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Preventing Underage Drinking: A Salvadoran Program Evaluation

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Preventing underage drinking:

A Salvadoran Program Evaluation.

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Executive Summary

      Through the direct effects on brain development, social choices, and changes in experiences, underage alcohol drinking is a problem that causes long term damage to psychological, social, and economic outcomes. While this is problematic for all underage drinkers, it is especially damaging for middle school students.

      In El Salvador, even though the legal drinking age is 18 years old, teenagers start drinking alcohol (mainly beer) when they are 13 years old, on average. In 2011 a Salvadoran nonprofit started implementing an underage drinking prevention program that targets students between 12 and 14 years old. The program is modeled after successful interventions in Mexico and in Latino communities in the U.S. The main goals of this program are: increasing the participants' knowledge about the consequences and risks of underage drinking, increasing their strategies and skills to make decisions and resist peer-pressure and reducing their alcohol consumption.

      In this study, I evaluate the success of this Salvadoran program to accomplishing the first two goals related to increasing participants' knowledge about the consequences and risks of underage drinking and to increasing their strategies and skills to make decisions and resist peer-pressure. I use a pre-post research design for years 2012 and 2013 to compare similar groups of students defined by age, gender, and school. The evaluation indicates that the program is successful in increasing students' knowledge of the potential problems related to underage drinking and in increasing their peer pressure resistance skills. Along with the evaluation, I also provide feedback and recommendations to the organization in charge of implementing the program, with regard to improving its results and impacts.

Introduction

Epidemiological data and results from studies investigating the social, health, and economic consequences of drinking by children and adolescents have suggested that underage drinking is a serious public health concern (Spoth et al., 2009). The US Department of Health and Human Services has found that alcohol is the drug of choice among youth, and underage drinking is prevalent in many different countries, including El Salvador.

Located in Central America, El Salvador has a land area of 21,040 km^2 and a population of 6.2 million, of which 1.3 million are between 10 and 19 years old[1].In El Salvador, the legal drinking age is 18 years old; however, according to the National Drug Commission (DNA), teenagers in that country begin drinking alcohol (mainly beer) when they are 13 years old, on average (DNA, 2011). In 2010, 32.5 percent of adolescents in schools had consumed alcohol. El Salvador does not have reliable statistics about the number of adolescents that have experienced the consequences of alcohol consumption, but according to different general studies and research, people who start drinking before age 15 are 4 times more likely to become alcohol dependent as adults than those who wait until 21 years of age (National Institute on Alcohol Abuse and Alcoholism, 2011).

Consequently, drinking at an early age increases the probability of becoming alcohol dependent and also is strongly correlated with violence, risky sexual behavior, poor school performance, suicide, and other harmful behaviors (Hingson and Kenkel, 2004). The negative consequences of underage alcohol consumption go beyond the individual because there are also externalities—costs imposed on the whole society, including lost lives, lost

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[1] El Salvador: "Population Census 2007: Statistics".

productivity, increased general and domestic violence and increased health care costs, among others.

Given the harmful impacts of alcohol consumption, it is important for the Salvadorian society to find the right mechanisms to prevent underage drinking and delay initiation of alcohol use. In recent years, a Salvadorian nonprofit has implemented an underage alcohol prevention program in different public schools around the country The main goal of this program is to delay alcohol consumption to 18 years of age- the legal drinking age. Programs like this can be part of the solution for preventing underage drinking; however, it is important to evaluate their strengths and weaknesses so that potential improvements can be made.

The purpose of this study is to evaluate how effective this Salvadoran program is in increasing students' knowledge about the consequences of drinking alcohol and in increasing their strategies and skills to make decisions and resist peer-pressure. Before presenting results of the evaluation, I review relevant literature. Next, I describe the research design, methodology, and results of the program evaluation. I discuss the results from the evaluation and address the limitations of the study. Lastly, I include recommendations that may be useful for the organization in charge of implementing this program.

Literature review

Underage drinking

Different studies and organizations have recognized that underage drinking can start at an early age and has consequences for youth, their families and society as a whole. The

U.S. National Institute of Alcohol Abuse and Alcoholism (NIAAA) recognize underage drinking as a disorder that affects teenagers. This disorder is especially problematic for teens because they often do not realize the damaging effects it can have on their own lives, their families, and their communities.

As children move from adolescence to young adulthood, they encounter dramatic physical, emotional, and lifestyle changes. According to the US Department of Health and Human Services, when kids experience developmental transitions, such as puberty, their independence increases and they want to try new things like alcoholic beverages. Therefore, just being an adolescent may be a key risk factor not only for starting to drink but also for drinking dangerously (i.e., binge drinking[2]).

The World Health Organization (WHO) has shown that people who consume alcoholic beverages in early adolescence have a higher probability of developing rapid alcohol dependence, and they have an increased likelihood of alcohol-related disorders in adulthood. For example, individuals who initiate drinking before 15 years of age are 4 times more likely to develop alcohol dependence as those who wait until 21 years of age. In fact, each additional year of delayed drinking reduce the likelihood of dependence by 14 percent (Grant BF, Dawson DA, 1997).

Underage drinking has several negative consequences for both the individual and society. In the case of the individual, heavy drinking may have significant long lasting effects on brain structure and function that adversely affect positive youth and young adult development (Tapert SF, Schweinsburg, 2006). As such, underage drinking is also associated with mental health problems, such as depression and suicidal ideation (NIAAA

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[2] **Binge drinking** or **heavy episodic drinking** refers to drinking alcoholic beverages with the primary intention of becoming intoxicated by heavy consumption of alcohol over a short period of time

1997; Windle 1992). Society-related problems include delinquency and violence, among others (Hingson et al. 2002; Spoth et al. 2006; Swartzwelder et al. 1995). Also, other studies show that adolescents who indulge in heavy drinking, especially binge drinking, are more likely to engage in risky behaviors, such as drinking and driving. (Grunbaum et al. 2002; Hingson and Kenkel 2004; Hingson et al. 2005).

