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LESSONS FROM PARTICIPATION IN A WEB-BASED SUBSTANCE USE PREVENTIVE PROGRAM IN URUGUAY

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Lessons from participation in a web-based substance use preventive program in Uruguay

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Abstract

We analyzed individual and program characteristics associated with participation in an ICT-based substance use preventive intervention in Uruguay, South America. The intervention was directed at nine- and ten-grade students in ten private schools in Montevideo. Participation in the program was non-mandatory and effective participation rates were low. We found that individual characteristics, such as prior heavy engagement with alcohol and opportunity costs of time, were associated with the decision to participate. We also found that sending the participants periodic reminders via email and SMS text messages had a positive impact in participation. The lessons from this intervention suggest that participation in non mandatory web-based programs aimed at preventing substance use among adolescents could be substantially improved with a more structured, mandatory, and longer intervention.

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1. Introduction

Uruguay is one of a few countries providing free laptops to each child aged 7 to 14 in the public education system. This widespread availability of computers has created a strong incentive for the development of educational software to be used in the classroom. In addition, Information and Communication Technologies (ICT) provide a cost-effective platform for the implementation of extracurricular interventions, such as programs aimed at the prevention of substance misuse among adolescents.

This article describes the determinants of participation in a web-based intervention designed to provide students of ten private schools in Uruguay with information about the risks and consequences of substance use. The intervention received support from schools, but participation from students was not mandatory.

In an analysis of 75 computer-delivered interventions for health promotion, Portnoy et al. (2008) find that these can improve health-related knowledge and attitudes, and can modify some health related behaviors, at least in the short term.

The effectiveness of any ICT-based preventive intervention is closely linked to the program's ability to attract participants. Some programs mandate participation as part of the school curriculum or as part of entry requirements to the school or college. Such was the case of "Head On," a program included in the public school curriculum and designed to deliver drug abuse prevention tools to youth in grades 6-8 in the state of Vermont, USA via computer-based educational technologies. The program promoted learning of information and drug refusal skills, self-efficacy and social competency through fluency-building computer-assisted instruction and simulation-based technology (Marsch, Bickel and Badger, 2006). Head On participants showed improvements in knowledge about substances and in substance-

related behavior. Croom et al. (2009) describe and evaluate another web-based alcohol online intervention mandated on all entering freshmen prior to arrival to campus. As in the case of Head On, the program was effective in achieving higher levels of accuracy in objective knowledge about drug abuse prevention. However, the college intervention did not produce changes in substance-using behavior (Marsch, Bickel and Badger, 2006).

Other programs have been made available on a voluntary basis. BARN (Body Awareness Resource Network) was designed as a computer-based health promotion/behavior change system that provided students at school (grades 6–12) with information and skill-building activities on AIDS, substance use, body management, sexuality, and stress management (Bosworth, Gustafson and Hawkins, 1994). Despite its voluntary nature, during the 14 months it was available, BARN was used heavily by both middle school and high school students (67 percent of students in experimental schools interacted with BARN at least once, and users came back an average of 18 times). These high rates of participation were associated with the relatively lengthy availability of BARN on participating schools' computers and with the inclusion of games and simulations that helped attract teens to the system. Users of BARN were more likely to remain free of risk-taking behaviors than nonusers of BARN. Another successful voluntary program is described in Schwinn et al. (2009), where an internet based drug abuse prevention program was implemented for 13 and 14 year old North American girls. The participants were recruited through a youth oriented website and the girls exposed to the internet-based intervention reported lower rates of alcohol and drug relative to girls in the control group. Participation rates were very high in this study, which may be explained by the monetary incentives awareded to participants.

Other voluntary programs, however, have not achieved positive results in terms of participation or outcomes. De Nooijer et al. (2008) describe an Internet-based health-monitoring instrument that provided individually tailored electronic feedback to students at a number of schools in The Netherlands. Only 3 percent of these students returned a follow-up assessment of the feedback system, suggesting poor take-up rates. Even among those who responded, one out of three claimed that the information was not new to them, and 40 percent indicated that the information failed to provide them with additional insight regarding their health behavior. Recommendations for future interventions included embedding monitoring and feedback in school curriculum, providing immediate feedback, and adapting tailored messages to educational levels and age.

