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Preventing underage alcohol use through changes in norms and risk perception: A randomized evaluation of two school-based prevention programs in Colombia

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This study evaluates the short-term impact of two school-based interventions designed to prevent alcohol use among children in high-risk schools in Bogotá, Colombia. The programs aimed at increasing the perception of risk and modifying normative values and beliefs related to alcohol consumption among students as a mechanism to delay first-time alcohol use and reduce consumption among those already consuming alcohol. The two interventions varied in terms of the core curriculum strategy and the organization that implemented them. A stratified random assignment procedure was used to allocate 100 schools, with approximately 13.000 sixth-grade students, across three study arms (i.e., two treatment groups and a control group). The students who received treatment were given the first intervention in sixth grade, followed by a second wave in seventh grade. The study results show that both programs were effective in affecting the perception of the risk of alcohol consumption and normative attitudes toward alcohol use in the desired direction. One of the main factors that explain these results is the increase in students' objective knowledge about the harmful effects of alcohol consumption. However, there were no systematic effects on actual consumption as reported by students.

KEYWORDS

underage alcohol use, risk perception, normative attitudes, school-based interventions, prevention.

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Prevención del consumo de alcohol en menores mediante cambios en las normas y la percepción del riesgo: Una evaluación aleatoria de dos programas escolares de prevención en Colombia

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Este estudio evalúa el impacto de corto plazo de dos intervenciones escolares diseñadas para prevenir el consumo de alcohol en niños de escuelas de alto riesgo en Bogotá, Colombia. Ambos programas buscaban aumentar la percepción del riesgo y modificar los valores normativos relacionados con el consumo de alcohol entre los estudiantes como mecanismo para retrasar el inicio del consumo o reducirlo entre quienes ya consumían. Los programas se diferenciaban en la estrategia curricular utilizada y la organización que los implementaba. Se utilizó un procedimiento de asignación aleatoria estratificada para distribuir 100 escuelas, con aproximadamente 13.000 alumnos de sexto curso, en dos grupos de tratamiento y un grupo de control. Los alumnos que recibieron tratamiento recibieron la primera intervención en sexto curso, seguida de una segunda tanda en séptimo. Los resultados del estudio muestran que ambos programas fueron eficaces para afectar la percepción del riesgo de consumo y las actitudes normativas en la dirección deseada. Uno de los principales factores que explican estos resultados es el aumento del conocimiento objetivo de los alumnos sobre los efectos nocivos del consumo de alcohol. Sin embargo, no se observaron efectos sistemáticos sobre el consumo, según lo declarado por los estudiantes.

KEYWORDS

consumo de alcohol en menores, percepción del riesgo, actitudes normativas, intervenciones escolares, prevención.

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1 | INTRODUCTION

Underage alcohol consumption is a public health issue in many low- and middle-income countries (LMICs). A study using data collected between 2006 and 2013 for 57 LMICs by the Global School-Based Student Health Surveys (GSHS) shows that, on average, one in four adolescents aged 12–15 report having at least one drink in the past 30 days (Ma et al., 2018). Colombia is a salient case among middle-income countries in Latin America. The age of initiation of alcohol consumption in Colombia is close to 13 years, and the prevalence of consumption increases as students progress through the educational cycle: the proportion of students who have consumed alcohol during the last 30 days rises from 24% in the seventh grade to more than 50% in eleventh grade. Likewise, those who consume tend to do so frequently: about 40% of students between 12 and 18 years of age consume an alcoholic beverage at least once or twice a week (ODC, 2016). The high burden of morbidity and early mortality associated with underage alcohol consumption makes it a priority to develop effective prevention strategies to combat this phenomenon (Harding et al., 2016).

Several studies have demonstrated the physiological harms associated with alcohol consumption, especially when it is excessive (Sarasa-Renedo et al., 2014). Another group of studies points out the harmful effects of alcohol when its consumption begins during adolescence—a stage characterized by a series of natural brain processes that are crucial for cognitive maturation and development (Squeglia et al., 2009; Guerri and Pascual, 2010; Spear, 2013; Jacobus and Tapert, 2013).¹ Furthermore, early use is often related to a higher likelihood of lifetime problem use (Hingson et al., 2006; SAMSHA, 2009). In this regard, Gómez et al. (2011) point out that in the Colombian population, starting to drink before the age of 14 increases the probability of consuming illegal substances and having problems associated with alcohol consumption in adulthood by a factor of 10, compared to those who start drinking after the age of 21.

Despite its potential catastrophic consequences, the onset of alcohol consumption during adolescence is prevalent, and social environments make it difficult for families to transmit the necessary values or reinforcements that would lead to lower consumption levels (Hemovich et al., 2011). Social interactions outside the home increase during this stage, which can lead to the development of relationships and friendships that can influence adolescents' behavior. Furthermore, research has indicated that increased exposure outside the home amplifies the prevalence of communal factors that stimulate alcohol consumption including, but not limited to, widespread access, socially acceptable drinking laws or regulations, and community disarray (Hawkins et al., 1992). All of these concerns are influenced by the expectations and perceptions of alcohol's effects (Goldman et al., 1991). Indeed, the literature suggests that positive expectations about alcohol consumption are prevalent among adolescents, possibly due to the perceived increase in sociability and popularity associated with drinking (Cassola et al., 2005; Pilatti et al., 2011).

Evidence around the biological and social factors that promote underage alcohol consumption and its enormous consequences on the cognitive and socio-emotional development of young people generate consensus on the importance and urgency to invest in initiatives and public policies aimed at mitigating this problem. The school is an ideal place to carry out such prevention efforts, as it is the epicenter of young people's social relations, as well as a place where they spend a large part of their time. Yet, despite the existence of a wide variety of school-based substance abuse prevention programs, there is little evidence of their effectiveness and the design and contextual factors that affect the expected impact. As usual, the dearth of evidence is more pronounced in developing countries. Among the

¹For an additional review of the harmful effects of alcohol consumption during adolescence see, for instance, Sanhueza et al. (2011); Parada et al. (2012); Sneider et al. (2013).

few works that have attempted to systematize what is known about the effectiveness of these types of interventions is the study by [Foxcroft and Tsertsvadze \(2012\)](#), which includes 53 experimental evaluations—none of them implemented in Latin America.²

This study evaluates the short-term impact of two school-based interventions designed to prevent underage alcohol use in Bogotá, Colombia. Although both programs aim at preventing early initiation of alcohol consumption by implementing a curriculum designed to increase risk perceptions and normative influences around alcohol use, the interventions differ in the main delivery strategy: adding in the classroom sessions to the school penum versus blending the prevention curriculum into sports and recreational activities happening already in Physical Education classes. After being defined as eligible, a total of 100 schools, with approximately 13,000 sixth-grade students, were assigned to receive one of the two prevention programs or to be part of the control group, according to the multi-treatment stratified randomized control trial design. The students who received treatment were given the first intervention in sixth grade, followed by a second wave in seventh grade.

The main findings are that both prevention programs increased, albeit modestly, the perceptions of risk of alcohol consumption and influenced normative aspects in the desirable direction, as measured approximately one month after the end of implementation. In addition, a reduction in expected consumption was observed mainly in students who reported having consumed alcohol before the onset of the interventions. To better understand the mechanisms explaining these effects, we use a measure of the student's knowledge about the consequences of alcohol use, collected during the second follow-up survey. We find that students in treated schools are more likely to identify the harmful health effects of alcohol consumption, suggesting that this increased level of knowledge is what mediates the increase in risk perception and changes in normative values.