Intervention and prevention programs

These problematic consequences of underage drinking are some of the main drivers for public health interventions like prevention programs. According to the US Department of Health and Human Services, intervention approaches typically fall into two distinct categories: environmental-level and individual-level interventions. Environmental approaches seek to decrease the opportunities for underage drinking and increase penalties for violating minimum legal drinking age and other alcohol use laws. On the other hand, individual interventions seek to increase the knowledge, expectancies, attitudes, intentions, motivation, and skills so that youth are better able to resist the drinking influences and opportunities that surround them. This is often achieved by providing more productive alternatives.

Individual-level interventions and, more specifically, school-based prevention programs are the focus of this evaluation. Pre-post self-report surveys are a primary data source to evaluate these individual-level programs, especially if the goal is to reduce consumption or alcohol-related problem behaviors. Student drinking surveys must meet several requirements to be considered scientifically valid. The questions themselves must be both valid and reliable, meaning that they must measure what is intended (validity), and that with a repeated administration students will provide the same answer to the same

question (reliability), except when the underlying condition changes (e.g. because of an intervention).

Evaluations of school-based interventions have found that these programs have improved over time, and they have the following elements in common: (1) they are guided by models which influence social habits and include setting rules; (2) they address social pressures to drink; and (3) they teach resistance skills. In addition, these programs offer interactive and developmentally appropriate information, including peer-led components, and provide teacher training (NIAAA, January 2006). However, for these programs to be effective they must have accomplished the following goals at a minimum: (1) reduce risk factors and consequences of binge drinking and other forms of underage alcohol abuse; (2) promote protective factors that delay initial use; and (3) reduce harmful adolescent drinking patterns and the likelihood of developing alcohol related problems during adulthood (Grant and Dawson 1997).

Researchers classify intervention into three categories: (1) universal interventions that target all members of certain population; (2) selective interventions that target specific population subgroups; and (3) indicated interventions that target specific individuals who have risk factors or conditions which identify them as being at risk for alcohol use (Spoth, Greenberg and Turrisi, 2009). Offord et al. (1998) discussed the key advantages of the three kinds of intervention programs and the tradeoffs among them. The assessment concludes that a universal intervention would likely be preferable over selective or indicated interventions if the problem addressed (underage drinking, for example) is highly prevalent and associated with high costs.

A variety of universal and selective school-based intervention programs have been developed. These programs include different components like life skills, peer refusal skills,

role playing to practice new skills, strengthening positive peer relationships, provision of accurate guidelines for alcohol, and other drug use. Some of these interventions have been shown to reduce significantly aggression and disruptive behavior in younger children, as well as delaying early initiation and progression of alcohol use in younger and older adolescents (Spoth, Greenberg and Turrisi, 2009).

The most promising universal and selective school-based interventions that might have an impact in reducing underage drinking are sub-classified according to the ages of target populations. These groups are divided into adolescents younger than 10 years old (group 1), between 10 and 15 years old (group 2), and 16 and 20 years old (group 3). Based on different evaluations, the most effective programs for group 1 are universal interventions that are implemented from 1st to 7th grades. Results from these interventions include reduction of physical child aggression, decreased growth of alcohol use and decreased heavy drinking (Eddy et al., 2000; Brown et al., 2005; Catalano et al., 2003: Hawkins et al., 1992). For group 2, the most promising are universal programs implemented from 6th to 8th grades, and the main result is to decrease alcohol use 19 months after program implementation (Hecht et al., 2003). Finally, for group 3, the most effective are selective- and indicated interventions. The main results of this interventions are reduced levels of alcohol use among baseline users at 1 year after the intervention and reduced numbers of drinks per month at 22 months follow-up (Sussman et al., 2002).

However, even the most effective school-based programs need improvements in order to increase their impact. In this sense, an effective evaluation can be extremely important because it has the potential to demonstrate whether the programs are accomplishing their goals or not. The use of pre- and post-surveys to evaluate programs can help to demonstrate a measurable difference in alcohol expectancy scores before and after

implementing an intervention. All of these evaluations strengthen the validity and reliability of results and estimate both the short-and long-term effects of the programs (Salazar et al., 2004).

Several types of interventions that can reduce alcohol use in adolescents have already been developed, and these promote protective factors and develop resistance skills. In part, these developments have been a result of substantial methodological improvements in study design and analysis, such as the increased evaluation of interventions. Therefore, to increase the probability of achieving greater public health impact, it is essential to keep evaluating all of these interventions, sharing the results, and providing meaningful feedback and recommendations to those who are in charge of implementing them.

Research Design

Problem statement

In El Salvador, teenagers who participate in underage drinking (mainly beer) do so when they are 13 years old, on average. In order to overcome this social problem, school-based intervention programs have been developed with the purpose of increasing the knowledge of the participants about the consequences of underage drinking. These programs place an emphasis on increasing life skills, peer refusal skills and roleplaying to practice new skills, among others.

In El Salvador, GWI[3] has been implementing the school-based prevention program "Keeping it REAL" since 2011. This program lasts for four weeks, targets students between 12 and 14 years old and is based on an intervention that has been proven to be successful in Mexico and in Latino communities in the U.S. Its creators say that it allows the

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[3] GWI stands for the name of the Salvadorian nonprofit. For confidentiality the full name is not provided in this paper.

participants to recognize themselves in the prevention message, and also increases their knowledge about the consequences of drinking at an early age, and teaches them habits of everyday life and positive communication. The curriculum is designed to help adolescents accomplish the following goals: (a) increasing their knowledge about the consequences and risks associated with underage consumption of alcohol, (b) increasing their strategies and skills to make decisions and resist peer-pressure to drink, (c) changing their beliefs, norms and attitudes towards drinking alcohol, and (d) reducing underage alcohol consumption.