Internet based programs are not only targeted at students. Pemberton et al (2011) reports an evaluation of two web-based alcohol interventions in the U.S. Military. The interventions were based on a sample of active-duty military personnel. They report that at a on month follow up, participants of one of the programs had significant reductions in alcohol consumption.

In this paper we explore subject and program characteristics associated with students' decision to explore the website of a substance use preventive intervention implemented in ten Uruguayan private schools. First, we inquire about student characteristics. We are particularly interested in assessing whether those most in need are more likely to be attracted to the program. Second, we explore actions that can be taken at the program level to encourage participation. Our final model combines both adolescent and program characteristics as predictors of the participation decision.

2. The intervention

A group of adolescents attending ten private schools in Montevideo, Uruguay, were exposed to an intervention designed to provide them with information about the risks and consequences of substance use. The program, which took place between September and November of 2009, had several components that took advantage of the wide array of ICTs used regularly by adolescents. The first component consisted in the posting of adolescent-friendly information and materials related to drug use and abuse on a website named "COLOKT". The website was specially designed and administered for this study by Evimed[1], a private developer of on-line educational services for physicians throughout Latin American. The website used Moodle as its platform. Moodle is an open-source e-learning software application designed for the production of modular internet-based courses. Its free nature makes it a very suitable tool for the development of educational interventions in less developed countries.

The website COLOKT offered valuable information on a variety of topics. These included the relationship between adolescence and substance use, the risks and problems associated with this use, and the particular characteristics of the drugs most likely to be consumed by Uruguayan adolescents. The information on the website was updated weekly. All participants in the intervention with a valid e-mail address (the majority of students) were given a unique nickname and password that gave them anonymous access to the website. These students were able to access the site unrestrictedly and could download all available materials. Access to the site was optional: there was no requirement of a minimum number of entries and the students were not subject to a final assessment regarding the site's content.

Besides the educational materials posted in COLOKT, the site offered the

1 http://www.evimed.net/

opportunity to meet in forums and chats, to complete short surveys on different topics, and to discuss ideas or ask about the materials or other topics related to substance use. This internet-based social network component was aimed at generating discussion, questions and knowledge exchange among participants. In order to stimulate and organize participation, an educator, who was either a psychologist or a family physician with expertise on adolescents' substance use, mediated the exchanges. Periodically, one of the educators commented on the issues discussed to clarify concepts or misconceptions. These comments were posted on the site and sent to all participants via email. Additional measures to encourage participation included the invitation of a well-known local rock group to chat on-line with participants, and the posting of perceptions and norms about drinking that had emerged from the baseline survey.

Before being granted access to COLOKT, subjects in the intervention group attended a two-hour workshop. At the workshop, a brainstorming activity was proposed in which students posed questions and raised concerns about the use of substances. The object of this activity was to get a sense of adolescents' expectations and needs regarding this topic, but no answers or content were provided during this instance. At the workshop students were introduced to the project's site COLOKT and were given instructions on how to log in and use the different resources available at the site. The workshops were offered at all schools participating in the study, although some students did not attend because they had forgotten to ask for parental authorization or had scheduling problems.

Intervention participants were also reached through two other channels. All students received a series of emails from the project staff announcing the disclosure of new materials at COLOKT or commenting on issues raised by students during their

participation in the website. In addition, text messages were sent to participants' cell-phones. These text messages also announced forthcoming activities at COLOKT and provided basic information about substance use and risks. During the 3 months of the intervention the project staff sent 8 emails and 7 SMS.

A total of 359 adolescents were randomly selected to participate in the intervention from a pool of 1,044 adolescents. Rather than selecting subjects individually, a lottery was drawn at the class level. Seventeen classes were drafted from a total of 47 ninth- and tenth-grade classes in ten schools. We refer to the selected subjects as the Intention to Treat group (ITT). Results from the impact evaluation study, reported in detail in Balsa, Gandelman, and Porzekanski (2010), show that the intervention changed adolescents' knowledge of what is a drug, but did not affect their risk perceptions, nor induced changes in behavior. This lack of effectiveness is likely related to the intervention's inability to achieve significant participation and retention rates.[2] Out of the 359 students in the ITT, only 74 (21%) logged in at least once during the three months of the intervention. Among this subgroup, 41 students (55%) logged in just once, 13 (18%) did it on two days and the remaining 27% did it on at least three days. Most visitors simply browsed the site and read posts or materials uploaded. Around 25 students (7%) showed a stronger interest in the site and engaged in other activities, such as forums, chats, or online surveys.