The heterogeneity in the effectiveness of the interventions found in this study is aligned with the generalized findings in the literature: the implementation of school-based strategies is insufficient to guarantee sustained prevention of underage alcohol use. Unfortunately, this study does not identify patterns to precisely identify the determinants of the success or failure of interventions. Nevertheless, the evidence provided points in the direction that programs that promote psychosocial support to students and the development of their socio-emotional skills can achieve more prolonged results (compared to those that focus exclusively on alcohol consumption). This article contributes to the existing literature in two ways. First, by presenting empirical evidence that school-based substance use prevention interventions have favorable impacts on underage alcohol consumption. Second, by providing evidence that suggests strategies with a general prevention focus are more effective than those that provide specific content, and that shorter interventions may be

²This study divides the interventions into two main categories: interventions focusing solely on the prevention of early alcohol consumption (11 studies) and interventions with a more general approach that, in addition to consumption, seek to prevent other risky behaviors and antisocial behaviors (39 studies). Additional important studies are the meta-analysis conducted by [Strøm et al. \(2014\)](#) and [Hennessy and Tanner-Smith \(2015\)](#) from the results of 28 and 17 experimental evaluations, respectively. The latter focuses on identifying the effectiveness of short-duration interventions, which are characterized by being implemented in contexts with modest availability of time and resources (e.g., schools). Both studies find favorable and significant, albeit moderate, desired effects.

2 | STUDY DESIGN

2.1 | Intervention

The intervention consisted of a 2-year implementation of two school-based alcohol prevention programs for students enrolled in a random sample of eligible schools.³ The first wave of implementation took place in 2018 and targeted sixth-grade students in eligible schools, while the second wave was implemented in 2019 for the same group of students who were then in seventh grade.

By delivering an alcohol use prevention curriculum, the interventions aimed at increasing the perception of risk and modifying normative values and beliefs related to alcohol consumption among students, as direct mechanisms to delay first-time alcohol use and reduce consumption among those who already consume alcohol. Both programs involved activities with students, their parents, and school staff to have a holistic impact on the ecology that shapes children's behavior. Each program was designed and implemented by two different non-profit organizations with extensive experience in the field of prevention of risky behaviors among children, in Colombia. Next, we describe these programs in more detail.

Sanamente (SM) program. This treatment is structured in three main components: (i) eight 90-minute sessions with students in the classroom; (ii) a two-hour workshop for parents; and (iii) five one-hour learning activities that students carry out at home together with their parents. Components (i) and (ii) were led by school teachers who were previously selected and trained by experts from the implementation organization in an eight-hour workshop. During this training, school teachers were familiarized with the curriculum, were informed about underage alcohol use in Colombia and its physiological and behavioral effects on youth, and were provided with practical tools to manage and implement the sessions. Additionally, teachers received four hours of *in-situ* support and ten weeks of continuous virtual support (mainly by telephone and e-mail). During the workshop, parents received information on the risks and consequences of underage drinking and received materials and instructions to carry out home activities with their children. They were also invited to participate in one of the classroom sessions. The design and application of this program was carried out by Colectivo Aquí y Ahora, a non-government organization (NGO) with more than 20 years of experience in the design and implementation of school-based strategies to prevent underage alcohol consumption and substance abuse, as well as clinical treatments to overcome addiction.

Goles para una vida mejor (GVM) program. This treatment consisted of the delivery of an alcohol prevention curriculum embedded in sports and recreational activities that took place during Physical Education (PE) courses at school. The sessions were implemented by the regular PE teachers, who were previously subject to a 16-hour training developed and conducted by experts from the implementing organization. The curriculum included four modules on the topics of self-care, external factors that determine substance consumption, internal factors determining substance consumption, and life skills. The curriculum consisted of 20 modules, with 17 to be implemented during school PE sessions and 3 at home with parental collaboration. Treated schools assigned as many PE practices to the program as necessary to cover the 17 modules (usually one per session). Each PE session was structured in three activities or moments: (a) a sensitization or warm-up, in which the students perform an exercise or reading activity to introduce and motivate the topic to be covered; (b) socialization of the specific topic of the curriculum through sports or recreational physical activities; and (c) a wrap-up moment, in which the students discuss

³On the eligibility requirements of schools, see Section 2.3.1

and reinforce the most relevant lessons of the session. The program not only aimed to increase the perception of the risk of underage alcohol consumption but also to promote the development of specific socio-emotional and life skills that are considered important factors in preventing alcohol misuse, such as assertiveness and self-care. The GVM program was jointly designed by Fundación Colombianitos, which specializes in sports-based strategies to promote the development of socio-emotional skills among children and youth, and Corporación Nuevos Rumbos, an organization devoted to the research and prevention of substance abuse and delinquency among adolescents and youth.⁴

2.2 | Measures and outcomes

Data collection instruments were designed to be aligned with the interventions' theory of change of both prevention programs and included five main constructs: (1) alcohol consumption (prevalence, frequency, and consumption expectations); (2) determinants of substance consumption (risk perception and normative beliefs); (3) socio-emotional skills (assertiveness and self-care); (4) risk and protective factors at the community, school, and family level; and (5) knowledge of the consequences of underage alcohol consumption.

We combined several validated scales into a face-to-face self-completed student survey questionnaire to measure these dimensions. The core of the questionnaire consisted of 123 items in the Spanish version of the "Communities that Care" (CtC) survey, which collected demographic information, prevalence of alcohol and other substance use, and delinquent and violent behaviors. It also evaluated 17 risk factors and eight protective factors that are used to construct risk profiles for the respondents (Pérez-Gómez et al., 2016).⁵

We also included additional measures of relevant normative beliefs and perceptions of risk in the community of young people. The Spanish version of the *Children Assertive Behavior Scale* (CABS) was used to measure assertiveness (Wood et al., 1978; Michelson and Wood, 1982; Mesa et al., 2013). The Spanish version of the *Child and Adolescent Self-Care Performance Questionnaire* (CAS PQ) (Moore, 1995; Jaimovich et al., 2009) and elements of the *Health Behavior in School-Aged Children* (HBSC) (Currie et al., 2009) were also integrated to measure self-care.

Finally, we included a set of specific questions to measure students' knowledge and beliefs about the risks and consequences of alcohol consumption. Among these, there was a self-developed multiple-choice question about the harmful effects of alcohol consumption that was expected to be correctly answered by students in the treated groups. This question aimed to evaluate the degree of internalization of the content taught in the programs. We also included three sets of questions taken from Rinehart et al. (2006) about brain-mediated effects of alcohol use (2 questions), beliefs about true long-term effects of alcohol use (3 questions), and beliefs about false long-term effects of alcohol use (4 questions). Table A.3 in the Appendix lists the dimensions prioritized for the study with their respective indicators and instruments selected to measure them.

To reduce the length of the questionnaire and avoid the fatigue of the respondent, we used a multiple-form design (Graham et al., 1996). To do this, the complete set of items was purposefully distributed across three equal-sized forms (or sub-questionnaires), and subsequently, one form was randomly assigned to each respondent in the field. Items in all

⁴Corporación Nuevos Rumbos has played a leading role in the implementation of the globally renowned "Communities that Care" program in Colombia (see, Mejía-Trujillo et al., 2015).

⁵"Communities that Care" is an evidence-based prevention system that promotes healthy youth development and improves youth outcomes. At the heart of this strategy lies the CtC survey, which is used to identify risks and strengths in a community to then select and implement appropriate prevention programs. Only in Colombia, approximately 75,000 young individuals have participated in the CtC survey. More information about the CtC prevention system [here](#).

forms were organized into four mutually exclusive blocks. The first block included items that had to be answered by all respondents, while the rest of the items were distributed in the other three blocks (each of equal size). Each form contained the first common block of questions and two of the three remaining blocks. Hence, in each form, there was a subset of questions that were not present and, therefore, resulted in missing values assigned to the omitted items.