As previous literature suggests, an effective evaluation of underage drinking prevention programs is important because it can demonstrate whether these are having a measurable impact. Therefore the primary purpose of this paper is to assess if GWI's program accomplished the goals related to increasing students' knowledge about the consequences and risks associated with underage consumption and increasing students' strategies and skills to make decisions and resist peer-pressure. The research questions are:

- Does the GWI program increase the knowledge of the participants about the consequences and risks of underage drinking? (Evaluated in 2012 and 2013)

- Does the GWI program have an effect on the ability of the participants to resist peer pressure to drink? (Evaluated in 2013)

Methodology

I use a pretest posttest (single group) quasi-experimental design to evaluate the results of the program. In this technique, the same groups of individuals are compared at different times, before and after the intervention. The statistical approach to test the change between pre- and post-results is ordinary least squares estimation of a multiple linear regression. GWI's staff provided the relevant data for this study on pre- and post- surveys

and, since they started collecting formal data in 2012, it corresponds to two years of operations (2012-2013). The database contains individual level data of all the participants of the program which are 1,036 students of 4 urban schools for 2012 and 585 additional students of 2 additional urban schools for 2013.

Researchers have shown that students report their behaviors more accurately when anonymity is assured (Williams, Eng, Botvin, Hill & Ernst, 1979). As such, the pre-post surveys of this evaluation are anonymous, which increases their validity.

Individual students are not identified and not matched to their own answers pre-treatment and post-treatment, however, all students provide information of their age, gender, and school attended. In El Salvador, students rarely change schools over the short period considered here (4 weeks). Therefore, in order to compare the increase in knowledge about the consequences and risks of underage drinking and the increase in peer pressure resistance skills to drink alcohol, before and after the program, I employ a collapsed cell technique using the combination of age (mainly 12 to 16 years, with a few below and above that) by gender and by school to define cells with the associated count of number of students in each cell. This means, for example, that the cell that categorizes the group of 15 year old females from school one compares their pre-post results. This procedure is repeated for all the cells and the different categories. Thus, rather than comparing each student pre-post, a fixed set of students is compared pre-post. If the people in the cells pre- and post-treatment were not the same, their comparability could be questioned. In this case, however, they are essential the same students.

Larger cells provide more precise pre-post comparisons, so they are weighted to reflect that. The cell collapse technique used here is similar to that used by the U.S. Census to estimate missing values, using many variables to create relatively specific cells (such as single women of an age range in a region and an occupation). In the present work, however, the cells are used to compare pre- and post-measures, not to predict missing values. This technique increase the validity of the estimates as the students are matched almost exactly in many groups, even though individual students are not matched with their own answers.

Therefore, the data are organized into cells with essentially the same students' pre- and post-, and everybody is treated so all of the students of the cell (e.g. 15 year old females in school one) are treated. This permits results to be estimated more efficiently than just comparing the overall mean. In fact, given the variability across cells, the treatment effect would be difficult to detect in the overall mean.

Variables and measurement

Multiple fixed effects regressions are performed and the dependent variables are the test scores of each question, while the explanatory variables include dummy variables for age, female, school and a dummy variable equal to 0 pre-treatment and 1 post-treatment. The regression is estimated for the test scores of each of the questions of the survey related to knowledge about the consequences and risks of underage drinking (Table 1), and for the questions related to the ability of the participants to resist peer pressure (Table 2). The 2012 survey instrument is different from the 2013, but the goals of the program are the same and similar factors are measured. Therefore, the same regression model is used to evaluate the

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results of the two years. However, the ability of the participants to resist peer pressure is only measured in 2013; therefore results related to this are available only for that year.

It is important to clarify that the answers of the questions can go in different directions. For example, when respondents are asked whether they agree or disagree on "alcohol beverages are stimulants" the correct answer is to disagree, because this reflects that the participant knows about the effects of alcohol. Conversely, when they are asked whether they agree or disagree on "alcohol affects coordination", the correct answer is to agree. Thus, the questions avoid response sets, but the answers are rescaled in order to measure the increase in knowledge and peer-pressure resistance of the participants, such that, a higher score will reflect more knowledge and more resistance to peer-pressure situations.

Table 1: Knowledge of consequences and risks variables considered.

Pre-Post Consequences and Risks Knowledge Questions	Type	Measurement	Year
Alcohol consumption before being 18 years old can cause severe damage to my physical and mental health.	Dummy	0=False, 1=True	2012
Drinking alcohol before 15 years old increases the probability that I develop a serious problem in my life as an adult.	Dummy	0=False, 1=True	2012
Alcohol beverages are stimulants.	Dummy	0=True, 1=False	2012
A person under the influence of alcohol thinks, speaks and walks slowly.	Dummy	0=False, 1=True	2012
Drinking alcohol for a long period of time can affect self-control and the ability to make decisions	Dummy	0=False, 1=True	2012
Drinking alcohol in moderation is healthy for me.	Dummy	0=True, 1=False	2013
Drinking alcohol is more harmful to me than an adult.	Dummy	0=False, 1=True	2013
Alcohol affects coordination	Dummy	0=False, 1=True	2013
Alcohol affects ability to decide	Dummy	0=False, 1=True	2013
Alcohol affects brain and body	Dummy	0=False, 1=True	2013
Drinking alcohol, at least once in a while, is dangerous for me.	Dummy	0=False, 1=True	2013

Table 2: Peer-pressure resistance variables considered.