3. Individual level characteristics associated with participation

We consider the following individual characteristics likely to be associated with participation: socio-demographics (gender, age, grade, results from midterm tests, religion); socioeconomic status, indicators of the opportunity cost of time,

[2] The short period elapsed between the baseline and follow-up evaluations (less than 6 months) could have also played a role in the failure to detect significant effects.

mental health status and wellbeing, measures of social networking resources and ability, knowledge about substances, substance consumption, use of substances in the family, and use of the Internet.

Table 1 reports summary statistics for these characteristics by participation status, that is, considering whether the student ever logged in to the intervention website.[3] About half of the students were male and there was a slightly higher participation of females in the program. The average age was 15.4: 62% of students were attending 10^{th} grade and the rest were in 9^{th} grade. Participation in the program was higher among 9 graders. Regarding academics, the average grade for the midterm Mathematics, History, Literature, and Biology tests was 7.2 out of 12 (note that the passing grade is 6). Grades were about 3% larger for program participants, but the difference was not statistically significant. The dichotomous variable *Religious* takes the value 1 if the student mentioned an affiliation with a religion and the value of 0 when he or she reported being atheist or agnostic. Three out of four of the students selected for the study considered themselves religious and were less likely to participate in the intervention than atheist or agnostic individuals. This difference was significant at a statistical level of 10% .

<TABLE 1 ABOUT HERE>

To account for socioeconomic status, we constructed a *Household Wealth Index* that captured household availability of the following assets: refrigerator, laundry machine, dishwasher, traditional TV, flat TV, cable, DVD player, computer, DSL Internet connection, video camera, and car. The index weighted each item by its relative scarcity within the sample; the scarcer an item was, the more it contributed to

[3] Of the 359 students in our original sample. only 303 are included because of missing information in at least one of the explanatory variables.

the index. Participants were no different than non-participants in terms of this wealth index.

Because the website could not be accessed during school time, the program competed with the student's leisure or sick time. Two variables capture this opportunity cost. *Extracurricular activities* measures the number of hours each participant committed to extracurricular activities, such as arts, languages, or sports, in the previous week. *Missed school days* takes the value of 1 if the participant missed at least one school day in the previous month. It is hard to predict whether this variable leads to more or less participation. Students that miss school because they are sick may have more time available to browse the web (their opportunity cost of engaging in a non-school activity that can be accessed from home is lower). On the other hand, students that miss school because they play truant or engage in competing activities seem a priori less likely to access the website of a preventive intervention. Raw comparisons show that those who logged in to the COLOKT website reported a lower number of hours committed to extracurricular activities and were less likely to have missed school..

Two variables account for the student's mental health status and well-being. The baseline questionnaire included a version of the Center for Epidemiologic Studies Short Depression Scale (CES-D 10), which consists of 10 depression symptoms that score on a 0 to 3 range (a 0 implies that the respondent never experienced a symptom, a 3 stands for high frequency of the symptom, and 1 and 2 are in between frequencies).[4] According to this diagnostic scale, adolescents with a score of 10 or more are considered depressed. In this study, we define the variable *Depression symptoms* as the total score of the CES-D scale (that can potentially go from 0 to 30).

[4] This version of the CES-D was validated for Spanish speakers by Rueda-Jaimes (2009) using a sample of Colombian adolescents.

We also consider a measure of happiness constructed on the basis of the following question: "Please imagine a ladder with steps numbered from 1 to 10 where 1 represents the worst possible life for you and 10 represents the best possible life for you. On which step of the ladder do you feel you stand at the present time?" Participants and non-participants did not differ in these two psychological dimensions considered.