The multiple-form methodology allows us to impute the answers of the omitted block, using the information from the item blocks that were included. Therefore, it is possible to reduce the duration of the questionnaire, without sacrificing the quality of the responses due to response fatigue or attrition. This is particularly important for this study due to the number of dimensions included and the age of the population surveyed (12-14 years).⁶

2.3 | Sample selection

2.3.1 | Initial eligibility

In 2018, Bogotá had 1,332 schools with lower secondary education (6th to 9th grades), and approximately 427,000 students enrolled.⁷ Of the total, 19% were public schools and provided services to 61% of the enrolled students in the city. To enter the study sample, schools had to meet specific criteria related both to an ex-ante study on the institution's risk profile and other characteristics. Specifically, to be selected for the study, a school had to be classified into one of the following three prioritized risk profiles: (i) high risk of student substance abuse; (ii) high risk of student substance abuse or insecure environment; or (iii) high risk of student substance abuse, aggression, bullying, and insecure environment (see [Molano et al., 2018](#), for more details on the definition of the risk profiles).⁸ These school-level selection criteria reduced the number of eligible schools to 301. Furthermore, to be included in the study sample, schools had to have a minimum of 10 students in sixth grade, not have received an intervention similar to SM or GVM in the recent past, and have a low volume of incoming assistance programs.⁹ Finally, to facilitate the program implementation logistics and to lower costs, schools had to be located in 10 of the 19 localities of the city.¹⁰

Once all these additional criteria were considered, the eligible sample for the study consisted of 123 schools (105 public and 18 private schools) that provided education for 23,440 sixth-grade students. A possible implication of this school selection criterion is that

⁶While we employed a multiple-form design, our estimates in the paper present results without any imputation of students' answers. Nevertheless, when considering imputed outcomes instead of those with missing data, the results are very similar. For detailed results, please feel free to request them.

⁷Lower-secondary education extends from sixth to ninth grade and usually includes children between 11 and 16 years of age. Basic education in Colombia is divided into primary education (grades 1 to 5), lower secondary education (grades 6 to 9), and upper secondary education (grades 10 and 11).

⁸Using the 2015 Bogota School Climate and Victimization Survey and clustering methodologies, [Molano et al. \(2018\)](#) created a taxonomy of six risk profiles using prevalence measures for different school risk factors: student-to-student aggression, student possession of weapons, perceived incidence of substance use, bullying, negative school environment and discrimination. The study grouped schools into six risk categories: minimal risk (all risk dimensions are well below the city average), low risk (risk levels are lower but close to city average), high prevalence of student substance abuse (the main risk factor is the student substance use), aggression and bullying (the main risk factors are aggression, bullying and discrimination among students), student substance use and risky environment (the highest risk factors are the prevalence of substance use and insecurity at the school and its surroundings), high risk (all risk factors are much higher than city average).

⁹The idea of the last requirement was to avoid schools being overburdened by other public interventions. Specifically, the public institutions included in the study could have at most one more program in operation, while private institutions could have at most two.

¹⁰Schools had to be located in the following localities: Bosa, Fontibón, Kennedy, Puente Aranda, Rafael Uribe, San Cristóbal, Santa Fe, Tunjuelito or Usme.

our findings could be particularly pertinent for the population for which alcohol prevention initiatives are most relevant, that is, schools in communities with a higher risk of substance abuse.

2.3.2 | Randomization method

The stratified random assignment to the two treatment arms and the control group was made at the "school-shift" level. Given the prevalent scarcity of educational infrastructure in Colombia, schools often double the supply of services by providing morning and afternoon shifts.¹¹ The presence of double shifts (morning and afternoon) in some of the schools of the eligible sample meant that selection had to be done at the "school-shift" level.

Furthermore, the sample was stratified following the population distribution across two dimensions: the public-private school composition in the city and the average socioeconomic level (SEL) of the students in the city's education system. Specifically, three strata were constructed: (I) private schools (18 schools), (II) public schools with lower SEL (53 schools), and (III) public schools with higher SEL (52 schools). Subsequently, the schools were randomly assigned within these strata, among four possible groups: SM treatment, GVM treatment, control group, and the waiting list. Given the budget constraints and the *ex-ante* statistical power analysis (see the Appendix for more details), the study included a sample of 100 schools with 13,085 students distributed as follows: 40 schools (4,637 students) with the SM program, 20 schools (2,110 students) with the GVM program, 40 schools (4,235 students) in the control group. The remaining 21 eligible schools (2,103 students) were assigned to a program waiting list but did not participate in the study.¹²

2.3.3 | Study timeline

The baseline survey was conducted between May and August 2018. The first wave of program implementation began in August 2018 and was completed in October 2018. The first follow-up survey was conducted between October and November 2018, just when the interventions ended. The second wave of program implementation took place between April and October 2019. Finally, the second follow-up survey was conducted between August and November 2019. In all cases, second follow-up surveys were conducted approximately one month after each school had completed all sessions of the assigned program.¹³

2.3.4 | Sample balance and attrition

Table 1 reports basic descriptive statistics of school and student characteristics at baseline, as well as the differences in those characteristics between experimental groups. Columns 1 and 2 show the mean and standard deviation, respectively, for each variable in the control group. Columns 3 and 5 report the mean difference for each variable between the treatment groups and the control group, while columns 4 and 6 report the corresponding standard errors. Panel A shows characteristics of schools: academic test scores (from the national standardized test SABER), desertion and repetition rates, and the average socioeconomic

¹¹Supply is doubled because each shift serves different students with teaching staff. In 2013, 54.7% of the public schools offered a morning shift, 39.0% an afternoon shift, and 6.3% a full day shift.

¹²The total number of students was reduced from 23,440 to 13,085 due to the impossibility of working with both shifts in those institutions with double shifts.

¹³The study took advantage of the fact that schools completed program activities in different weeks during the implementation period—which, in turn, is explained by schools having different initial dates due to logistical and bureaucratic reasons—to start with surveys only in the schools that had completed the program and progressively advanced with the ones that completed it later.

status of the student population attending the school. Panel B reports age and gender statistics for students in the sample. Panel C shows measures of the incidence of alcohol use among students. Panel D reports the main outcome measures at baseline: an index of the perceived risk of alcohol consumption, an index of the perceived risk of drug use, the alcohol-related question of the previous perceived risk of drug use index, an index of attitudes toward the use of drugs, and the alcohol-related question of that index. Finally, Panel E reports two measures of socio-emotional skills obtained at baseline: assertiveness and self-care. As expected, the treatment-control differences in almost all variables are small and not statistically different from zero, which shows that the random assignment procedure was successful and the study satisfies this basic internal validity test.

The summary statistics presented in column 1 describe the main characteristics of the sample. Negative test scores in reading, math, and science indicate that schools in the sample performed below the national level in the subjects evaluated by the SABER test. The average socioeconomic status at the school level of the student population is 1.90 on a scale of 1 to 6, suggesting that most students belong to a low and medium socioeconomic status. The students in the sample were 11.43 years of age at the beginning of the study and 52.2% are female. Around this age, alcohol use usually begins. In fact, at baseline 20% of the students report having already consumed alcohol, and 43.4% of those who have consumed alcohol did so before age 10. Furthermore, 13.3% of the students reported having consumed alcohol in the last month. Scales of risk perception and normative attitudes, as well as those of socio-emotional skills, are useful for comparing two or more populations and are less interesting when analyzed by themselves. However, by comparing the perceived risk and favorable attitudes indices for overall drug use (which also encompass substances such as cigarettes and marijuana) with the specific indices related to alcohol consumption, we can understand the student's perceptions and beliefs about alcohol in comparison to other drugs. As can be seen, students perceive drinking alcohol as less risky than consuming other substances and have more favorable attitudes toward the use of alcohol than toward the consumption of other drugs.

