

Effects of a social norms intervention to reduce alcohol drinking behaviors in Argentinean adolescents

Efectos de una intervención basada en normas sociales para reducir las conductas de consumo de alcohol en adolescentes argentinos

Efeitos de uma intervenção baseada em normas sociais para reduzir comportamentos de consumo de álcool em adolescentes argentinos

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Abstract: Alcohol-related social norms are internalized beliefs regarding the extension and approval of alcohol consumption by social reference groups. Prevention programs based on social norms and behavioral insights are empirical evidence-based approaches that challenge cognitive biases and promote healthy choices by providing actual information of targeted behaviors. These programs, to our knowledge, have not been applied to reduce alcohol use in Latin-America. Objectives: This study examined the effectiveness of a school-based social norms intervention to reduce alcohol use behaviors in high-school adolescents from Córdoba city (Argentina). Ninety-two students (Mean age = 14.18±0.82 years) participated. A 2 (type of school administration: public, private) x 2 (treatment: experimental, control) factorial design was employed. Data collections provided information on actual alcohol consumption, perceived alcohol consumption of classmates and discrepancies (i.e., biases) between both measures. Results: A brief feedback session, which was complemented with the placement of posters inside the classroom, reduced the prevalence and frequency of several alcohol drinking behaviors. These effects were more noticeable in the public than in the private schools. Conclusions: This is, to our knowledge, the first report of a program that applied a social norms strategy to reduce alcohol consumption in high schoolers from South America.

Keywords: social norms; high-school; alcohol use; normative feedback

Resumen: Las normas sociales relacionadas con el alcohol son creencias internalizadas con respecto a la extensión y aprobación del consumo de alcohol en grupos sociales de referencia. Los programas de prevención basados en normas sociales y percepciones conductuales desafían los sesgos cognitivos y promueven elecciones saludables al proporcionar información real sobre conductas específicas. Hasta donde sabemos, estos programas no se han aplicado en Sudamérica. Objetivos: Este estudio examinó la efectividad de una intervención de normas sociales para reducir las conductas de consumo de alcohol en estudiantes de una escuela media de la ciudad de Córdoba (Argentina). Participaron 92 estudiantes (edad media = 14,18 ± 0,82 años). Se empleó un diseño factorial 2 (tipo de administración escolar: pública, privada) x 2 (tratamiento: experimental, controlado). Se recolectó información sobre el consumo real y percibido de alcohol, y se detectaron discrepancias entre ambas medidas. Resultados: Breves sesiones de retroalimentación, complementadas con carteles dentro del aula, redujeron la prevalencia y la frecuencia del consumo de alcohol. Estos efectos fueron más notorios en las escuelas públicas. Conclusiones: Este es, hasta donde sabemos, el primer reporte de aplicación de una estrategia de normas sociales para reducir el consumo de alcohol en estudiantes Sudamericanos.

Palabras clave: normas sociales; educación secundaria; consumo de alcohol; retroalimentación normativa



Resumo: As normas sociais relacionadas ao álcool são crenças internalizadas sobre a extensão e a aprovação do consumo de álcool em grupos sociais de referência. Programas de prevenção baseados em normas sociais e percepções comportamentais desafiam vieses cognitivos e promovem escolhas saudáveis por meio de informações reais sobre comportamentos específicos. Até onde sabemos, esses programas não foram aplicados na América do Sul. Objetivos: este estudo examinou a eficácia de uma intervenção de normas sociais para reduzir comportamentos de consumo de álcool em estudantes do ensino médio na cidade de Córdoba (Argentina). Participaram 92 estudantes (M idade = 14,18 ± 0,82 anos). Foi utilizado um desenho fatorial 2 (tipo de administração escolar: pública, privada) x 2 (tratamento: experimental, controle). Foram coletadas informações sobre consumo real e percebido de álcool e detectaram-se discrepâncias entre as duas medidas. Resultados: Breves sessões de feedback, complementadas por cartazes em sala de aula, reduziram a prevalência e a frequência do consumo de álcool. Esses efeitos foram mais perceptíveis nas escolas públicas. Conclusões: Este é, até onde sabemos, o primeiro estudo sobre a aplicação de uma estratégia de normas sociais para reduzir o consumo de álcool em estudantes sul-americanos.