Participation in a web-based intervention that includes a social component is likely to be associated with a student's social networking skills and resources. We asked each student to name his or her five best male friends and his/her five best female friends in his class. *Popularity* is defined as the number of times each individual was nominated as a best friend by his/her classmates divided by the number of students in the class[5]. Students that logged in to the program website had a higher popularity ratio than students who did not, but the difference was not statistically significant. We also consider a variable indicating if the student was dating a boyfriend/girlfriend. Participants were less likely to be dating than non-participants.

Another set of variables relates to students' perceptions and involvement with drugs. A first variable in this set, *drug identification*, captures the number of substances that subjects can correctly identify as drugs in a list of ten substances.[6] Second, students were asked to rate how risky they thought consuming alcohol, cocaine, and crack on a frequent basis was (*risk perception*). The options were no risk (1), low risk (2), some risk (3), and high risk (4). Those logging in to the website had a higher risk perception than non-participants., but there was no difference between

[5] Each student was asked to report his/her five best male and five best female friends among the students in his/her same class.

[6] Balsa, Gandelman and Porzecanski (2010) use these questions to address the impact of the program and find a very small impact.

the two groups in drug identification.

Students were also asked to report their substance consumption habits. We defined several dichotomous variables taking the value of 1 if the student *Smoked cigarettes in the previous 30 days*, consumed *Alcohol in the previous 30 days*, *was dunk in the previous 30 days*, or *consumed illegal drugs in the previous 3 months*. Those that participated in the program had lower tobacco and alcohol consumption rates but were more likely to have been drunk in the last month, although none of these differences was statistically significant.

Two additional dummy variables, *Parent with alcohol abuse problems* and F*amily member with drug abuse problems,* capture family involvement with drugs. Participants show lower prevalence of alcohol or drug abuse problems in the family, but again, the difference is not statistically significant.

A final set of indicators aim at measuring familiarity with the use of the Internet. *Use of Internet* is defined as the average number of hours per week each participant reported navigating the web. We also define a dummy variable for those that report having *searched for health related topics on the Internet*. Participants showed 4 additional hours of Internet use per week and were more likely to have searched for health-related topics on the web.

Table 2 reports a probit multivariate regression of the participation decision on each of the above described individual characteristics. The regression adjusts for school fixed effects to avoid confounding school-specific with individual-specific factors associated with participation. We compute robust standard errors to account for heterogeneity across individuals. The dependent variable, participation in the program, takes the value of 1 if the individual logged in at least once to the COLOKT website according to electronic registration and 0 otherwise.

<TABLE 2 ABOUT HERE>

Religiosity is the only socio-demographic individual characteristic significantly associated with participation. Students with a religious affiliation show a lower probability of participating in the program, perhaps due to less curiosity for drug or alcohol related issues or to alternative sources of guidance on risky behaviors.

Socioeconomic status is also associated with participation after controlling for other covariates but only at a statistical significance of 10%. Wealthier students, as measured by the durable assets index, are more likely to participate in the program: availability of computers at home and faster Internet connections could mediate this effect.

The opportunity cost of time is another important determinant of participation in the program. Both variables used to capture this effect are statistically significant. One additional hour of extracurricular activities per week decreases participation by 1 percentage point (note that the average number of hours per week in extracurricular activities is 9). In addition, students missing at least one day of school are almost 7 percentage points less likely to participate than other students.

The measures of mental health status and well-being do not show a statistically significant association with participation in the program. Nor does the measure of popularity, meant to capture social networking skills and resources. Having a boyfriend or a girlfriend, however, decreases the likelihood of participating by 15 percentage points. This suggests that the COLOKT website may have been initially explored with the purpose of connecting with other adolescents. Alternatively, having a boyfriend or girlfriend may decrease participation because it

increases the opportunity cost of time.

Students' risk perceptions also affect the probability of program participation. A 1 point increase (25%) in the risk perceptions of alcohol, cocaine, and crack frequent use increases participation by 12 percentage points. On the other hand, previous knowledge about which substances are drugs has no significant effect in participation.