TABLE 1 Summary statistics and balance of school and individual characteristics between experimental groups

Panel A: School characteristics	Control group		Sanamente		GVM	
	Mean	S.D.	Difference	S.E.	Difference	S.E.
Reading score	-0.365	(0.555)	-0.157	(0.113)	-0.091	(0.160)
Math score	-0.412	(0.497)	-0.075	(0.113)	-0.050	(0.149)
Science score	-0.393	(0.537)	-0.169	(0.106)	-0.055	(0.154)
Repetition rate	9.396	(4.635)	-0.404	(1.114)	0.197	(1.167)
Desertion rate	2.906	(3.783)	-0.036	(0.834)	0.276	(1.108)
Socioeconomic status	1.905	(0.347)	-0.122	(0.074)	-0.061	(0.099)
Number of schools	38		77		55	
Panel B: Students characteristics						
Age	11.433	(1.030)	0.044	(0.051)	0.024	(0.083)
Gender	0.522	(0.500)	0.012	(0.016)	-0.029	(0.018)
Panel C: Consumption prevalence						
Lifetime alcohol use	0.200	(0.400)	-0.007	(0.018)	0.018	(0.023)
Lifetime beer use	0.162	(0.368)	0.001	(0.016)	0.000	(0.017)
Age at first use of alcohol	0.434	(0.496)	-0.010	(0.037)	0.030	(0.041)
Age at first use of beer	0.574	(0.495)	-0.021	(0.039)	0.025	(0.049)
Alcohol Consumption - Last month	0.133	(0.339)	-0.008	(0.014)	-0.009	(0.017)
Panel D: Risk perception and normative attitudes						
Consumption Risk Perception	2.961	(1.021)	-0.015	(0.036)	-0.004	(0.046)
Perceived Risks of Drug Use	1.800	(0.883)	0.051	(0.034)	-0.080**	(0.038)
Perceived Risks of Drug Use (Alcohol item)	1.582	(1.085)	0.087	(0.053)	-0.046	(0.056)
Favorable Attitudes Toward Drug Use	1.310	(0.559)	0.014	(0.022)	-0.004	(0.022)
Favorable Attitudes Toward Drug Use (Alcohol item)	1.488	(0.806)	0.010	(0.031)	0.000	(0.032)
Panel E: Socio-emotional skills						
Assertiveness	1.282	(1.217)	-0.028	(0.045)	-0.052	(0.062)
Self-care	2.518	(0.514)	0.041	(0.034)	0.003	(0.050)
Number of students	2,253		4,560		3,284	

Notes: The table shows summary statistics and the balance of covariates between the experimental groups for school-level characteristics (panel A), student-level characteristics (panel B), incidence of alcohol consumption (panel C), measures of perception of risks and normative attitudes about the use of alcohol (panel D), and measures of socio-emotional skills (panel E). Columns (1) and (2) present the mean and standard deviation of each variable in the control group. Columns (3) and (5) show the mean differences for each variable between schools and individuals in the control group with respect to those in the SM and GVM treatments, respectively, and the corresponding standard errors in parentheses. In columns (3) and (5), ***, **, and * denote statistically significant differences at the significance levels 1%, 5%, and 10%. The last two rows of the table shows the number of observations—schools and students—used for the calculation of each column's statistics: in column (1) this corresponds to the size of the control group, while in columns (3) and (5) it indicates the sizes of the control group and the SM treatment arm, and the control group and the GVM treatment arm, respectively.

Table 2 shows the number of schools initially assigned to randomized groups and surveyed at different points throughout the study. At the beginning of the study, 94 of the 100 schools initially selected were administered the survey. Of these 94 schools, 81 schools were surveyed at the 1-year follow-up and 87 were surveyed at the 2-year follow-up. These figures imply an attrition rate in the total sample of 19% between the baseline and the first follow-up and 13% between the baseline and the second follow-up. In addition, there are differences in the attrition rate across groups. Attrition was higher in the control group than in both treatment groups, which could be explained in part by the lesser interests of some school principals in the control group in coordinating the survey administration with the research team, possibly because their schools did not benefit from the program.

TABLE 2 Attrition in the sample of schools throughout the study

	Schools			
	Control group (1)	SM treatment (2)	GVM treatment (3)	Total (4)
Initial assignment	40	40	20	100
Surveyed at baseline	38	39	17	94
Surveyed at baseline and first follow-up	27	38	16	81
Surveyed at baseline and second follow-up	34	38	15	87
Attrition first follow-up vs Initial assignment (%)	32.5%	5.0%	20.0%	19.0%
Attrition second follow-up vs Initial assignment (%)	15.0%	5.0%	25.0%	13.0%

Notes: The first row shows the number of schools randomly assigned to each group. The following rows of the first panel report the number of schools that were successfully surveyed at each stage of the intervention for each assigned group. Finally, the last rows show the attrition rate of each stage relative to the initial assignment.

Attrition may be a problem if the characteristics of schools and students differ across

study arms. In other words, if attrition introduced imbalances in observed and unobserved school or student-level characteristics that are potentially correlated with the outcomes of interest, the coefficients of the effects of the treatment would be biased. Of course, even if attrition is not correlated with the characteristics or outcomes of any subject, it could still be a problem, as it reduces the statistical power of the estimations.

To test whether there are any systematic differences in attrition by experimental group, in the appendix we report means of school and individual level characteristics at baseline, together with differences in those characteristics between the two treatment groups and the control group, but limited to the sample of schools which were surveyed both at baseline and at each follow-up. In Table A.1 we restrict the sample to schools surveyed both at baseline and at the 1-year follow-up, while in Table A.2 we restrict the sample to those schools surveyed both at baseline and at the 2-year follow-up. In both cases, the balance between experimental groups in observed school and student-level characteristics is preserved, despite the sample attrition.

2.4 | Econometric strategy

We estimate the effect of the intervention on the outcomes of interest based on the post-treatment difference in means between students belonging to schools in any of the treatment arms and those in the control group, controlling for individual covariates. Given the random assignment of schools to treatment groups, the estimated effects can be interpreted causally.¹⁴ We estimate the parameters of the linear model represented by the following equation:

$$Y_{is} = \alpha + \beta_1 SM_s + \beta_2 GVM_s + X'_i \delta + \varepsilon_{is} \quad (1)$$

Where Y_{is} represents the outcome variable for the individual i belonging to school s , SM_s and GVM_s are binary variables that take the value 1 if school s received the *Sanamente* or *GVM* program, respectively, and 0 otherwise. Finally, X'_i is a vector of student-level controls such as age and sex. The coefficients of interest in this model are β_1 and β_2 , which indicate differences in the outcome variable after treatment between individuals who received the corresponding intervention and those who did not. Considering that the randomization of the treatments was performed at the school level, we clustered the standard errors at that level to adjust for potential correlations in the outcomes of interest between students of the same school.

Since our estimations have a large number of outcomes, it is important to minimize the possibility of type I errors when making statistical inferences; that is, to reduce the probability of rejecting at least one null hypothesis when it is true (family-wise error rate). There are several methods to correct for multiple hypothesis testing (Bonferroni-Holm, Sidak-Holm) that are considered to be very conservative (with high levels of over-rejection) and that differ in the assumptions they make (e.g., independence of the outcomes under study). We use the [Westfall and Young \(1993\)](#) free step-down resampling method for the family-wise error rate (FWER) recently implemented in studies in which the condition of independence between outcomes is not imposed (See, for instance, [Anderson, 2008](#); [Blattman et al., 2017](#)). In Section 3 we will present unadjusted and FWER adjusted statistical

¹⁴Notice that we are unable to identify individual students in the different data surveys due to privacy of information regulations in Colombia. This prevents us from using other empirical strategies that would allow us to take advantage of the existence of a baseline and exploit changes over time in main outcomes for the same individual, such as difference-in-differences or ANCOVA.

inferences.

3 | RESULTS

3.1 | Main results

3.1.1 | Effects on risk perception and beliefs

Table 3 reports the impact of each treatment, evaluated at the first and second follow-ups. All impact estimates are expressed in effect sizes—that is, in terms of the standard deviation from the control group. Statistical significance without controlling for multiple hypotheses is denoted with stars, while p-values after controlling for multiple hypotheses, as described before, are shown in brackets. The results clearly show that both programs are effective in increasing the perception of risk associated with alcohol consumption. The perception of risk of alcohol use increases between 0.09 and 0.14 standard deviations depending on the program and the assessment horizon. Perception of risk associated with drug use also increases; however, the effects are only statistically different from zero for the *GVM* program. Importantly, the alcohol-related item of the perceived risk of drug use index denotes a statistically significant effect on the perception of risk of alcohol consumption for both programs. This is to be expected, as the focus of the prevention curricula in both cases focuses on alcohol consumption.

Both programs appear to be effective in affecting normative attitudes toward substance use, although the estimated effects are only statistically significant in the case of the 2-year follow-up. The magnitude of the effects on the normative measures is relatively similar to that of the effects on risk perceptions. Again, the effect on the specific item of the index that refers to alcohol is larger and is estimated more precisely.