Pre-Post Peer-Pressure Resistance Questions	Type	Measurement	Year
If my friends drink I also want to drink.	Dummy	0=True, 1=False	2013
I say no when my friends pressure me to drink alcohol.	Dummy	0=False, 1=True	2013
When my family offers me beer or other alcoholic beverage, saying no is…	Categorical	0=Difficult 1=Easy, 2= Extremely easy	2013

The regressions control for age, gender and school in order to obtain the post-treatment coefficient and estimate whether the program has an effect or not. In 2013, grade level is included in the survey, so it will be used as an additional controlling variable. Also, in 2013 there are 16 participants that do not provide information about their gender, so a dummy variable is included to control for it. After controlling for these variables, if the estimated effect of the post-treatment is positive and significant it implies that there is statistical evidence that the program has a significant effect as intended.   In both years, the cell size becomes a weight giving more effect to larger groups, such as 15 year old females in a large school.

The model for 2012 is specified as:

$$KnowledgeScore_i = \beta_o + \beta_1 Age_i + \beta_2 Female_i + \beta_3 School_i + \beta_4 Post\text{-}treatment_i + \varepsilon_i$$

The models for 2013 are specified as:

$$KnowledgeScore_i = \beta_o + \beta_1 Age_i + \beta_2 Female_i + \beta_3 Gender\text{-}Missing_i + \beta_3 School_i + \beta_5 Grade\text{-}Level_i$$

$$+ \beta_6 Post\text{-}treatment_i + \varepsilon_i$$

$$Peer\text{-}PressureScore_i = \beta_o + \beta_1 Age_i + \beta_2 Female_i + \beta_3 Gender\text{-}Missing_i + \beta_3 School_i + \beta_5 Grade\text{-}Level_i$$

$$+ \beta_6 Post\text{-}treatment_i + \varepsilon_i$$

Where the dependent variables are the scores for the variables related to knowledge of the consequences and risks of underage drinking, either pre- or post-treatment, and to the peer-pressure resistance variables. The β's represent coefficients of the estimates for the following dummy variables included in the model: age, female, gender-missing, school and grade levels. These dummy variables control for fixed effects of the program's participants. The coefficient of the post-treatment dummy estimates the program's treatment effect, and ε denotes the random error in the model.

General Hypothesis

I predict that the coefficient of the post treatment dummy will be positive and significant for all of the questions, which is the intended result of the intervention.

Results

Descriptive Context

The pre-post surveys used in 2012 and 2013 differ in some questions. Therefore, although the main goals of the survey instruments are the same for both years, there are some differences in the descriptive statistics, so the results in this section are presented by year.

Descriptive results 2012

During 2012, a total of 1,036 students from four schools participated in the program. All participants answered the surveys at the beginning of the workshops, but only 845 students completed the surveys at the end, resulting in 18 percent participant attrition during this year. However, the characteristics of the distribution of the population remained the same by the end of the 2012 program. In this sense, during 2012 the dataset shows that

52 percent of the participants are male and 48 percent are female. In terms of age, 85 percent, of the participants are between 12 and 15 years old and the remaining 15 percent are between 16 and 18 years old.

In order to make a diagnostic of the previous alcohol consumption behavior of the participants, at the beginning of the program they are asked if they had ever tried an alcoholic beverage in the past. In their responses, 49 percent said yes and 51 percent answered no. Out of the 49 percent that said yes: 81 percent are between 12 and 15 years old, 53 percent are males and 47 percent are females. This question is not included in the regression because whether a student ever drank is by definition endogenous to the knowledge of the consequences and risk. So, it could be a dependent variable, but could not be an explanatory variable. This is not primarily a study of drinking, but of the knowledge of the effects of drinking and peer resistance skills.

At the end of the program, the participants are asked if after attending to it, they would refuse drinking an alcoholic beverage. Only 80 percent of them answered this question, and out of these 96 percent said that they would refuse an alcoholic beverage, but there was still 4 percent that said that they would accept an alcoholic beverage. This represents good evidence that the answers are a truthful measure of students' likely behavior, as 100 percent would not be credible.

Descriptive results 2013

In 2013 the program had 585 additional participants from two additional schools. Just as in 2012 all of the participants answered the pretest instruments at the beginning of the program and 575 completed the post-test tools at the end, so in 2013 there is a 2 percent

attrition. In this year the dataset shows that 51percent of the participants are female and 49 percent are male, which differs from 2012 where the majority of the participants are male. Another important characteristic of the 2013 group is that the majority, 91 percent, of the participants are between 12 and 15 years old and the remaining 9 percent are between 16 and 19 years old.

A diagnosis of the previous alcohol consumption behavior of the participants is also made during 2013, so at the beginning of the program they are asked if they have ever tried an alcoholic beverage in the past. Results show that 48 percent said yes and 52 percent said no. Out of the 48 percent that said yes: 86 percent are between 12 and 15 years old, 54 percent are males and 46 percent are females. As in 2012, this question is not included as an explanatory variable because is endogenous to the knowledge of the consequences and risk.

The post-test question related to the decision of refusing an alcoholic beverage after participating in the program was not asked in 2013. In future, greater consistency of questions is an important goal to improve the research.

Regression Analysis

For the regression analysis the three equations described in the *Variables and Measurement* section are used. Regressions analyze each of the questions. The dependent variables of each regression measured as test scores related to each of the knowledge of consequences and risks and peer-pressure resistance questions. The explanatory variables for both years are dummy variables for age, female, school and a dummy variable equal to 0 pre-treatment and 1 post-treatment. In 2013, dummy variables for grade levels and gender

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missing are included in the regression model as well. An alpha level of 0.05 is used for all

statistical tests and the results are presented by year in the following sections.

Results 2012

The regression analysis for 2012 is based on 5 questions related to knowledge of the

consequences and risks of underage drinking. The results are summarized in Table 3.