Palavras-chave: normas sociais; educação secundária; consumo de álcool; feedback normativo

Alcohol is the most consumed psychoactive substance among Argentinean adolescents, with 54 % and 35 % of teenagers (aged 12-17) reporting, respectively, last year and last month alcohol use (Sedronar, 2017). Arguably more concerning: heavy episodic drinking (HED), which is associated with a plethora of negative consequences (Chung et al., 2018; Kuntsche et al., 2017), is also highly prevalent (between 35 % and 50 %) in Argentinean adolescents and youth (Rivarola Montejano et al., 2016).

In Argentina, as in most western countries, the onset of alcohol use usually occurs during high school (i.e., between ages 12 to 17) or earlier, with 66 % of adolescents (aged 13-17) reporting alcohol use before 14 years old (Ministerio de Salud y Desarrollo Social, 2018). Studies in college samples from Argentina reported that by ages 18-19 the use of alcohol is normative, with reported lifetime prevalence of alcohol use nearing 95 % (Pilatti et al., 2014; Pilatti et al., 2017). Findings from a sample of Argentinian adolescents (13-17 years old) indicated that 78.9 % and 76.1 % reported lifetime and last-year alcohol use, while 46.8 % reported engaging in HED within the previous month (Pilatti et al., 2023). It seems, therefore, that high-schoolers should be prime targets for prevention efforts aimed at either delaying the initiation of alcohol drinking or —if such onset has already occurred— reducing the extension of hazardous drinking behaviors. The latter include drunkenness and HED, which in drinkers aged approximately 14 to 15 involves the ingestion of 3 or 4 (girls and boys, respectively) standard drinks of alcohol in a single drinking occasion (Chung et al., 2018). HED is associated with several negative consequences, including greater probability of alcohol-related injuries, traffic accidents and interpersonal violence (Chung et al., 2018; Vera et al., 2020a). Those students who exhibit HED, or a rapid progression from first drink to drunkenness, are also at greater risk for alcohol use disorders (Linakis et al., 2019; Morean et al., 2014; Vera et al., 2020b).

Social cognitive models posit that behavior is partially determined through cognitions learned and maintained via exposure to social models. Social norms refer to the effect that relevant social groups exert on substance use, via the internalization of guidelines and values of the reference group (Cialdini & Goldstein, 2004). Social norms for alcohol use, which are important factor contributing to the transition from social to problematic drinking (Perkins, 2007; Tobin et al., 2014), refer to the perception of how much alcohol is used (“descriptive norms”) by individuals belonging to reference social groups (father, mother, typical student, etc.), and to the perception of the level of approval/disapproval of drinking by these groups (“injunctive norms”; Neighbors et al., 2011). Adolescents tend to overestimate how much alcohol their peers drink and the level of approval of drinking behaviors (Amialchuk et al., 2019; Borsari & Carey, 2003; Pilatti et al., 2017). These biases help develop the belief that their own alcohol consumption is less problematic, or socially accepted, which leads to greater alcohol involvement.

Different interventions in educational settings, based on social norms theory, have been associated with reductions in alcohol-related behaviors (Gersh et al., 2019; Stock et al., 2016; Vallentin-Holbech et al., 2018). The interventions, built around these cognitive biases, aim at reducing alcohol involvement by challenging these misperceptions. A key feature of these interventions is to obtain information regarding alcohol use and social norms. The information is then used to provide feedback on the divergence between actual and perceived behavior (Boyle et al., 2018). Traditionally, the feedback is given face to face, in individual or collective settings, or through posters/billboards and written materials (Jones et al., 2017). Another study (Vallentin-Holbech et al., 2018) developed an interactive web application to provide the feedback. It has been reported, however, that students may not exhibit significant interest in such an approach, resulting in low engagement with the application (Stock et al., 2020).