Again, both programs appear to influence the perceptions of the pros and cons of alcohol consumption in the desired direction, particularly after the second stage of the intervention. The effects on both scales in the 2-year follow-up have the expected sign and are in most cases statistically significant. Most of the effects described so far remain statistically significant after controlling for multiple hypotheses as described before.

3.1.2 | Effects on socio-emotional skills

We do not find any systematic effects of the interventions on the measures of socio-emotional skills that are expected to prevent alcohol consumption. Estimated coefficients are close to null and statistically insignificant in most cases. The exception is the measure of self-regulation. The results point to a large positive and statistically significant effect of *GVM* treatment after the second stage of the intervention, as well as to a smaller and significant effect in the opposite direction in *Sanamente* treatment.

TABLE 3 Effects of the intervention on risk perception and normative beliefs

	Sanamete				GVM			
	First follow-up		Second follow-up		First follow-up		Second follow-up	
	Effect size	Adj. p-value	Effect size	Adj. p-value	Effect size	Adj. p-value	Effect size	Adj. p-value
Risk perception and normative attitudes								
Consumption Risk Perception (+)	0.102**	[1.000]	0.141***	[0.000]	0.0929**	[0.000]	0.129***	[0.000]
Perceived Risks of Drug Use (-)	-0.0563	[1.000]	-0.0517	[0.000]	-0.0853*	[1.000]	-0.110**	[0.000]
Perceived Risks of Drug Use (Alcohol item) (-)	-0.0732*	[1.000]	-0.0660*	[0.000]	-0.119***	[0.000]	-0.173***	[0.000]
Favorable Attitudes Toward Drug Use (-)	-0.0354	[1.000]	-0.115***	[0.000]	-0.0662	[1.000]	-0.0805*	[0.000]
Favorable Attitudes Toward Drug Use (Alcohol item) (-)	-0.0565	[1.000]	-0.134***	[0.000]	-0.0726*	[0.000]	-0.111***	[0.000]
Barriers for consumption (+)	0.000801	[1.000]	0.0725*	[0.000]	-0.0657	[1.000]	0.142***	[0.000]
Benefit of consumption (-)	-0.0740	[1.000]	-0.130***	[0.000]	-0.107**	[0.000]	-0.0566	[0.000]
Socioemotional skills								
Assertiveness (+)	0.0650	[1.000]	0.0320	[1.000]	0.0265	[1.000]	-0.0523	[0.000]
Self-care (+)	0.0509	[1.000]			0.0161	[1.000]		
Self-regulation (-)	0.00759	[1.000]	0.109**	[0.000]	-0.0596	[1.000]	-0.297***	[0.000]
Depression (-)	-0.00216	[1.000]	0.00142	[1.000]	0.0228	[1.000]	-0.0802	[0.000]
Observations	3553		4052		2441		2932	
Number of schools	66		74		47		54	

Notes: ***, **, and * denotes statistical significance at 1%, 5% and 10%, respectively, not adjusted for multiple hypothesis. The adjusted p-values presented in brackets were estimated following the methodology of Westfall and Young (1993) by performing 10,000 bootstraps. For the adjusted and unadjusted inference the standard errors were clustered by school. The expected sign of the effect for each variable is in parentheses.

3.1.3 | Effects on consumption prevalence

Table 4 reports the effects of the intervention on actual and expected alcohol consumption. Despite the effectiveness of both interventions in affecting risk perceptions and normative beliefs about alcohol consumption, we did not find systematic impacts on the incidence of alcohol consumption in the last month or on the probability of having been drunk in the last month, as measured by student reports in surveys. Interestingly, we do find an effect of the treatment in the desired direction on expected consumption of about 0.09 standard deviations for both programs, only measured in the 2-year follow-up.

TABLE 4 Effects of the intervention on alcohol consumption

	Sanamete				GVM			
	First follow-up		Second follow-up		First follow-up		Second follow-up	
	Effect size	Adj. p-value	Effect size	Adj. p-value	Effect size	Adj. p-value	Effect size	Adj. p-value
Consumption of Alcohol								
Alcohol Consumption - Last month (-)	0.0187	[1.000]	-0.0193	[1.000]	0.0626	[0.000]	0.00523	[1.000]
Has been drunk - Last month (-)			0.00122	[1.000]			-0.00263	[1.000]
Expected Consumption of Alcohol (-)			-0.0895**	[0.000]			-0.0887*	[0.000]
Observations	3553		4052		2441		2932	
Number of schools	66		74		47		54	

Notes: ***, **, and * denotes statistical significance at 1%, 5% and 10%, respectively, not adjusted for multiple hypothesis. The adjusted p-values presented in brackets were estimated following the methodology of Westfall and Young (1993) by performing 10,000 bootstraps. For the adjusted and unadjusted inference, the standard errors were clustered by school. The expected sign of the effect for each variable is in parentheses.

3.1.4 | Effects on knowledge about the consequences of consumption

In the second follow-up survey questionnaire, we included indicators of knowledge of the consequences of alcohol consumption to assess the extent to which the effects on perceptions and beliefs, which we observed in the first follow-up, were mediated by an increase in objective knowledge of the effects of alcohol intake.

Table 5 presents the results of this exercise. We find that students in both treatment groups are more likely to correctly answer a set of questions about the consequences of alcohol use (compared to those in the control group). This is an expected result, as the question referred to content included in the prevention curriculum received by the students treated by the intervention. We also find that students in both treatment groups scored higher on an index of knowledge of brain-mediated effects of alcohol use.

In addition, we added two indices that capture beliefs about the long-term effects of alcohol use. The first includes true statements about long-term effects—e.g., "consuming alcohol in large quantities over many years can cause liver damage: yes/no"—, while the second includes false statements about long-term consequences of alcohol use—e.g., "drinking large amounts of alcohol over many years can lead to lung cancer: yes/no". We expect that treated students are more likely to answer affirmatively the first set of questions

and less likely to answer affirmatively the second set of questions. We find a different result. Treated students are more likely to recognize the long-term consequences of alcohol use, but they are also more likely to incorrectly identify various health diseases that are not related to its consumption as consequences of alcohol use. This is not necessarily a cause for concern from the point of view of the effectiveness of the intervention, as it is difficult to expect detailed knowledge of the specific health harms of alcohol consumption at this age, and simply knowing that alcohol has harmful effects may be enough to change perceptions. Nevertheless, this result is informative for the design of prevention curricula.

TABLE 5 Effects on knowledge about the consequences of alcohol use

	Sanamente		GVM	
	Effect size	Adj. p-value	Effect size	Adj. p-value
Knowledge about consequences of alcohol consumption				
Internalization of contents (+)	0.308***	[0.000]	0.231***	[0.000]
Brain-mediated effects (+)	0.137***	[0.000]	0.164***	[0.000]
True statements about long-term effects (+)	0.247***	[0.000]	0.252***	[0.000]
False statements about long-term effects (-)	0.128***	[0.000]	0.106***	[0.000]
Observations	4052		2932	
Number of schools	74		54	

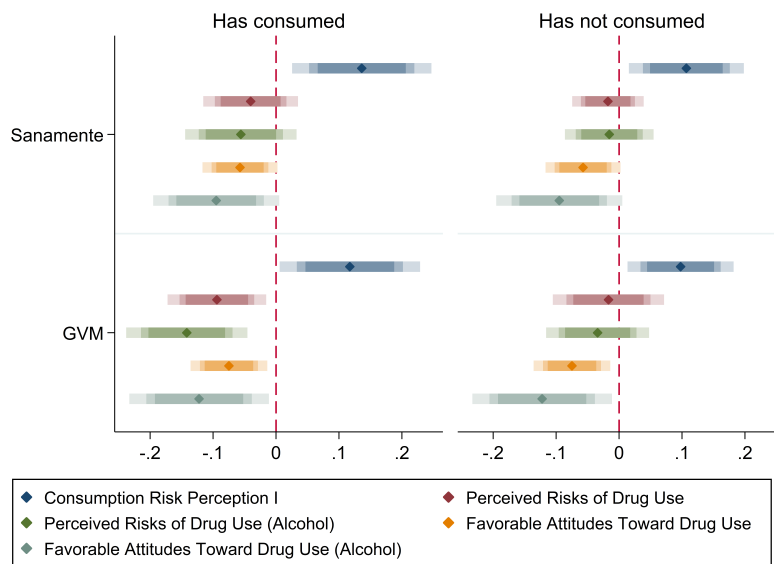
Notes: ***, **, and * denotes statistical significance at 1%, 5% and 10%, respectively, not adjusted for multiple hypothesis. The adjusted p-values presented in brackets were estimated following the methodology of Westfall and Young (1993) by performing 10,000 bootstraps. For the adjusted and unadjusted inference the standard errors were clustered by school. The expected sign of the effect for each variable is in parentheses.