Surprisingly, out of the four variables chosen to capture substance consumption, only having been drunk in the previous month shows a positive and statistically significant effect on participation. The effect is also important in magnitude: having been drunk increases the likelihood of participation by 26 percentage points. This suggests that this type of interventions is likely to target those that need it most. Precedents of family members with substance abuse problems are not significant in explaining participation.

Finally, the use of the Internet and having used the Internet for health reasons in the past are both statistically associated with participation. Each additional hour of Internet-use per week increases the likelihood of participation by 0.3 percentage points. Considering that the difference between participants and non-participants is of approximately 4 hours per week, prior use of Internet had a positive effect of 1.2 percentage points on participation. Having searched for health related topics on the internet increases the probability of participation by 14 percentage points.

In a follow-up survey administered after the program had ended, we asked all students who reported never logging in about the reasons for not doing so. Students were offered several choices and could select as many as they wanted. 64% declared that they did not log in because they were not interested in the topic, 12% reported that they preferred using other channels of information on drugs, 2% was not sure that

their anonymity was guaranteed, 10% reported they were not frequent Internet users, and 2% argued that the site was not recommended by other classmates.

4. Program characteristics associated with participation

The mobile text messages and e-mails sent to students during the intervention were aimed at further raising awareness of the risks of substance abuse, and at the same time, encouraging participation in the website. To explore the effects of these communication channels on website log-ins we reorganized as a time panel, with each observation capturing the behavior of a subject in the intention to treat group in a particular day of the intervention. Considering that the intervention lasted 93 days, the final size of the dataset was of 28,179 student-day observations. The dependent variable is defined as participation in a given day. Many of the participants that logged in to the COLOKT website did it only once or twice. Thus, the rate of participation as measured by the ratio of student logins per day to the total amount of student-day observations is only 0.6%.

We are interested in three program-level variables likely to have affected participation in the website. The variable *SMS* takes the value 1 if an SMS message was sent to the participants in a particular day and 0 otherwise. The variable *mail* takes the value 1 if an e-mail was sent to participants in a particular day and 0 otherwise. And the variable *celebrity chat* indicates the day a popular local rock band[7] was invited to chair an on-line forum.

In order to estimate the effects of these variables free of biases due to individual unobserved heterogeneity, we run a least squares (LS) model with individual fixed effects. The model is run on a transformed panel that redefines time-

[7] El Cuarteto de Nos

dependent variables as within-individual deviations from the mean. The fixed effects model associates changes in the timing of SMS or e-mails to within-individual changes in participation. We capture delayed effects of SMS, e-mails and forums on participation by including up to four lags for each of these variables. Because we have more individual units than time periods, we use an estimator defined for short panels that computes robust standard errors, regardless of the particular shape of the dependence of the error term over time and across units.[8] Table 3 shows the results of this estimation.

<TABLE 3 ABOUT HERE>

Results show positive and statistically significant effects of SMS text messages and e-mail messages on participation on the same day the actions are taken. The effect of the SMS text messages is lower than that of the emails, which is quite expected considering that emails are received while the subject is connected to the Internet but this is not necessarily the case with SMS messages. An e-mail increases the likelihood of participation by 1.8 percentage points, a 300% increase in participation relative to the average participation rate of 0.6%. Our model suggests that e-mail messages can encourage participation up to the 4th day following the day the action was taken.[9] SMS messages, however, seem to encourage participation on the day they are sent but discourage participation in the future. While there is not a clear explanation for this behavior, during the follow-up assessment, some subjects manifested informally being bothered by the receipt of SMS messages from the program administrators.

[8] We estimate these models in Stata using the commands xtreg.
[9] We tried further lags, but these were non-significant.

Because there was only one celebrity-chat over the 93 days of the intervention, the effect of this variable is estimated with poor precision. However, the coefficient has the right sign and is quite important in magnitude. The celebrity chat induced a peak in participation for that particular day of 0.0123, a 200% increase in participation relative to the average rate of 0.6%. Unlike the e-mails, however, the celebrity chat generated effects only on the day in which it took place.

5. Combined model

The final model attempts to capture both the effects of individual-level and program-level variables on the likelihood of participation. To estimate this model we use a pooled least squares estimator (also known as Population-Averaged estimator[10]) with robust standard errors, which are valid even if the error term has an autoregressive behavior.