The implementation of programs based on social norms to prevent alcohol use in adolescents has been associated with significant reductions in HED (Morgenstern et al., 2009; Stock et al., 2016; Vallentin-Holbech et al., 2017; Vallentin-Holbech et al., 2018; Vallentin-Holbech et al., 2019) and in the level of approval of peer drinking (Vallentin-Holbech et al., 2017). Other studies also showed a significant decrease in the prevalence of drunkenness (Faggiano et al., 2008), or in the frequency of the negative consequences of drinking (Vallentin-Holbech et al., 2018). Moreover, Gersh et al. (2019) implemented a brief online intervention aimed at providing normative feedback to reduce alcohol use via changes in peer norms. The findings showed changes in social norms (e.g., reductions in the perceived proportion of peers using alcohol), which, in turn, were associated with reductions in frequency and quantity of alcohol use in adolescents. A recent study (van Roozendaal et al., 2024) showed that a social norms campaign corrected misperceptions (about peer's alcohol use) but did not reduce alcohol consumption. Evidence on the short- and long-term effectiveness of these programs remains limited and controversial (Foxcroft et al., 2015; Gersh et al., 2019; Miller & Prentice, 2016). Moreover, most of these programs have been implemented in the US, or in other developed countries (Gersh et al., 2019; Jiloha, 2017; Jones et al., 2017; Vallentin-Holbech et al., 2017), which limits the generalization of the findings. Due to a lack of local studies in the target age group (i.e., high-school adolescents), it is difficult to predict if these interventions would be useful in Argentina.

Therefore, it is relevant and necessary to examine the effectiveness of interventions based on social norms to reduce underage alcohol use in less studied populations, particularly those whose idiosyncratic cultural features (Pilatti et al., 2023; Kuendig et al., 2008) may promote early contact with alcohol. In some, so-called "wet", cultures (Piumatti et al., 2021) alcohol is readily available for children at some homes, for instance due to the parents' belief that such supervised exposure could inoculate against hazardous drinking at adolescence (van der Vorst et al., 2009). In Pilatti et al. (2013) the main source of alcohol in Argentinean children (8-12 years old) involved their parents providing them alcohol beverages or them being allowed to drink in family gatherings. Argentina has been usually classified as a "wet" culture in which alcohol use is the norm and drinking is embedded in daily activities (Graham et al., 2008).

This study implemented a social-norms based intervention program to reduce alcohol use behaviors in 14-years old Argentinean high school students. The students reported their own alcohol use and their perception about drinking behaviors in their classmates. We identified discrepancies and biases between these measures, and conducted normative feedback sessions that exposed the biases. The hypothesis was that students exposed to this intervention would show a reduction in alcohol use behaviors compared to control students not exposed to the program. In Argentina, privately administered, but not publicly-administered, schools attract students that, for the most part, belong to upper or upper-middle class families (Formichella, 2011). Thus, another aim was to assess if the impact of the intervention program was affected by the type of school administration.

Materials and methods

General description of the intervention

The intervention was conducted between April and August of 2019 in two private and two public schools of Córdoba City (Argentina). In most provinces of Argentina, the secondary level of education comprises grades first to sixth. Public secondary schools are managed by the Ministry of Education of each province, whereas private schools are managed by a non-government organization or a private institution. Both receive public funds –albeit private schools much less than public schools- and follow the same curricula. Several private schools were contacted, yet only two finally agreed to participate. The public schools were selected by the Ministry of Education of the Province of Córdoba, who endorsed the intervention.

The normative feedback messages were provided, in those division assigned to the experimental condition, via verbal sessions held during class hours and the placement of posters inside the classroom. The messages were based on the results from all responses to the baseline (i.e., pre-test) survey which assessed drinking behaviors and perception of the extension of such behaviors in the class' peers. The survey, which was administered 30 days before the intervention, was answered individually but applied collectively by members of the research team, during class hours in the classrooms or in the computer rooms. The first page or screen had an information sheet (i.e., included study objectives, activities to be

performed, risks and benefits) and the informed consent. The data collected through the survey was explored for discrepancies, at the group level, between indicators of objective drinking (i.e., report of students' own drinking) and normative consumption (i.e., report of the female and male classmates drinking) of alcohol. Based on this information, normative messages were created to expose these misperceptions.

The intervention consisted of normative verbal feedback, provided by a group of trained and experienced psychologists, and emphasized discrepancies between actual behaviors and perceived alcohol use (at the group level), and was accompanied by a slideshow projected on a monitor. The investigators designed a script, which began by thanking the students for their participation in the program. Then, a set of contrasting sentences indicated the main discrepancies found between actual and perceived drinking behaviors. For instance, "Most of you believe that the typical student of this class drinks at least once per month, yet the results derived from the survey indicate that the great majority of you did not drink at all in the month before the survey" or "According to the answers you gave on the survey, none of the students of this course got drunk in the last month; however, almost half of you believe that the vast majority of your classmates did get drunk in the last month". Specific numeric references (i.e., number of drinks per occasion) were sometimes used, if deemed useful. The script was rehearsed before the actual feedback session. Efforts were made to emphasize that the data shown derived from the baseline survey.