Table 3

Knowledge of the consequences and risks of underage drinking

Explanatory Variable	Dependent Variable (Test scores)	1. Underage drinking can cause severe damages to my physical and mental health. R^2= 0.3193	2. Drinking alcohol before 15 years old increases the probability of developing a serious problem as an adult. R^2= 0.2141	3. Alcohol beverages are stimulants. R^2= 0.7691	4. A person under the influence of alcohol thinks, speaks and walks slowly. R^2=0.5076	5. Drinking alcohol for a long period of time can affect self-control and the ability to make decisions R^2= 0.1952
Age	Coefficient	-0.0042**	-0.0052	-0.0266**	0.005	0.0052
	(Std. Error)	(0.0016)	(0.0027)	(0.0044)	(0.0029)	(0.0036)
	t-value	-2.53	-1.94	-6.04	1.87	-1.47
Female	Coefficient	-0.0109	0.01188**	-0.0508**	-0.0314**	0.0032
	(Std. Error)	(0.0021)	(0.0035)	(0.0055)	(0.0044)	(0.0042)
	t-value	-5.14	3.39	-9.20	-7.15	-0.75
School 2	Coefficient	0.0071**	-0.0265**	0.0096	0.0771**	-0.0536**
	(Std. Error)	(0.0029)	(0.0076)	(0.0088)	(0.0061)	(0.0068)
	t-value	2.48	-3.46	1.09	12.69	-7.78
School 3	Coefficient	-0.0191**	0.0578**	0.0330**	0.0577**	0.0051
	(Std. Error)	(0.0031)	(0.0032)	(0.0067)	(0.0055)	(0.0050)
	t-value	-6.04	18.29	4.88	10.48	1.02
School 4	Coefficient	0.0159**	0.0095**	-0.0213**	0.0503**	-0.0045
	(Std. Error)	(0.0023)	(0.0038)	(0.0079)	(0.0068)	(0.0060)
	t-value	6.70	2.47	-2.70	7.37	-0.74
Post treatment	Coefficient	0.0578**	0.0468**	0.4215**	0.1795**	0.0816**
	(Std. Error)	(0.0019)	(0.0030)	(0.0059)	(0.0041)	(0.0041)
	t-value	29.77	15.42	72.05	43.26	19.85
n = 1,036 students Number of cells = 107						

All the coefficients are interpreted as unit changes in mean test scores.
t>1.96, significant at 95% confidence level

Age Differences

There are statistically significant differences related to age in two of the five

questions. In these two questions age has a negative effect on knowledge about the

consequences of underage drinking; for example, as age increases, the participants test

score decreases when they are asked whether they agree or disagree with "underage

drinking can cause severe damages to my physical and mental health."; similarly when respondents are asked if they agree or disagree with "alcohol beverages are stimulants", the test score decreases as age increases.

For the three remaining questions age does not have statistically significant effects on test scores. Therefore, based on the statistically significant questions, older students are more resistant to the knowledge of effects of alcohol.

Male/Female Differences

Table 3 shows that there are differences between females and males in four of the five knowledge questions. For example, when participants are asked whether they agree or disagree on "drinking alcohol before 15 years old increases the probability of developing a serious problem in their adult lives", females have a positive effect (more knowledge) on test scores compared to males. However, when respondents are asked if "alcohol beverages are stimulants", females have a negative effect (less knowledge) on test scores compared to males. Similarly when participants are asked whether they agree or disagree on "a person under the influence of alcohol, thinks, speaks and walks slowly", females also have a negative effect on test scores compared to males. In most of the statistically significant questions, females have a negative effect on knowledge.

School Differences

Students from four schools participated in the program during 2012 and the results presented in Table 3 show that there are statistically significant differences between schools for all the questions. However, there is not one pattern for this, as a school can be higher on one question and lower on another. It would be difficult to explain precisely why schools

differ in this way, but local culture and misinformation can lead to such differences, however that explanation is beyond the scope of this research.

All of the five questions have statistically significant differences between all of the schools, for example when respondents are asked whether they agree or disagree with the following statements: "underage drinking can cause severe damage to my physical and mental health" (question 1) and "a person under the influence of alcohol thinks, speaks and walks slowly" (question 4), schools two and four have a positive effect on test scores compared to school one. School three has a negative effect on test scores compared to school one in question one, but a positive effect in question four.

For two of the other remaining questions, when participants are asked if they agree or disagree on "drinking alcohol before 15 years old increases the probability of developing a serious problem as an adult", school three and school four have positive effects (more knowledge) on test scores compared to school one; when respondents are asked whether they agree or disagree with "drinking alcohol for a long period of time can affect self-control and decide", school two has a negative effect on test scores compared to school one. And finally when participants are asked if alcoholic beverages are stimulants, school three has a positive effect compared to school one, but school four has a negative effect.

Post treatment (Post-Program) results

The purpose of the intervention is to increase the scores by increasing the knowledge of the students. This is evaluated by controlling for other factors, previously described, and estimating the effect of the training. The results show statistically significant and positive effects, increasing knowledge as intended, for all five questions.

The largest effect is estimated for the question of whether alcohol is a stimulant. The percentage increases are approximately 6 percent for question one, 5 percent for question two, 71 percent for question three (alcohol is a stimulant), 22 percent for question four and 9 percent for question five. These percentages are calculated comparing the increase of the post treatment coefficients with the average test scores, as shown in table 4. Note that the estimation used matched groups of students, so that the results here should be relatively free of any composition effects in the sampling, i.e. the same groups of students are compared. Thus, the results support the claim that the training increased the knowledge of the students during 2012.