<TABLE 4 ABOUT HERE>

The results from the combined model confirm the findings in the previous sections and contribute to compare the magnitudes of the effects across individual and program specific characteristics. SMS and e-mails show positive and statistically significant contemporaneous effects. E-mails' effects spread up to the fourth day after they have been sent. As before, the celebrity chat indicator is not-significant but is high in magnitude.

As for the time independent variables, religious individuals or individuals that engage in extracurricular activities are less likely to participate. Popularity is now

[10] Generalized Estimating Equations estimator in the statistics literature.

statistically significant at a 10% level and positive as would be expected, but having a boyfriend or a girlfriend loses significance in this model. Students that reported having been drunk in the 30 days before the initiation of the intervention are more likely to participate. The variable "consumed alcohol in previous 30 days" is now statistically significant at 10% and has a negative sign. This suggests that the intervention may be more likely to attract the extremes (those that drink too much and those that do not drink) relative to those that drink a little.

In this specification, the wealth index, risk perception of substance use, and having searched for health related topics on the internet do not achieve statistical significance.

6. Discussion and Conclusions

This paper analyzes individual and program characteristics associated with participation in an ICT-based substance use preventive intervention in Uruguay, South America. Identifying program level variables likely to encourage performance is of high significance for the design of future interventions. While some of the individual specific characteristics are difficult to influence, measuring them prior to implementation may help detect potential barriers and respond proactively by implementing complementary measures.

The referred intervention displayed information on the web in an adolescent-friendly format and provided participants with social networking tools and interactive dynamics for a period of three months. Participation, however, was relatively low. The majority of adolescents did not feel compelled to participate mainly because they were not interested in the topic, as reported in the post-intervention survey. Findings from our statistical analysis also show that participation was higher among

adolescents with some interest or concern in the content of the program. Those who had been drunk prior to the intervention, for example, were significantly more likely to participate, suggesting that the intervention targeted adolescents who needed it more. Results also show that competing uses of time play against participation in non-mandatory programs: students with extracurricular activities were less likely to participate. With less robustness, we found that participation was higher among subjects that spent many hours during the week on the internet, and among adolescents that had used the web before to get information about health related topics. Interestingly, the social component of the intervention also appeared to attract subjects. Not having a boyfriend or a girlfriend increased substantially the probability of participation in one of the models and being popular increased it in another. The promise of meeting other people and generating social exchanges may be an interesting feature to exploit in future interventions.

Finally, the study shows that sending the participants periodic reminders via email and SMS text messages has a positive impact in participation when the program is not mandatory. Specific events bringing celebrities to the program do not seem to have a long lasting effect in participation, but if applied periodically, may induce a greater participation flow.

The lessons from this intervention suggest that participation in web-based programs aimed at preventing substance use among adolescents could be substantially improved with a more structured, mandatory, and longer intervention. The negative effects of time constraints in our estimations plus the expressions of disinterest from many of the students invited to participate suggest that a program implemented as part of the school curriculum may be more successful in involving students. As previously evidenced in the literature, programs that are part of the school curricula, such as

"Head On" (Marsch, Bickel and Badger, 2006) or interventions that are available for more than a year, such as BARN (Bosworth, Gustafson and Hawkins, 1994) tend to perform better in terms of participation and outcomes. Our suggestions are in line with De Nooijer et al. (2008), who recommended embedding monitoring and feedback for these interventions in the school curriculum.

Also, any school-based program using computer resources should make sure that students have ready access to computers and internet connections, either at school labs or at home. In this sense, the One Laptop per Child (Ceibal) initiative recently launched in Uruguay ensures that a vast majority of the students in the country (those enrolled in public schools) have a laptop at home and creates an excellent setting for the applications of such programs. The population in this study, however, was not under such initiative because all schools involved were private.

