimating peer effects due to what he called the "reflection problem." He also distinguished among three types of social interactions: endogenous, exogenous or contextual, and correlated effects. Endogenous effects, also known as peer effects, appear when the propensity to participate in a specific behaviour depends on the prevalence of this behavior in the group. Second, exogenous or contextual effects appear when the propensity of an individual to behave in a certain way depends on the exogenous characteristics of the group (e.g., the socioeconomic composition of the reference group). Endogenous and contextual effects are also known as social effects. Finally, correlated effects emerge when individuals of a group tend to behave in similar ways due to the fact that they are affected by similar environments.

Distinguishing between the different kinds of effects is important for policy reasons; if a specific policy is implemented and affects the propensity to participate in a specific behavior, there will be an indirect effect if there are endogenous effects, since other individuals will reconsider their decisions in response to the new decisions of others in the group. This implies that a social multiplier could be exploited if endogenous effects are present. In contrast, we cannot expect social multipliers from contextual and correlated effects (Manski, 2000).

In light of this, it is not surprising that most of the existing literature has concentrated on quantifying the magnitude of endogenous effects. Unfortunately, this is a very difficult, if not impossible, task. Manski (1993) concluded that we can only determine whether or not some social effects are present, but we cannot distinguish between the two social effects. A similar statement appears in Krauth (2007), who pointed out that, in most cases, it is only possible to distinguish between endogenous and contextual effects by assuming that one or the other is absent. Following this argument, most works have assumed that there are no contextual effects, interpreting the composite social effects as endogenous peer effects (see, for example, Gaviria & Raphael, 2001, or most recently, McVicar, 2011).

The empirical literature on peer effects or social interactions has dealt with a range of behaviors. Without providing a detailed list, some recent applications include the following: alcohol drinking (Anderson & Brown, 2011; Lundborg, 2006); alcohol drinking and truancy (Duarte, Escario, & Molina, 2011); fitness (Carrell, Hoekstra, & West, 2011); gang membership (Case & Kartz, 1991); marijuana consumption (Clark & Lohéac, 2007; Clark, Nguyen, & Belgrave, 2011); overweight (Trogdon, Nonnemaker, & Pais, 2008); schooling (Foster, 2006; Mora & Oreopoulos, 2011); sexual behavior (Ali & Dwyer, 2011); stent utilization among cardiologists (Huesch, 2011); and tobacco smoking (Ali & Dwyer, 2009).

As we have pointed out, the objective of this article is to extend the analysis of driving under the influence of alcohol. Thus, in this article, we are able to progress in the identification of predictors of such risky behavior by introducing the social interactions into the analysis. The remainder of this articles is as follows. The next section describes our data and empirical strategy. The following section presents the results of our analysis. We then discuss the implications of our results and finally report the main conclusions.

Methods

Participants

We use data from the Spanish Survey on Drug Use in the School Population, for the year 2004, carried out by the Spanish Government's Delegation for the National Plan on Drugs (SGDNPD, 2004). Although there are later surveys, we cannot compute peer measures from them as they do not provide class or school identifiers. The survey constitutes a nationally representative sample of Spanish students between 14 and 18 years old. A total of 25,473 students were surveyed.

The dependent variable

Information about alcohol-impaired driving is often expressed in terms of prevalence. In order to compute our dependent variable, we use the response to the following question: "During the past year, how many days have you driven a motor vehicle with impaired faculties by alcohol or have you been a passenger in a vehicle where the driver has impaired faculties by alcohol?" From these responses, we create a dummy variable indicating whether or not the adolescent has driven a motor vehicle under the influence of alcohol, or has been a passenger when the driver was under the influence of alcohol. We call this variable alcohol-impaired driving or, more concisely, impaired driving.

Measures

The survey provides information on certain individual, family, and school characteristics. Table 1 provides a descriptive analysis of the dependent and independent

Table 1. Descriptive analysis.