Table 4

	1. Underage drinking can cause severe damages to my physical and mental health.	2. Drinking alcohol before 15 years old increases the probability of developing a serious problem as an adult.	3. Alcohol beverages are stimulants.	4. A person under the influence of alcohol thinks, speaks and walks slowly.	5. Drinking alcohol for a long period of time can affect self-control and the ability to make decision.
Average test score	0.9650	0.9389	0.5953	0.8107	0.8860
Post treatment coefficient	0.0578	0.0468	0.4215	0.1795	0.0816
Post treatment % increase	6%	5%	71%	22%	9%

Results 2013

The regression analysis for 2013 is based on six questions related to knowledge of the consequences and risks of underage drinking, and on three questions related to developing peer-pressure resistance skills. A dummy variable to control for the missing data on gender is included in these regressions.

Results of knowledge of alcohol consequences and risks

The results of the six questions related to this section are summarized in Table 5.

Table 5
Knowledge of the consequences and risks of underage drinking

Explanatory Variable	Dependent Variable (Test scores)	1. Drinking alcohol in moderation is healthy for me. $R^2=0.1100$	2. Drinking alcohol is more harmful to me than an adult. $R^2= 0.2607$	3. Alcohol affects coordination $R^2= 0.3369$	4. Alcohol affects ability to decide $R^2= 0.3389$	5. Alcohol affects brain and body $R^2=0.1082$	6. Drinking alcohol, at least once in a while, is dangerous for me. $R^2=0.0722$
Age	Coefficient	-0.0036	-0.0263**	-0.0466**	-0.0563**	-0.0476**	-0.0035
	(Std. Error)	(0.0071)	(0.0082)	(0.0094)	(0.0089)	(0.0084)	(0.0078)
	t-value	-0.55	-3.20	-4.92	-6.33	-5.64	-0.45
Female	Coefficient	0.0575**	-0.1275**	-0.0147	0.0282**	0.01021	-0.0421**
	(Std. Error)	(0.0870)	(0.0090)	(0.0132)	(0.0113)	(0.0101)	(0.0093)
	t-value	6.62	-14.09	-1.11	2.48	1.01	-4.50
Gender Missing	Coefficient	-0.0733	-0.0927	0.01361	0.0575	-0.0464	-0.0348
	(Std. Error)	(0.0698)	(0.0593)	(0.0829)	(0.0839)	(0.0638)	(0.0604)
	t-value	-1.05	-1.56	0.16	0.69	-0.73	-0.58
School 2	Coefficient	-0.0065	-0.0185	0.0001	0.0315**	0.0384**	0.0109
	(Std. Error)	(0.0117)	(0.0108)	(0.0166)	(0.0149)	(0.0123)	(0.0115)
	t-value	-0.56	-1.70	0.01	2.11	3.07	0.95
7th grade	Coefficient	-0.0781**	0.0578**	0.0915**	0.1607**	0.0712**	0.0437**
	(Std. Error)	(0.0141)	(0.0157)	(0.0230)	(0.0185)	(0.0165)	(0.0157)
	t-value	-4.51	3.69	3.98	8.69	4.32	2.79
8th grade	Coefficient	-0.0404**	-0.0455**	0.1461**	0.1505**	0.0799**	-0.0328**
	(Std. Error)	(0.0151)	(0.0190)	(0.0235)	(0.0210)	(0.0179)	(0.0189)
	t-value	-2.66	-2.39	6.21	7.16	4.47	-1.73
Post treatment	Coefficient	0.0557**	-0.0168**	0.2936**	0.2396**	0.0266**	0.0411**
	(Std. Error)	(0.0086)	(0.0086)	(0.0130)	(0.0116)	(0.0097)	(0.0094)
	t-value	6.48	-1.95	22.58	20.39	2.74	4.39
n = 585 students Number of cells = 142							

All the coefficients are interpreted as unit changes in mean test scores.
$**t>1.96$, significant at 95% confidence level.

Age Differences

There are statistically significant differences related to age in four of the six questions. In these four questions age has a negative effect on knowledge; for example, as age increases, the participants test score decreases when they are asked whether they agree or disagree with "drinking alcohol is more harmful to me as an adult". Similarly, when respondents are asked if they agree or disagree with "alcohol affects ability to decide", and "alcohol affects brain and body", the test score decreases as participants' age increases. Therefore, based on the statistically significant questions, older students are more resistant to the knowledge of effects of alcohol.

Male/Female Differences

Table 5 shows that there are differences between females and males in four of the six knowledge questions. In two of these four questions, females have a positive effect (more knowledge) on test scores compared to males, for example when participants are asked whether they agree or disagree on "drinking alcohol in moderation is healthy for me", and when they are asked if "alcohol affects brain or body". On the other hand, when respondents are asked if "drinking alcohol is more harmful to me than an adult" and if "alcohol affects coordination", females have a negative effect on test scores (less knowledge) compared to males. For the two remaining questions, females are not statistically significantly different from males.

The dummy variable "gender missing" shows that, in all of the questions, the missing data related to gender is not statistically significant and does not affect the results.

School Differences

The results between schools statistically significantly differ in only two of the questions. As it is shown in table 5, school two has a positive effect on participants' knowledge in the questions related to how alcohol affects the ability to decide, and how it affects brain and body. There are no significantly differences between schools in the other four remaining questions.

The grade levels that participated in the program during 2013 were 6th, 7th and 8th grade. The results presented in table 5 show that there are statistically significant differences between grade levels in all of the questions.

Seventh graders have a positive effect on test scores compared to sixth graders, in five of the six questions. When participants are asked whether they agree or disagree on "drinking alcohol is more harmful to me as an adult'', "alcohol affects coordination and ability to decide", "alcohol affects brain and body" and "drinking alcohol, at least once in a while, is dangerous for me", seventh graders have a positive effect (more knowledge) on test scores compared to sixth graders. On the other hand, the only question in which they show a negative effect (less knowledge) on test scores is when they are asked to agree or disagree with "drinking alcohol in moderation is healthy for me"

Eight graders have a positive effect on test scores, compared to sixth graders, in questions related to the fact that alcohol affects coordination, ability to decide and brain and body; but eight graders have a negative effect on test scores compared to sixth graders in questions related to drinking in moderation and to the harmful, and not healthy and dangerous consequences of alcohol.