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Table 1. Summary Statistics

		Participation		Total	Differences
		YES	NO		
Socio-demographic characteristics					
Male#	mean	49.2%	52.1%	51.5%	
	s.d.	0.504	0.501	0.501	
Age#	mean	15.342	15.448	15.425	
	s.d.	0.696	0.621	0.638	
4th year student#	mean	55.4%	63.9%	62.0%	
	s.d.	0.501	0.481	0.486	
Grade Point Average (min=1, max=12)	mean	7.421	7.169	7.223	
	s.d.	1.609	1.878	1.824	
Individual Religious Affiliation#	mean	69.2%	78.2%	76.2%	*
	s.d.	0.465	0.414	0.426	
Socioeconomic Status					
Wealth Index	mean	0.296	0.303	0.301	
	s.d.	0.197	0.197	0.197	
Opportunity Cost of Time					
Extracurricular Activities (hours per week)	mean	6.831	9.874	9.221	***
	s.d.	5.430	9.991	9.282	
Missed School Days#	mean	43.1%	58.4%	55.1%	**
	s.d.	0.499	0.494	0.498	
Mental Health Status and Well Being					
Happiness (min=1, max=10)	mean	7.877	7.840	7.848	
	s.d.	1.305	1.452	1.420	
Depression (min=0, max=30)	mean	7.403	7.234	7.270	
	s.d.	4.340	4.365	4.353	
Social Networks					
Popularity (number of friends of fiends/class size)	mean	7.7%	8.9%	8.6%	
	s.d.	0.085	0.136	0.127	
Boyfriend/Girlfriend#	mean	23.1%	37.8%	34.7%	**
	s.d.	0.425	0.486	0.477	
Drug Knowledge and Risk Perceptions					
Drug Identification#	mean	75.1%	74.8%	74.9%	
	s.d.	0.214	0.209	0.210	
Risk Perception of Substance Use (min=1, max=4)	mean	3.510	3.385	3.412	**
	s.d.	0.468	0.529	0.518	
Substance Use					
Smoked in previous 30 days#	mean	18.5%	23.5%	22.4%	
	s.d.	0.391	0.425	0.418	
Consumed alcohol in previous 30 days#	mean	47.7%	56.3%	54.5%	
	s.d.	0.503	0.497	0.499	
Was drunk in previous 30 days#	mean	29.2%	21.8%	23.4%	
	s.d.	0.458	0.414	0.424	
Consumed drugs in previous 3 months#	mean	12.3%	13.0%	12.9%	
	s.d.	0.331	0.337	0.335	
Family Substance Use					
Parent with alcohol abuse problems#	mean	3.1%	6.3%	5.6%	
	s.d.	0.174	0.244	0.231	
Family member with drug abuse problems#	mean	13.8%	17.2%	16.5%	
	s.d.	0.348	0.378	0.372	
Internet Use					
Use of Internet (hours per week)	mean	18.554	14.420	15.307	**
	s.d.	14.901	15.745	15.636	
Searched for health related topics on the internet#	mean	56.9%	40.8%	44.2%	***
	s.d.	0.499	0.492	0.497	

Note: ***significant at 1% **significant at 5% * significant at 10%, # percentage of

Table 2. Probability of participation in the program (probit model)		
		Marginal effects
Socio-demographic characteristics	Male	-0.021 (0.058)
	Age	0.015 (0.028)
	4th year student	-0.081 (0.096)
	Grade Point Average (min=1, max=12)	0.008 (0.010)
	Individual Religious Affiliation	-0.263 (0.058)***
Socioeconomic Status	Wealth Index	0.133 (0.080)*
Opportunity Cost of Time	Extracurricular Activities (hours per week)	-0.011 (0.003)***
	Missed School Days	-0.069 (0.039)*
Mental Health Status and Well Being	Happiness (min=1, max=10)	0.002 (0.022)
	Depression (min=0, max=30)	0.002 (0.004)
Social Networks	Popularity (number of friends of fiends/class size)	0.305 (0.315)
	Boyfriend/Girlfriend	-0.164 (0.038)***
Drug Knowledge and Risk Perceptions	Drug Identification	0.141 (0.107)
	Risk Perception of Substance Use (min=1, max=4)	0.123 (0.067)*
Substance Use	Smoked in previous 30 days	-0.084 (0.055)
	Consumed alcohol in previous 30 days	-0.053 (0.057)
	Was drunk in previous 30 days	0.258 (0.110)**
	Consumed drugs in previous 3 months	0.102 (0.078)
Family Substance Use	Parent with alcohol abuse problems	-0.006 (0.129)
	Family member with drug abuse problems	-0.006 (0.087)
Internet Use	Use of Internet (hours per week)	0.003 (0.001)***
	Searched for health related topics on the internet	0.144 (0.045)***
Observations		303