Variable	Obs	Mean	*SD*	Min	Max
ImpairedDriving	24,939	0.144	0.351	0	1
Gender (Male = 1, Female = 0)	25,473	0.492	0.500	0	1
Age14 (Omitted category)	25,473	0.142	0.349	0	1
Age15	25,473	0.277	0.447	0	1
Age16	25,473	0.349	0.477	0	1
Age17	25,473	0.168	0.374	0	1
Age18	25,473	0.064	0.245	0	1
LiveWithoutFather	25,473	0.121	0.326	0	1
UnemployedFather	25,417	0.015	0.123	0	1
HouseWife	25,457	0.325	0.468	0	1
SmokerFather	25,473	0.319	0.466	0	1
SmokerMother	25,473	0.318	0.466	0	1
AlcoholFather	24,375	2.190	1.257	0	5
AlcoholMother	24,934	1.712	1.019	0	5
Primary/SecondarySchoolFather (Omitted Category)	24,937	0.501	0.500	0	1
HighSchoolFather	24,937	0.269	0.444	0	1
UniversityFather	24,937	0.229	0.420	0	1
SecondarySchoolMother	25,310	0.496	0.500	0	1
HighSchoolMother	25,310	0.300	0.458	0	1
UniversityMother	25,310	0.204	0.403	0	1
Income	25,473	16.225	17.250	0	230
InformationCampaign	25,473	0.754	0.431	0	1

variables. Most independent variables are binary and, as a consequence, they don't provide any explanation to understand their meaning. However, it is worth pointing out that the variables *Motherdrinking* and *Fatherdrinking* are scale variables measuring the frequency of parents' drinking. These variables take the value 1 if she or he never drinks alcohol; 2 if she or he sometimes drinks; 3 if only on weekends; 4 almost every day in moderation; and 5 every day a lot. As a result, we can measure the drinking behavior of parents and allow this data to represent "parental influences."

According to our descriptive analysis, 14.4% of adolescents declared having driven a motor vehicle under the influence of alcohol, or having been a passenger in a motor vehicle where the driver was under the influence of alcohol. This is a concern given that the majority of these adolescents have not attained the minimum legal age to drive a car. If we focus now on the remaining variables, we can see that 49.2% are males, only 1.5% of the fathers are unemployed, around 32% of the mothers and fathers smoke, and the percentage of parents with university degrees is 22.9% for fathers and 20.4% for mothers. Finally, the mean disposable income of adolescents was €16.20 ($20.10) per week.

Given that our interest is to evaluate the social interactions on impaired driving, we must define an appropriate measure. We use a traditional measure computed at the class level; that is to say, we compute for each individual the average prevalence of impaired driving among the rest of the class. As Lundborg (2006) points out, by using measures of peer effects at the class level, the importance of the contextual effects will be reduced, since when the reference group is broader, pupils are likely less exposed to the family background of their peers, and thus the observed peer effects are more likely to be caused by endogenous rather than contextual effects. Following this argument, and the bulk of the literature (Ali & Dwyer, 2011; Clark & Lohéac, 2007; Duarte et al., 2011; Gaviria & Raphael, 2001; Lundborg, 2006; Trogdon et al., 2008), we interpret the estimates of social interactions as an approximation of the endogenous peer effects.

Analysis

Linear probability models were used in order to evaluate the association between the independent variables and impaired driving, and thus the estimated coefficients give the marginal effects, or the amount by which the probability of the outcome increases or decreases when the independent variables increase by one unit. We have chosen linear probability models, rather than the more common logistic or probit regressions, for two reasons. First, the two-stage least squares (2SLS) for linear probability models yield estimated coefficients that are consistent and, consequently, directly interpretable as marginal effects. Second, as Terza, Basu, and Rathouz (2008) point out, general methods that address endogeneity by two-stage predictor substitution of the endogenous variables that are consistent in the linear case are generally inconsistent in nonlinear cases. Similarly, Arellano (2008) argues that instrumental variables techniques in binary index models provide consistent estimates of a scale transformation of the parameters. From this transformation, we can only obtain the direction of the effect but not proper marginal effects or odds ratios.