3.2 | Further results: heterogeneous impacts

We now turn to analyze whether the effectiveness of the intervention varies depending on whether the beneficiaries started drinking alcohol or not before the intervention started. To do this, we divided the sample into two groups: students who had already consumed alcohol at the time the program began and students who had not yet consumed alcohol. In the following analysis, we refer to these groups two groups as "consumers" and "non-consumers", respectively.

Figure 1 shows the estimated effects of both programs on these two sub-samples for the first five variables included in the first panel of Table 3. Although the results show that for both groups (consumers and non-consumers) the estimated effects go in the same direction, they are stronger and statistically significant mainly for those students who reported having consumed before the interventions.

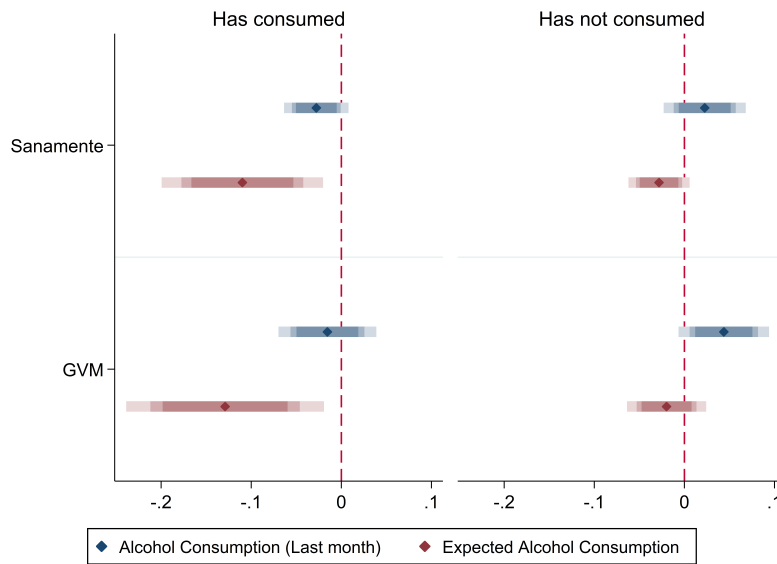
FIGURE 1 Effects on risk perception and normative attitudes - Consumer/Non-consumer



Notes: Each point estimate indicates the effect of the corresponding intervention on indicators of previous and expected alcohol consumption. Students were considered not to have consumed if they reported never having consumed alcohol or if their first reported alcohol consumption was before the implementation of the interventions. Confidence intervals at 90, 95, and 99 percent are included for each estimate. Estimates include controls for student age and sex. Standard errors are clustered at the school level.

Figure 2 shows the effects of the intervention on actual and expected alcohol consumption for the same two groups. We find that both programs are more effective in curbing current and expected consumption for students who had already started to drink before treatment, although the effects on current consumption are estimated with noise. These results seem to suggest that both interventions could not only play a preventive role but also be effective in reducing students' alcohol consumption patterns.

FIGURE 2 Effects on past and expected alcohol consumption - Consumer/Non-consumer



Notes: Each point estimate indicates the effect of the corresponding intervention on indicators of previous and expected alcohol consumption. Students were considered not to have consumed if they reported never having consumed alcohol or if their first reported alcohol consumption was prior to the implementation of the interventions. Confidence intervals at 90, 95, and 99 percent are included for each estimate. Estimates include controls for student age and sex. Standard errors are clustered at the school level.

4 | CONCLUSION

We assess the effects of two distinct school-based programs aimed at preventing underage alcohol drinking in Bogotá, Colombia. Both interventions share the common goal of deterring early alcohol consumption by introducing a curriculum designed to heighten risk perceptions associated with alcohol and modify normative influences related to alcohol consumption. However, the interventions differ in their approach to curriculum delivery: one is implemented through dedicated sessions in the classroom, while the other is integrated into physical education classes, combining the prevention curriculum with sports and recreational activities. We find that the two programs implemented were effective in shifting risk perception and normative beliefs about alcohol consumption among students in the desired direction. This is an encouraging result, as these perceptions and beliefs are important determinants of alcohol consumption decisions during adolescence. Interestingly, both programs have effects along both dimensions and these effects are quantitatively similar, suggesting that the consumption prevention curriculum, which is the common component of both programs, is a key element of the intervention.

Not surprisingly, we do not find effects on consumption patterns. First, the intervention aimed only at one of the multiple dimensions that affect underage drinking. Second, the magnitude of the impacts on perceptions and beliefs is relatively small, so it is difficult to expect these impacts to be sufficient to alter consumption patterns. However, two encouraging results are worth highlighting. First, the programs were effective in affecting alcohol consumption among students who had prior drinking experience. Second, the programs were successful in moderating the student's self-reported alcohol consumption

expectations.

We do not find effects on socio-emotional skills such as self-care or assertive communication, which are expected to deter risky behaviors such as alcohol consumption at an early age. However, it is important to bear in mind that the interventions' theory of change suggests a certain skepticism about the potential of this type of program to modify these skills, considering its short duration and the challenges associated with affecting those skills.

On the contrary, we evaluated the level of knowledge about alcohol consumption and found that students in treated schools were more likely to identify its long-term consequences for health. This, in turn, indicates that the effects of the intervention on perceptions and beliefs could be mediated by greater knowledge about the harmful health effects of alcohol consumption. However, we also found that treated students are more likely to incorrectly associate with the use of alcohol and various health diseases that are not related to consumption. This is informative for the design of the prevention curriculum.

5 | DISCUSSION

Although this study has external validity limitations inherent to all social experiments, the evidence provided has practical implications for policymakers, educators, and practitioners involved in alcohol prevention programs. Both evaluated programs have shown promising effectiveness at an important implementation scale (reaching more than ten thousand students during the study), and operating in high-vulnerability contexts.

Yet, further research is encouraged to develop and evaluate innovations to incorporate supplementary components to promote structural determinants (such as socio-emotional skills development) that may enhance the lasting impact of prevention initiatives. Also, by providing a deeper understanding of the complex interplay between ecological interventions, and contextual factors, future research can help to refine and optimize school-based programs for preventing underage alcohol drinking and contribute to the broader field of adolescent health and well-being.

6 | DECLARATIONS

Competing interests

- The authors have no relevant financial or non-financial interests to disclose.
- The authors have no competing interests to declare that are relevant to the content of this article.
- All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.
- The authors have no financial or proprietary interests in any material discussed in this article.