Note: ***significant at 1% **significant at 5% * significant at 10%, Clustered standard errors in parenthesis

Table 3. Fixed effects model analyzing the association between program-specific characteristics and participation	
	Participation
E-mail	0.0179***
	(0.005)
L.E-mail	0.0056*
	(0.0031)
L2.E-mail	0.0047*
	(0.0026)
L3.E-mail	0.0048*
	(0.0025)
L4.E-mail	0.0068***
	(0.0023)
SMS	0.0051*
	(0.0026)
L.SMS	-0.0003
	(0.0017)
L2.SMS	-0.0044***
	(0.0016)
L3.SMS	-0.0029**
	(0.0014)
L4.SMS	0.0002
	(0.0015)
Celebrity chat	0.0123
	(0.0091)
L.celebrity chat	-0.001
	(0.0061)
L2.celebrity chat	-0.0033
	(0.0031)
L3.celebrity chat	-0.0002
	(0.0092)
L4.celebrity chat	0.0033
	(0.0092)
Constant	0.0030***
	(0.0007)
N	26967

Note: ***significant at 1% **significant at 5% * significant at 10%

Clustered standard errors in parenthesis

L stands for lag operator.

Table 4. Combined model: individual and program-specific characteristics associated with participation		
Program-specific characteristics	*SMS*	0.0050*
		(0.0029)
	L.SMS	-0.0001
		(0.0015)
	L2.SMS	-0.0049***
		(0.0014)
	L3.SMS	-0.0029*
		(0.0017)
	L4.SMS	0.0005
		(0.0017)
	E-mail	0.0184***
		(0.0049)
	L.E-mail	0.0062**
		(0.0028)
	L2.E-mail	0.0045*
		(0.0024)
	L3.E-mail	0.0044**
		(0.0021)
	L4.E-mail	0.0068***
		(0.0023)
	Celebrity chat	0.0118
		(0.0090)
Socio-demographic characteristics	Male	0.0028
		(0.0024)
	Age	0.0007
		(0.0015)
	4th year student	-0.0013
		(0.0027)
	Grade Point Average (min=1, max=12)	0.0001
		(0.0006)
	Individual Religious Affiliation	-0.0071**
		(0.0031)
Socioeconomic Status	Wealth Index	0.0031
		(0.0057)
Opportunity Cost of Time	Extracurricular Activities (hours per week)	-0.0002**
		(0.0001)
	Missed School Days	-0.0026
		(0.0026)
Mental Status and Well Being	Happiness (min=1, max=10)	0.0003
		(0.0006)
	Depression (min=0,max=30)	0.0005
		(0.0003)
Social Networks	Popularity (Friend nominations/class size)	0.0151*
		(0.0087)
	Boyfriend/Girlfriend	-0.003
		(0.0021)
Drug Knowledge and Risk Perceptions	Drug Identification	0.0028
		(0.0055)
	Risk Perception of Substance Use (min=1, max=4)	0.0015
		(0.0014)

Table 4. (continued)		
Substance Use	Smoked in previous 30 days	-0.0004
		(0.0030)
	Consumed alcohol in previous 30 days	-0.0039*
		(0.0021)
	Was drunk in previous 30 days	0.0079***
		(0.0026)
	Consumed drugs in previous 3 months	-0.0017
		(0.0039)
Family Substance Use	Parent with alcohol abuse problems	-0.0014
		(0.0035)
	Family member with drug abuse problems	-0.0017
		(0.0023)
Internet Use	Use of Internet (hours per week)	0.0001
		(0.0001)
	Searched for health related topics on the internet	0.0014
		(0.0024)
Other	School fixed effects	Yes
Constant		-0.0192
		(0.0235)
Observations		26967

Note: ***significant at 1% **significant at 5% * significant at 10%, Clustered standard errors in parenthesis, L stands for lag operator.