Results

Table 2 reports the estimates by 2SLS of the probability of being in a motor vehicle in which the driver or a friend is under the influence of alcohol. We use as instruments the average of the rest of the class of the following variables: *Income, AlcoholFather, AlcoholMother, LiveWithoutFather*, and *HouseWife*, which pass the usual tests for the validity of instruments (i.e., a significance test and an over-identification test; Wooldridge, 2002), which are reported at the end of the table. In order to gain more confidence in our results, we have computed robust standard errors. In the first column we present results for the peer effects and in the second column we present the results of eliminating the peer variable. Our main result is that the peer variable appears as positive and significant even after controlling for such things as physical, socioeconomic, and school characteristics. Moreover, the magnitude is quite high. Thus, the probability of impaired driving will increase by 3.62 points if the proportion of classmates who participate in that behavior rises by 10 points.

Results for other variables indicate that males tend to have a higher probability of impaired driving. Older adolescents tend to participate in the outcome with a higher probability. The family environment also exerts an effect on the probability of the behavior analysed; thus, this is higher in unstructured families where the father does not live with the adolescent. It is also higher in families where the father or the mother smoke, and in families where the father drinks. On the other hand, the adolescents have less probability of impaired driving as the education level of the father increases. This implies that fathers' characteristics have greater effects than mothers' in the outcome. A similar pattern for parents' behavior appears in Bianchi and Summala (2004), who found that the father's alcohol use is more important than that of the mother in predicting traffic violations by adolescents.

We repeat the peer effect analysis in order to check if there are differences between males and females. The new estimates appear in Table 3. The estimated coefficients provide evidence that peer effects do exist and that, all other things being equal, the effects are stronger for males than for females; thus, the relative difference in both effects is about 28%. We also find, as before, that in those families where the father drinks, adolescents have a higher probability of impaired driving, with this effect being more pronounced for boys than for girls. However, male students are less sensitive to the remaining family characteristics than are female students.

Finally, we check for possible differences in peer effects among younger and older adolescents. To that end, we present results for two groups, the first being 14 and 15 years old, and the second including the remainder of the sample. According to the results reported in Table 4, younger students are more sensitive to the behavior of their friends than are older students.

Table 2. Effects of risk factors on Alcohol-Impaired Driving: Full estimation (2SLS Regression).

	Peer Effects		Without Peer Effects	
Variable	Coefficient	S.E.	Coefficient	S.E.
Peer effect	0.362***	0.105	–	–
Gender	0.032***	0.005	0.033***	0.005
Age15	0.034***	0.007	0.041***	0.008
Age16	0.050***	0.008	0.066***	0.008
Age17	0.103***	0.011	0.121***	0.009
Age18	0.124***	0.015	0.141***	0.013
LiveWithoutFather	0.029***	0.009	0.029***	0.008
UnemployedFather	−0.036**	0.017	−0.037**	0.018
HouseWife	−0.011**	0.005	−0.011**	0.005
SmokerFather	0.015***	0.005	0.014***	0.005
SmokerMother	0.016***	0.005	0.015***	0.005
AlcoholFather	0.010***	0.002	0.010***	0.002
AlcoholMother	−0.003	0.003	−0.003	0.003
HighSchoolFather	−0.016**	0.006	−0.016**	0.006
UniversityFather	−0.022***	0.007	−0.022***	0.007
HighSchoolMother	0.003	0.006	0.003	0.006
UniversityMother	0.003	0.007	0.003	0.008
Income	0.002***	0	0.002***	0
InformationCampaign	−0.025***	0.006	−0.026***	0.006
Intercept	−0.012	0.045	0.019	0.048
Significance of instruments	$F(5,22926) = 432^{***}$			
Wooldridge's over-identification test	$\chi^2(4) = 2.19$			
Number of observations	23,521		23,525	

$^{**}p < .05$. $^{***}p < .01$.

Table 3. Effects of risk factors on Alcohol-Impaired Driving by sex (2SLS Regression).