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REFERENCES

- Anderson, M. L. (2008) Multiple inference and gender differences in the effects of early intervention: A reevaluation of the abecedarian, perry preschool, and early training projects. *Journal of the American statistical Association*, **103**, 1481–1495.
- Blattman, C., Jamison, J. C. and Sheridan, M. (2017) Reducing crime and violence: Experimental evidence from cognitive behavioral therapy in Liberia. *American Economic Review*, **107**, 1165–1206.
- Cassola, I., Pilatti, A., Alderete, A. and Godoy, J. C. (2005) Conductas de riesgo, expectativas hacia el alcohol y consumo de alcohol en adolescentes de la ciudad de Córdoba. *Revista Evaluar*, **5**.
- Chaux, E., Barrera, M., Molano, A., Velásquez, A. M., Castellanos, M., Chaparro, M. P. and Bustamante, A. (2017) Classrooms in peace within violent contexts: Field evaluation of aulas en paz in Colombia. *Prevention science*, **18**, 828–838.
- Currie, C., Nic Gabhainn, S., Godeau, E. and Committee, I. H. N. C. (2009) The health behaviour in school-aged children: Who collaborative cross-national (HBSC) study: origins, concept, history and development 1982–2008. *International journal of public health*, **54**, 131–139.
- Foxcroft, D. R. and Tsertsvadze, A. (2012) Cochrane review: Universal school-based prevention programs for alcohol misuse in young people. *Evidence-Based Child Health: A Cochrane Review Journal*, **7**, 450–575.
- Goldman, M. S., Brown, S. A., Christiansen, B. A. and Smith, G. T. (1991) Alcoholism and memory: Broadening the scope of alcohol-expectancy research. *Psychological bulletin*.
- Gómez, A. P., Scoppetta, O. and Alarcón, L. F. (2011) Age at onset of alcohol consumption and risk of problematic alcohol and psychoactive substance use in adulthood in the general population in Colombia. *J Int Drug Alcohol Tobacco Res*, **1**, 19–24.
- Graham, J. W., Hofer, S. M. and MacKinnon, D. P. (1996) Maximizing the usefulness of data obtained with planned missing value patterns: An application of maximum likelihood procedures. *Multivariate Behavioral Research*, **31**, 197–218.
- Guerri, C. and Pascual, M. (2010) Mechanisms involved in the neurotoxic, cognitive, and neurobehavioral effects of alcohol consumption during adolescence. *Alcohol*, **44**, 15–26.

- Harding, F. M., Hingson, R. W., Klitzner, M., Mosher, J. F., Brown, J., Vincent, R. M., Dahl, E. and Cannon, C. L. (2016) Underage drinking: A review of trends and prevention strategies. *American Journal of Preventive Medicine*, **51**, S148–S157. Realizing Population-Level Improvement for All Children’s Cognitive, Affective, and Behavioral Health.
- Hawkins, J. D., Catalano, R. F. and Miller, J. Y. (1992) Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance abuse prevention. *Psychological bulletin*, **112**, 64.
- Hemovich, V., Lac, A. and Crano, W. D. (2011) Understanding early-onset drug and alcohol outcomes among youth: The role of family structure, social factors, and interpersonal perceptions of use. *Psychology, health & medicine*, **16**, 249–267.
- Hennessy, E. A. and Tanner-Smith, E. E. (2015) Effectiveness of brief school-based interventions for adolescents: A meta-analysis of alcohol use prevention programs. *Prevention Science*, **16**, 463–474.
- Hingson, R. W., Heeren, T. and Winter, M. R. (2006) Age at drinking onset and alcohol dependence: age at onset, duration, and severity. *Archives of pediatrics & adolescent medicine*, **160**, 739–746.
- Jacobus, J. and Tapert, S. F. (2013) Neurotoxic effects of alcohol in adolescence. *Annual review of clinical psychology*, **9**, 703–721.
- Jaimovich, S., Campos, M. C., Campos, M. S. and Moore, J. B. (2009) Spanish version of the child and adolescent self-care performance questionnaire: psychometric testing. *Pediatric nursing*, **35**.
- Ma, C., Bovet, P., Yang, L., Zhao, M., Liang, Y. and Xi, B. (2018) Alcohol use among young adolescents in low-income and middle-income countries: a population-based study. *The Lancet Child Adolescent Health*, **2**, 415–429. URL: <https://www.sciencedirect.com/science/article/pii/S2352464218301123>.
- Mejía-Trujillo, J., Pérez-Gómez, A. and Reyes-Rodríguez, M. F. (2015) Implementation and adaptation in Colombia of the communities that care. *Adicciones*, **27** 4, 253–64.
- Mesa, J., García, D., Betancort, M. and Segura, M. (2013) Psychometric properties of the spanish version of the children assertive behavior scale. *The Spanish Journal of Psychology*, **16**, E104.
- Michelson, L. and Wood, R. (1982) Development and psychometric properties of the children’s assertive behavior scale. *Journal of Behavioral Assessment*, **4**, 3–13.
- Molano, A., Harker Roa, A., Gómez, S. and Cristancho, J. C. (2018) Aproximaciones ecológicas al clima escolar en bogotá: perfiles de riesgo, asociaciones con desempeño escolar y entornos escolares. *Secretaría de Educación de Bogotá*.
- Moore, J. B. (1995) Measuring the self-care practice of children and adolescents: instrument development. *Maternal-Child Nursing Journal*, **23**, 101–108.
- ODC (2016) Estudio nacional de consumo de sustancias psicoactivas en población escolar, Colombia - 2016. *Tech. rep.*
- Parada, M., Corral, M., Mota, N., Crego, A., Holguín, S. R. and Cadaveira, F. (2012) Executive functioning and alcohol binge drinking in university students. *Addictive behaviors*, **37**, 167–172.
- Pérez-Gómez, A., Mejía-Trujillo, J., Brown, E. C. and Eisenberg, N. (2016) Adaptation and implementation of a science-based prevention system in colombia: challenges and achievements. *Journal of Community Psychology*, **44**, 538–545.
- Pilatti, A., Godoy, J. C. and Brussino, S. A. (2011) Expectativas hacia el alcohol y consumo de alcohol en niños y adolescentes de Argentina. *International Journal of psychology and psychological therapy*, **11**, 13–32.

- Rinehart, C. S., Bridges, L. J. and Sigelman, C. K. (2006) Differences between black and white elementary school children's orientations toward alcohol and cocaine: A three-study comparison. *Journal of Ethnicity in Substance Abuse*, **5**, 75–102.
- SAMSHA (2009) National study on drug use and health. *Substance Abuse and Mental Health Services Administration (SAMSHA)*.
- Sanhueza, C., García-Moreno, L. M. and Expósito, J. (2011) Weekend alcoholism in youth and neurocognitive aging. *Psicothema*, 209–214.
- Sarasa-Renedo, A., Sordo, L., Molist, G., Hoyos, J., Guitart, A. M. and Barrio, G. (2014) Principales daños sanitarios y sociales relacionados con el consumo de alcohol. *Revista Española de Salud Pública*, **88**, 469–491.
- Sneider, J. T., Cohen-Gilbert, J. E., Crowley, D. J., Paul, M. D. and Silveri, M. M. (2013) Differential effects of binge drinking on learning and memory in emerging adults. *Journal of addiction research & therapy*.
- Spear, L. (2013) The teenage brain: Adolescents and alcohol. *Current directions in psychological science*, **22**, 152–157.
- Squeglia, L. M., Jacobus, J. and Tapert, S. F. (2009) The influence of substance use on adolescent brain development. *Clinical EEG and neuroscience*, **40**, 31–38.
- Strøm, H. K., Adolfsen, F., Fossum, S., Kaiser, S. and Martinussen, M. (2014) Effectiveness of school-based preventive interventions on adolescent alcohol use: a meta-analysis of randomized controlled trials. *Substance abuse treatment, prevention, and policy*, **9**, 1–11.
- Telumbre Terrero, J. Y. and Sánchez-Jaimes, B. E. (2015) Percepción de barreras y beneficios del consumo de alcohol en adolescentes. *NURE investigación: Revista Científica de enfermería*, **12**, 3.
- Westfall, P. H. and Young, S. S. (1993) *Resampling-based multiple testing: Examples and methods for p-value adjustment*, vol. 279. John Wiley & Sons.
- Wood, R., Michelson, L. and Flynn, J. (1978) Assessment of assertive behavior in elementary school children. *Tech. rep.*, Chicago: Annual Meeting of the Association for Advancement of Behavior Therapy.