These grade effects vary, and it is unclear why particular patterns emerge, but for purposes of evaluating the training, it is important to control for peer effects like this.

Post treatment (Post-Program) results

As in 2012, the purpose of the intervention in 2013 is to increase the scores by increasing the knowledge of the students. This is evaluated by controlling for other factors, previously described, and estimating the effect of the training. The results for this year also show statistically significant and positive effects, increasing knowledge as intended, for five of the six questions. The only question that has a negative post treatment, and not significant, effect on test scores is question two, "drinking alcohol is more harmful for me than an adult". The largest positive effects are estimated for the questions alcohol affects coordination and ability to decide. The percentage increases are approximately 7 percent for question one, 76 percent for questions three and four (alcohol affects coordination and ability to decide), 3 percent for question five (alcohol affects brain and body), and 5 percent for question six. The percentage decrease for question two is 2 percent, but is not statistically significant. These percentages are calculated comparing the increase of the post treatment coefficients with the average test scores, as shown in table 6. Therefore, the results of these questions support the claim that, during 2013, the training increased the general knowledge related to the consequences of alcohol and how dangerous and harmful drinking is, but not to the knowledge related to drinking alcohol is more harmful to the participants (underage students) than adults.

Table 6

	1. Drinking alcohol in moderation is healthy for me.	2. Drinking alcohol is more harmful to me than an adult.	3. Alcohol affects coordination	4. Alcohol affects ability to decide	5. Alcohol affects brain and body	6. Drinking alcohol, at least once in a while, is dangerous for me.
Average test score	0.7856	0.7726	0.3881	0.3186	0.8357	0.7836
Post treatment coefficient	0.0557	-0.0168	0.2936	0.2407	0.0266	0.0411
Post treatment % increase	7%	-2%	76%	76%	3%	5%

Results of peer-pressure resistance measurements

The results of the three questions related to this section are summarized in Table 7.

Table 7
Peer-pressure resistance skills

Explanatory Variable	Dependent Variable (Test scores)	1. If my friends drink I also want to drink. $R^2=0.0423$	2. I say no when my friends pressure me to drink alcohol. $R^2=0.0933$	3. When my family offers me beer or other alcoholic beverage, saying no. $R^2=0.0528$
Age	Coefficient	-0.0547**	-0.0270**	-0.01054
	(Std. Error)	(0.0081)	(0.0099)	(0.0136)
	t-value	-6.73	-2.71	-0.77
Female	Coefficient	-0.0217**	-0.0354**	-0.0281
	(Std. Error)	(0.0093)	(0.0110)	(0.0162)
	t-value	-2.33	-3.20	-1.74
Gender Missing	Coefficient	0.1067**	0.03858	0.435
	(Std. Error)	(0.0513)	(0.0740)	(0.1269)
	t-value	2.08	-0.52	-0.34
School 2	Coefficient	0.0613**	-0.0245	-0.0051
	(Std. Error)	(0.0126)	(0.01307)	(0.0184)
	t-value	-4.85	-1.87	-0.28
7th grade	Coefficient	-0.0044	0.0565**	-0.1269**
	(Std. Error)	(0.0176)	(0.0195)	(0.0289)
	t-value	-0.26	2.89	-4.39
8th grade	Coefficient	-0.0695**	0.0067	-0.0037
	(Std. Error)	(0.0189)	(0.0225)	(0.0331)
	t-value	3.67	0.3	0.11
Post treatment	Coefficient	0.0242**	0.0778**	0.0599**
	(Std. Error)	(0.0091)	(0.0109)	(0.0155)
	t-value	2.66	7.15	3.85
n= 585 students Number of cells = 142				

All the coefficients are interpreted as unit changes in mean test scores.
$t>1.96$, significant at 95% confidence level

Age Differences

When evaluating peer-pressure resistance skills, age differences are statistically significant in two of the three questions. As age increases there is a negative effect on test score of participants related to whether they would want to drink or not if their friends want to drink and to whether they would say no to friends if they offer an alcoholic beverage. Older students are less resistant to peer-pressure when it comes to alcohol consumption. There are not statistically significant differences related to age for the question related to refusing an alcoholic beverage if family offers it.

Male/Female Differences

Results presented in table 7 show that females have a negative effect (less peer resistance skills) on test scores in two of the three questions. Therefore, females find it harder to resist the urge to consume alcohol if their friends are drinking, and it is also harder to refuse an alcoholic beverage if it is offered by friends. These are important differences between females and males.

The dummy variable "gender missing" shows that, in two of the three questions, the missing data related to gender is not statistically significant and does not affect the results. However, this missing data is having a positive effect on the differences between females and males in the results related to the urge of drinking if friends are drinking too. Overall, the missing gender variable is correlated with only one of nine outcomes, which could be sampling error.

School Differences

There are statistically significant differences between schools one and two in just one of the three questions, so when participants are asked whether they would want to drink if their friends want to drink, school two has a positive effect (more peer-pressure resistance) on test scores compared to school one. For the two remaining questions, schools do not significantly differ from each other.

Grade-Level differences

Students from 6th, 7th to 8th grade participated in the program during 2013. The results presented in table 7 show that there are statistically significant differences between grade levels.

The results show that seventh graders have positive effect on test scores (more peer pressure resistance skills) compared to sixth graders when friends offer them alcohol. On the other hand, seventh graders have more difficulty in saying no to family (less peer pressure resistance skills) if they offer them an alcoholic beverage.