	Boys		Girls	
Variable	Coefficient	S.E.	Coefficient	S.E
Peer effect	0.385**	0.164	0.301**	0.147
Gender	—	—	—	—
Age15	0.039***	0.011	0.031***	0.01
Age16	0.056***	0.013	0.047***	0.012
Age17	0.128***	0.016	0.079***	0.015
Age18	0.148***	0.022	0.106***	0.021
LiveWithoutFather	0.015	0.013	0.035***	0.011
UnemployedFather	−0.026	0.027	−0.054**	0.021
HouseWife	−0.006	0.008	−0.013	0.007
SmokerFather	0.010	0.008	0.019***	0.007
SmokerMother	0.015	0.008	0.017**	0.007
AlcoholFather	0.014***	0.003	0.005	0.003
AlcoholMother	−0.006	0.004	0.001	0.004
HighSchoolFather	−0.009	0.010	−0.024***	0.008
UniversityFather	−0.015	0.011	−0.026***	0.010
HighSchoolMother	−0.005	0.010	0.012	0.008
UniversityMother	0.001	0.011	0.003	0.010
Income	0.002***	0.000	0.002***	0.000
InformationCampaign	−0.041***	0.009	−0.007	0.008
Intercept	0.023	0.077	−0.021	0.052
Number of observations	11,584		11,937	

**$p < .05$. ***$p < .01$.

Discussion

Using a national representative sample of students between 14 and 18 years old, we have found that a significant number of them, 14.4%, have driven while alcohol-impaired, or have ridden in a motor vehicle where the driver was under the influence of alcohol. This study is one of the first to check the existence of endogenous peer effects in riding in a motor vehicle where the driver is under the influence of alcohol. The endogeneity of the peer measure is controlled using a combination of school fixed effects and instrumental variables techniques.

We find evidence that friends' behavior of riding in a motor vehicle driven by them, or others, under the influence of alcohol, affects the probability of doing the same. In this sense, we can conclude that there are peer effects in such behavior. The bad news is that adolescents are easily influenced by colleagues, which increases the proportion of adolescents who behave in this way. On the other hand, the good news is that any policy that reduces the participation of some adolescents would have a multiplier effect, via an indirect effect (Lundborg, 2006). Unfortunately, our results do not provide evidence that school campaigns have an effect in reducing the outcome for both genders, reinforcing the claim that school-based programs against driving after drinking are insufficient (Elder et al., 2005). In fact, this variable is only significant in the estimation with the male subsample, and even then, the coefficient is very low in quantitative terms.

It is important to point out that the informative campaigns about drugs risks, including legal ones, are not specifically oriented to inform about the risks of impaired driving. Moreover, these campaigns are not homogeneous, since they are not nationally designed. In fact, each school decides which methods, the duration, and other characteristics of the campaign to implement. In this context, it could be argued that there is some evidence, using the same data, that these campaigns have been effective in reducing alcohol abuse (Duarte et al., 2011). So, perhaps they have made some adolescents aware of some risks of drug consumption, but not about the risks of impaired driving. This could indicate that specific campaigns about impaired driving could perhaps reduce the prevalence of this behavior.

At the same time, some authors argue that school-based campaigns should not be carried out alone, but should be integrated in a more general community campaign (McCartt, Hellinga, & Wells, 2009). This appears to be confirmed by our study, as adolescents are influenced by the family environment. Thus, campaigns should include parents, whose behavior influences the probability of the outcome. For example, campaigns could warn that unstructured families, where the father does not live with the sons and daughters, parent smoking, father drinking, and having greater disposable income are predictors of impaired driving.

Our study has certain limitations that refer to the reliance on cross-sectional data and self-reported data. As is

Table 4. Effects of risk factors on Alcohol-Impaired Driving by age (2SLS Regression)

	Under 16 years		16 years or more	
Variable	Coefficient	S.E.	Coefficient	S.E.
Peer effect	0.495**	0.220	0.397**	0.155
Gender	0.023***	0.006	0.039***	0.007
Age15	0.048***	0.009	—	
Age16	—	—	−0.056***	0.009
Age17	—	—	—	
Age18	—	—	0.022	0.014
LiveWithoutFather	0.026**	0.012	0.029**	0.012
UnemployedFather	0.011	0.026	−0.058***	0.022
HouseWife	−0.007	0.007	−0.013	0.007
SmokerFather	0.025***	0.007	0.007	0.008
SmokerMother	0.009	0.007	0.020***	0.007
AlcoholFather	0.007**	0.003	0.011***	0.003
AlcoholMother	0.002	0.004	−0.007	0.004
HighSchoolFather	−0.015	0.009	−0.015	0.009
UniversityFather	−0.021**	0.009	−0.022**	0.011
HighSchoolMother	0.006	0.009	0.004	0.009
UniversityMother	0.004	0.010	0.006	0.011
Income	0.002***	0.000	0.002***	0.000
InformationCampaign	−0.046***	0.010	−0.015	0.008
Intercept	−0.004	0.041	0.089	0.084
Number of observations	9,823		13,628	