APPENDIX. ADDITIONAL FIGURES AND TABLES

TABLE A.1 Balance of school and individual characteristics between experimental groups in schools surveyed both at baseline and at 1-year follow-up

Panel A: School characteristics	Control group		Sanamente		GVM	
	Mean	S.D.	Difference	S.E.	Difference	S.E.
Reading score	-0.344	(0.549)	-0.178	(0.127)	-0.041	(0.159)
Math score	-0.400	(0.486)	-0.075	(0.123)	-0.026	(0.159)
Science score	-0.411	(0.538)	-0.149	(0.121)	0.007	(0.164)
Repetition rate	9.128	(4.652)	-0.032	(1.230)	0.245	(1.292)
Desertion rate	2.632	(3.994)	0.061	(0.950)	0.698	(1.245)
Socioeconomic status	1.922	(0.338)	-0.157*	(0.080)	-0.070	(0.109)
Number of schools	27		81		81	
Panel B: Students characteristics						
Age	11.451	(1.051)	0.027	(0.057)	0.011	(0.090)
Gender	1.479	(0.500)	-0.008	(0.019)	0.027	(0.021)
Panel C: Consumption prevalence						
Lifetime alcohol use	0.198	(0.399)	-0.005	(0.023)	0.026	(0.027)
Lifetime beer use	0.164	(0.370)	-0.002	(0.018)	-0.000	(0.020)
Age at first use of alcohol	0.455	(0.499)	-0.027	(0.042)	0.008	(0.046)
Age at first use of beer	0.596	(0.492)	-0.039	(0.046)	0.007	(0.055)
Alcohol Consumption - Last month	0.136	(0.343)	-0.011	(0.018)	-0.008	(0.020)
Panel D: Risk perception and normative attitudes						
Consumption Risk Perception	2.942	(1.013)	0.001	(0.042)	0.008	(0.052)
Perceived Risks of Drug Use	1.784	(0.865)	0.068	(0.041)	-0.065	(0.045)
Perceived Risks of Drug Use (Alcohol item)	1.541	(1.051)	0.129**	(0.063)	-0.015	(0.065)
Favorable Attitudes Toward Drug Use	1.309	(0.562)	0.014	(0.027)	-0.000	(0.027)
Favorable Attitudes Toward Drug Use (Alcohol item)	1.481	(0.803)	0.010	(0.036)	0.016	(0.037)
Panel E: Consumption prevalence						
Assertiveness	1.271	(1.215)	-0.025	(0.049)	-0.051	(0.066)
Self-care	2.501	(0.503)	0.056	(0.041)	0.020	(0.056)
Number of students	1,465		4,688		4,688	

Notes: The table shows summary statistics and the balance of covariates between the experimental groups that were surveyed at baseline and at the 1-year follow-up for school-level characteristics (panel A), student-level characteristics (panel B), incidence of alcohol consumption (panel C), measures of perception of risks of and normative attitudes about use of alcohol (panel D) and measures of socio-emotional skills (panel E). Columns (1) and (2) present the mean and standard deviation of each variable in the control group. Columns (3) and (5) show the mean differences for each variable between schools and individuals in the control group with respect to those in the Sanamente and GVM treatments, respectively, and the corresponding standard errors in parentheses. In columns (3) and (5), ***, ** and * denote statistically significant differences at 1%, 5% and 10% significance levels. The last two rows of the table show the number of observations—schools and students—used for the calculation of each column statistics: in column (1) this corresponds to the size of the control group, while in columns (3) and (5) it indicates the sizes of the control group and the Sanamente treatment arm, and the control group and the GVM treatment arm, respectively.

TABLE A.2 Balance of school and individual characteristics between experimental groups in schools surveyed both at baseline and at 2-year follow-up

Panel A: School characteristics	Control group	Sanamente	GVM	Difference	S.E.
	Mean				
Reading score	-0.426	(0.517)	-0.120	(0.113)	-0.077 (0.171)
Math score	-0.452	(0.486)	-0.054	(0.117)	-0.025 (0.164)
Science score	-0.464	(0.516)	-0.120	(0.108)	-0.045 (0.161)
Repetition rate	9.373	(4.362)	-0.238	(1.113)	-0.185 (1.219)
Desertion rate	3.245	(3.873)	-0.296	(0.890)	-0.162 (1.234)
Socioeconomic status	1.873	(0.336)	-0.102	(0.076)	-0.016 (0.109)
Number of schools	34		86		86
Panel B: Students characteristics					
Age	11.442	(1.037)	0.036	(0.053)	-0.020 (0.083)
Gender	1.477	(0.500)	-0.009	(0.017)	0.038** (0.018)
Panel C: Consumption prevalence					
Lifetime alcohol use	0.201	(0.401)	-0.007	(0.019)	0.027 (0.025)
Lifetime beer use	0.162	(0.369)	0.001	(0.016)	0.007 (0.018)
Age at first use of alcohol	0.443	(0.497)	-0.018	(0.039)	0.018 (0.044)
Age at first use of beer	0.593	(0.492)	-0.049	(0.038)	0.012 (0.051)
Alcohol Consumption - Last month	0.133	(0.339)	-0.006	(0.015)	-0.001 (0.018)
Panel D: Risk perception and normative attitudes					
Consumption Risk Perception	2.961	(1.024)	-0.016	(0.038)	-0.005 (0.051)
Perceived Risks of Drug Use	1.798	(0.886)	0.057	(0.034)	-0.060 (0.039)
Perceived Risks of Drug Use (Alcohol item)	1.601	(1.100)	0.077	(0.054)	-0.064 (0.061)
Favorable Attitudes Toward Drug Use	1.304	(0.553)	0.023	(0.023)	0.010 (0.023)
Favorable Attitudes Toward Drug Use (Alcohol item)	1.475	(0.799)	0.027	(0.031)	0.034 (0.031)
Panel E: Socio-emotional skills					
Assertiveness	1.295	(1.227)	-0.031	(0.045)	-0.100 (0.063)
Self-care	2.520	(0.517)	0.037	(0.035)	-0.007 (0.052)
Number of students	2,087		5,210		5,210

Notes: The table shows summary statistics and the balance of covariates between the experimental groups that were surveyed at baseline and at the 2-year follow-up for school-level characteristics (panel A), student-level characteristics (panel B), incidence of alcohol consumption (panel C), measures of perception of risks of and normative attitudes about use of alcohol (panel D) and measures of socio-emotional skills (panel E). Columns (1) and (2) present the mean and standard deviation of each variable in the control group. Columns (3) and (5) show the mean differences for each variable between schools and individuals in the control group with respect to those in the Sanamente and GVM treatments, respectively, and the corresponding standard errors in parentheses. In columns (3) and (5), ***, ** and * denote statistically significant differences at 1 percent, 5 percent, and 10 percent significance levels. The last two rows of the table show the number of observations—schools and students—used for the calculation of each column statistics: in column (1) this corresponds to the size of the control group, while in columns (3) and (5) it indicates the sizes of the control group and the Sanamente treatment arm, and the control group and the GVM treatment arm, respectively.

TABLE A.3 Outcome variables and survey instruments

Survey modules	Indicators	Instruments
Consumption of alcohol and other substances.	Frequency of consumption - Age at first drinking episode - Questions related to excessive and future alcohol consumption.	Jóvenes de Comunidades que se Cuidan Survey (EJCQC).
Normative beliefs about consumption	Normative beliefs scale. Scale of perceived barriers and benefits related to alcohol consumption.	Scale elaborated by Colectivo Aquí y Ahora as part of the Sanamente Program. - Telumbre Terrero and Sánchez-Jaimes (2015)
Perception of risks associated with consumption	2 risk perception scales.	Scale elaborated by Colectivo Aquí y Ahora as part of the Sanamente Program. - Scale elaborated by the Colombianitos Foundation as part of the Goles para una Vida Mejor Program.
Socio-emotional dimensions.	Assertiveness, depression and self-regulation.	Children Assertive Behavior Scale (CABS) - Jóvenes de Comunidades que se Cuidan Survey (EJCQC) - Aulas en Paz (Chaux et al., 2017).
Mechanisms and channels	Protective and risk factors of the community (3), family (6), school (3) and peers (2).	Jóvenes de Comunidades que se Cuidan Survey (EJCQC).
Knowledge about the consequences of alcohol use.	Knowledge about harmful effects of alcohol use, knowledge about brain-mediated effects, beliefs about true long-term effects, beliefs about false long-term effects.	One self-developed question and three sets of questions taken from Rinehart et al. (2006) .

Notes: Own elaboration.