The results for eight graders are different in the case of friends peer pressure, because eight graders have a negative effect (less peer-pressure resistance) on test scores compared to sixth graders when they are asked if they would want to drink an alcoholic beverage if their friends want to drink it too. The differences between sixth graders and eight graders are not statistically significant for the questions related to whether they would refuse and alcoholic beverage if friends or family offers it.

Post treatment (Post-Program) results

In the case of peer-pressure resistance, the purpose of the intervention in 2013 is to increase participants' resistance of drinking alcohol when subjected to peer-pressure situations. This is estimated by controlling for other factors, previously described, and estimating the effect of the training. The results in 2013 show statistically significant and positive effects, increasing peer-pressure resistance of the participants as intended, for all three questions. The percentage increases are approximately 3 percent for question one, 11 percent for question two and 7 percent for question three. These percentages are calculated

comparing the increase of the post treatment coefficients with the average test scores, as it is shown in table 8. Although these results are modest, they are positive and support the claim that the training increased the peer-pressure resistance of the students during 2013.

<div align="center">

Table 8

	1. If my friends drink I also want to drink.	2. I say no when my friends pressure me to drink alcohol.	3. When my family offers me beer or other alcoholic beverage, saying no.
Average test score	0.7876	0.7062	0.9064
Post treatment coefficient	0.0242	0.0778	0.0599
Post treatment % increase	3%	11%	7%

</div>

General Discussion

The results when comparing participants' age follow a consistent pattern in all of the statistically significant questions, because as they get older there is a negative effect in the knowledge about consequences and risks of underage drinking and in their peer pressure resistance skills. On the other hand when comparing participants' gender, school and grade level the pattern is not consistent, for example, females' knowledge levels are positive sometimes and other times negative compared to males, but their peer pressure resistance skills are lower than males in all of the statistically significant questions.

When comparing differences between schools the evaluation shows that there are significant differences in both directions for all the questions related to knowledge in 2012, but only positive effects (more knowledge) in two of the questions of 2013. Schools also differ in the question related to peer pressure resistance skills and the results in 2013 show that the students from school two have, on average, more peer resistance skills, when they friends want to drink, than students from school one.

The final set of control variables are grade levels (only included in 2013), and the results show that there are differences between the three grade levels that participated in the program during 2013. However, the results are mixed and there is no consistent pattern when comparing grade levels in terms of evaluating the participants' knowledge of alcohol consequences and risks and their peer pressure resistance skills.

The main objective of this research is to evaluate the effects of the program. For both years, the evaluation shows consistent positive results. The program had positive results in 2012 and 2013, in all but one of post treatment coefficients of the questions related to knowledge of alcohol consequences and risks and related to peer-pressure resistance skills of the participants. Note that even if the training always increased knowledge, on average, sampling error would be likely to produce an occasional result in the opposite direction. In this sense, while it is encouraging that the training increased most of the relevant post program measures, the real test is whether students change their behavior, which is not in this data set and has to be included in future follow-ups. However, increasing the knowledge and peer pressure skills of the participants, two of the main goals of the program, successfully increased.

All the regressions are statistically significant, but the R^2 values, power of the robust regression models, presented for both years are not high. However, since what is measured are teenagers' attitudes and knowledge towards drinking alcohol beverages, the R^2 values are not expected to be high, as they are not in general when evaluating students' outcomes (absent fixed effects, which require exact matching of people) and they do not need to be high to evaluate the program. The salient feature is the estimated coefficients of the treatment effect, and almost all of these are positive and statistically significant.

Limitations

The main limitation of this study is working with the data that has already been collected. One of the consequences of this is that some of the questions are asked in the pre-treatment surveys, but not in the post- treatment, therefore these could not be included in the analysis. Similarly, the instrument changed between 2012 and 2013 and some of the questions that are asked in 2012 are not asked in 2013, so direct comparisons between the questions of those years could not be done either. In terms of external validity, the results of this evaluation can be applied directly to similar underage drinking prevention programs implemented in public schools in countries similar to El Salvador, so there is a limitation in terms of generalizability of the results.

Additionally, the program has only been implemented for three years, and the data available is just for two years. This limits the ability to judge the reliability, which is just variability over measures, and internal validity of the results, because short term success is not a guarantee of long term change in treatment effect models, so these results may not be internally valid for longer future years. If the program could be evaluated for more periods, the validity and reliability of the results would increase because the sample size would increase and longer term results could be estimated.

Recommendations

Using a pre-post research design, comparing similar groups of students defined by age, sex, school, grade level and a variety of measures of knowledge of the effects of alcohol and peer pressure resistance skills, this research shows that the GWI program is successful and has positive results for the students. This is a vital piece of an overall strategy to measure and reduce underage drinking in El Salvador.

Greater consistency of questions would improve the future research. Therefore, in order to continue evaluating the program and increasing the reliability of the results, the surveys implemented before and after the training should be the same and follow the same pattern over the years. Also, the pre-post evaluations should include the following procedures: direct measurement of the participants' drinking behavior; measures of alternative activities and outcomes, such as educational attainment and participation in gangs (one hopes to reduce), sports or some other after school activity (one hopes to increase). The combination of these additional measures along with the increase in the consistency of the questions, will improve the effort to evaluate the program.

Finally, to measure the goals of the program directly related to changing the students' beliefs, norms and attitudes towards drinking alcohol, and reducing consumption of alcohol by children younger than 18 years old, longer follow-up of the participants should also be added to the program. Widely disseminated school based programs implemented in the U.S., assess and follow-up the participants before and after the intervention and then for the next 4 years through 10th grade. These kinds of assessments

would provide GWI information about how the program affected the participants' alcohol consumption in the long term.

While this research is conducted early in the process, the program shows success in achieving its goals in that the students learned more about the effects of alcohol and increased their peer pressure resistance skills. Consequently, with continued research and some program improvements, GWI's underage prevention drinking program has the potential to have a bigger impact and better results in the schools and communities where it is implemented.

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