**$p < .05$. ***$p < .01$.

well-known, cross-sectional data do not allow us to control for unobserved heterogeneity, dynamics, or changes in variables like family characteristics. Longitudinal data can deal with these topics if it is available. With reference to self-reported data, two problems arise. First, questions about "bad" behaviors could lead to some underreporting. Second, given that the dependent variable refers to behavior in the past year, it could be reported with errors due to memory problems. In both cases, the use of instrumental variables techniques helps to reduce the estimation problems of both measurement errors. Moreover, all our data was anonymously provided and parents were not present, nor were they informed; this reduces underreporting in the responses (Evans, Hansen, & Mittelmark, 1977; Warner, 1978).

The survey used in the study also has certain data limitations. For example, there is no information on characteristics such as being an immigrant or not. Similarly, we have no information on the times adolescents ride in a motor vehicle where the driver is alcohol-impaired, the blood concentration when it occurs, the duration of the drive, and other circumstances that could increase the probability of accidents.

Despite these limitations, this study has several strengths. First, we take an alternative approach by analyzing the existence of peer effects in driving, or being driven, in a motor vehicle with the driver under the influence of alcohol. Second, we have used a nationally representative survey with a relatively large number of individuals, given the size of the population. Finally, the use of an appropriate analysis to deal with the estimation of social interactions provides support for our results.

Conclusions

From a policy point of view, we agree that, despite the government's efforts warning about the dangers of impaired driving on TV and other mass media, policymakers have not prevented adolescent people from engaging in such activities. We have found evidence that one explanation for this fact is that peer effects or social iterations could make this behavior quite "sticky." At the same time, our findings hold several implications for policy purposes.

First, the existence of significant peer effects is of interest since these would amplify the effects of interventions. Consider, for example, a new law that reduces the incentives to participate in driving or riding in a motor vehicle under the influence of alcohol by punishing this behavior. A direct effect of the law is that it reduces the number of adolescents participating in this misconduct, and the frequency of such participation. But at the same time, it also reduces the number of peers that get involved. Consequently, if peers are important, there will be an indirect effect. Thus, each adolescent becomes aware that his or her schoolmates have cut back this behavior, and he or she will react to this change by cutting back his or her own similar conduct. Consequently, the effect yielded at the group level could be several times the effect at the individual level.

Second, our study reveals that peer effects are greater among male adolescents. In light of this, it would appear that policy interventions can have more impact on this sub-sample than on female students, since if the intervention has a similar effect on both sexes, the indirect effect will be greater for males. Furthermore, the male subsample should be considered as a priority group, given that the behavior analyzed is observed in greater proportion in this subsample. The results of the study also suggest that parents, and especially fathers, should be integrated as a target of these interventions.

Future research is needed to corroborate or to disprove the existence of peer effects in the behavior analyzed in our study. Thus, it would be interesting to check whether significant peer effects are confirmed with different variables, and with different, Spanish data. Similarly, given that our main result of significant peer effects cannot be generalized to other countries, further research is needed to determine whether peer effects can be found for other countries. Finally, as we have pointed out, the informative campaigns analyzed in this article are not specifically oriented to the risks of alcohol-impaired driving, but rather to drug risks in general, and prior research has found evidence that alcohol abuse has been reduced. So, more research is necessary to evaluate specific campaigns. Obviously, in order to do so it would be necessary to develop and implement such kinds of campaigns.

Funding

The authors are grateful for financial support from the Spanish Ministry of Economics (Project ECO2012-34828).

References

Ali, M. M., & Dwyer, D. S. (2009). Estimating peer effects in adolescent smoking behavior: A longitudinal analysis. *Journal of Adolescent Health*, *45*, 402–408.

Ali, M. M., & Dwyer, D. S. (2011). Estimating peer effects in sexual behavior among adolescents. *Journal of Adolescence*, *34*, 183–190. doi: 10.1016/j.adolescence.2009.12.008

Anderson, K. G., & Brown, S. A. (2011). Middle school drinking: Who, where, and when. *Journal of Child & Adolescent Substance Abuse*, *20*, 48–62. doi: 10.1080/1067828X.2011.534362

Anderson, P., & Baumberg, B. (2006). *Alcohol in Europe*. London, England: Institute of Alcohol Studies.

Arellano, M. (2008). Binary models with endogenous explanatory variables. Retrieved from www.cemfi.es/~arellano/binary-endogeneity.pdf

Barlés, M. J., Escario, J. J., & Galbe, J. (2014). Predictors of driving under the influence of alcohol among Spanish adolescents. *Adicciones*, *26*, 96–105.

Bianchi, A., & Summala, H. (2004). The "genetics" of driving behavior: Parents' driving style predicts their children's driving style. *Accident Analysis and Prevention*, *36*, 655–659.

Bina, M., Graziano, F., & Bonino, S. (2006). Risky driving and lifestyles in adolescence. *Accident Analysis and Prevention*, *38*, 472–481.

Calafat, A., Adrover-Roig, D., Blay, N., Juan, M., Bellis, M., Hughes, K., … Kokkevi, A. (2009). Which young people accept a lift from a drunk or drugged driver? *Accident Analysis and Prevention*, *41*, 703–709.

Carrell, S. E., Hoekstra, M., & West, J. E. (2011). Is poor fitness contagious? Evidence from randomly assigned friends. *Journal of Public Economics*, *95*, 657–663. doi: 10.1016/j.jpubeco.2010.12.005

Case, A., & Kartz, L. (1991). The company you keep: The effects of family and neighbourhood on disadvantaged youths. *NBER Working Paper,* No. 3705.

Chen, M., Grube, J. W., Nygaard, P., & Miller, B. A. (2008). Identifying social mechanisms for the prevention of adolescent drinking and driving. *Accident Analysis and Prevention*, *40*, 576–585.

Clark, A. E., & Lohéac, Y. (2007). "It wasn't me, it was them!" Social influence in risky behavior by adolescents. *Journal of Health Economics*, *26*, 763–784. doi: 10.1016/j.jhealeco.2006.11.005

Clark, T. T., Nguyen, A. B., & Belgrave, F. Z. (2011). Risk and protective factors for alcohol and marijuana use among African-American rural and urban adolescents. *Journal of Child & Adolescent Substance Abuse*, *20*, 205–220. doi: 10.1080/1067828X.2011.581898

Delcher, C., Johnson, R., & Maldonado-Molina, M. M. (2013). Driving after drinking among young adults of different race/ethnicities in the United States: Unique risk factors in early adolescence? *Journal of Adolescent Health*, *52*, 584–591.

Dols, S. T., González, F. J. Á., Llorens, N., Aleixandre, A. V., Rodrigo, M. J. T., & Valderrama-Zurián, J. C. (2010). Predictors of driving after alcohol and drug use among adolescents in Valencia (Spain). *Accident Analysis and Prevention*, *42*, 2024–2029.

Duarte, R., Escario, J. J., & Molina, J. A. (2011). Peer effects, unobserved factors and risk behaviours in adolescence. *Revista de Economia Aplicada*, *19*, 125–151.

Dunlop, S. M., & Romer, D. (2010). Adolescent and young adult crash risk: Sensation seeking, substance use propensity and substance use behaviors. *Journal of Adolescent Health*, *46*, 90–92.

Elder, R. W., Nichols, J. L., Shults, R. A., Sleet, D. A., Barrios, L. C., & Compton, R. (2005). Effectiveness of school-based programs for reducing drinking and driving and riding with drinking drivers: A systematic review. *American Journal of Preventive Medicine*, *28*(5 Suppl.), 288–304.

Evans, R. I., Hansen, W. B., & Mittelmark, M. B. (1977). Increasing the validity of self reports of smoking behavior in children. *Journal of Applied Psychology*, *62*, 521–523.

Foster, G. (2006). It's not your peers, and it's not your friends: Some progress toward understanding the educational peer effect mechanism. *Journal of Public Economics*, *90*, 1455–1475.

Gaviria, A., & Raphael, S. (2001). School-based peer effects and juvenile behavior. *Review of Economics and Statistics*, *83*, 257–268.

Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin*, *112*, 64–105.

Huesch, M. D. (2011). Is blood thicker than water? Peer effects in stent utilization among Floridian cardiologists. *Social Science and Medicine*, *73*, 1756–1765.

Kim, J. H., & Kim, K. S. (2012). The role of sensation seeking, perceived peer pressure, and harmful alcohol use in riding with an alcohol-impaired driver. *Accident Analysis and Prevention*, *48*, 326–334.

Krauth, B. V. (2007). Peer and selection effects on youth smoking in California. *Journal of Business and Economic Statistics*, *25*, 288–298.

Labrie, J. W., Kenney, S. R., Mirza, T., & Lac, A. (2011). Identifying factors that increase the likelihood of driving after drinking among college students. *Accident Analysis and Prevention*, *43*, 1371–1377.

Lundborg, P. (2006). Having the wrong friends? Peer effects in adolescent substance use. *Journal of Health Economics*, *25*, 214–233. doi: 10.1016/j.jhealeco.2005.02.001

Maldonado-Molina, M. M., Reingle, J. M., Delcher, C., & Branchini, J. (2011). The role of parental alcohol consumption on driving under the influence of alcohol: Results from a longitudinal, nationally representative sample. *Accident Analysis and Prevention*, *43*, 2182–2187.

Maldonado-Molina, M. M., Reingle, J. M., Jennings, W. G., & Prado, G. (2011). Drinking and driving among immigrant and US-born Hispanic young adults: Results from a longitudinal and nationally representative study. *Addictive Behaviors*, *36*, 381–388. doi: 10.1016/j.addbeh.2010.12.017

Manski, C. (1993). Identification of endogenous social effects: The reflection problem. *Review of Economic Studies*, *60*, 531–542. doi: 10.2307/2298123

Manski, C. F. (2000). Economic analysis of social interactions. *Journal of Economic Perspectives*, *14*, 115–136.

McCartt, A. T., Hellinga, L. A., & Wells, J. K. (2009). Effects of a college community campaign on drinking and driving with a strong enforcement component. *Traffic Injury Prevention*, *10*, 141–147.

McVicar, D. (2011). Estimates of peer effects in adolescent smoking across twenty six European countries. *Social Science & Medicine*, *73*, 1186–1193. doi: 10.1016/j.socscimed.2011.08.006

Mora, T., & Oreopoulos, P. (2011). Peer effects on high school aspirations: Evidence from a sample of close and not-so-close friends. *Economics of Education Review*, *30*, 575–581. doi: 10.1016/j.econedurev.2011.01.004

Ramos, P., Díez, E., Pérez, K., Rodriguez-Martos, A., Brugal, M. T., & Villalbí, J. R. (2008). Young people's perceptions of traffic injury risks, prevention and enforcement measures:

A qualitative study. *Accident Analysis and Prevention*, *40*, 1313−1319.

Spanish Government's Delegation for the National Plan on Drugs. (2004). *Spanish survey on drug use in the school population*. Retrieved from http://www.pnsd.msc.es/Categoria2/observa/estudios/home.htm

Terza, J. V., Basu, A., & Rathouz, P. J. (2008). Two-stage residual inclusion estimation: Addressing endogeneity in health econometric modeling. *Journal of Health Economics*, *27*, 531−543.

Trogdon, J. G., Nonnemaker, J., & Pais, J. (2008). Peer effects in adolescent overweight. *Journal of Health Economics*, *27*, 1388−1399. doi: 10.1016/j.jhealeco.2008.05.003

Warner, K. E. (1978). Possible increases in under-reporting of cigarette consumption. *Journal of the American Statistical Association*, *73*, 314−318. doi: 10.2307/2286658

Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge, MA: MIT Press.

World Health Organization. (1995, December). *European charter on alcohol*. Presented at the European Conference on Health, Society and Alcohol, Paris, France. Retrieved from http://www.euro.who.int/_data/assets/pdf_file/0008/79406/EUR_ICP_ALDT_94_03_CN01.pdf?ua=1

World Health Organization. (2011). *Global status report on alcohol and health*. Retrieved from http://www.who.int/substance_abuse/publications/global_alcohol_report/msbgsruprofiles.pdf