The feedback session (length: 20 min) was followed by a ludic activity conducted to promote engagement with the intervention. It consisted of a brainstorming by which the students generated, without input from the psychologists, hashtags that summarized the experience they had been involved with, for example, #HealthyClass (#CursoSaludable) or #HaveFunWithoutAlcohol (#DivertiteSinAlcohol). The student chose the hashtag they liked the most and a week later they received a sticker with this hashtag. Before leaving, the psychologists hanged 3-4 posters inside the classroom, with division-specific social norms messages, which reinforced the students' exposure to the intervention.

Those divisions assigned to the experimental condition were exposed to a second intervention session, approximately 45 days after the first intervention. A post-test measurement, employing the same survey as in the pre-test, was conducted approximately 45 days after this second intervention. Participants assigned to the control groups were exposed to the data collection procedures, but no normative feedback was provided. After termination of the study the controls were given an intervention on social skills and emotional regulation, aimed at promoting resilience against hazardous drug and alcohol use.

Design and sample

A 2 (treatment: experimental, control, i.e., the measurements were followed or not by normative feedback sessions, respectively) x 2 (type of school administration: public, private) factorial design was employed. The program was applied to 92 high school students (58 females) aged between 13 and 17 ($M_{age} = 14.18 \pm 0.82$) attending the 3rd year (i.e., out of six; equivalent to the 9th grade in the US) of two public and two private secondary schools.

In each school the program was applied to all students enrolled in a same 3rd year division. Students within each division share their daily activities in the same physical classroom. The assignment of each division as experimental or control, within each type of administration (i.e., public or private), was random. The parents or the adolescents' legal representatives were contacted, using the notification system of each institution, and debriefed on the aims, procedures, and potential consequences of the participation of the minors in the study. Their signed consent was required and no indication was provided as to the condition (experimental or control) assigned to their children. Likewise, the adolescents were asked for informed and signed consent. The adolescents whose parents or legal representatives did not provide the consent, or those who did not give their own consent, did not take part of the study.

Sample size in the pre-test was 16 and 31 participants in the private-school divisions, and 31 and 14 participants in the public-school divisions (experimental and control groups, respectively). Due to student absenteeism some cases were missed in the post-test. Specifically, sample size in the post-test was 13 and 27 participants in the private school divisions, and 21 and 9 participants in the public-school divisions (experimental and control groups, respectively).

The procedures, which were reviewed and approved by the institutional review board of the ethics committee of our institution (IIPsi-CONICET-UNC), endorsed the ethical guidelines for human research of the American Psychological Association, the Declaration of Helsinki and the National Law 25.326 for the Protection of Personal Data. The rationale for selecting 3rd-year high-school students as the target for the intervention took into account that the first drink among Argentinean adolescents occurs close to age 14, and that a significant fraction of these students rapidly escalates their drinking patterns (Pilatti et al., 2014; Pilatti et al., 2017). Our hypothesis was that the intervention would serve as a figurative break for the acceleration of alcohol drinking.

Instruments

Alcohol use

All questions for alcohol use: (a) defined alcohol use as drinking at least one standard drink (i.e., 1 SD = 14 g of alcohol) of any alcoholic beverage, (b) included an image describing the volume (in milliliters) of different alcoholic beverages equivalent to a standard drink, and (c) asked about drinking during the last 30 days. Following previous studies (Author et al., 2019), participants were asked about several alcohol use indices. Specifically, three questions measured the occurrence (0 = No; 1 = Yes) of drinking at least one SD of alcohol (have you ever drunk a standard drink or more of alcohol on the same occasion?), the number of SD consumed (when you drank alcohol, in general: how many standard drinks did you consume on the same occasion?) and the number of drinking days (i.e., frequency; how many days have you drunk a standard drink or more on the same drinking occasion?). Two separate questions assessed the occurrence (have you ever drunk on the same occasion of consumption 3 standard drinks or more if you are female, or 4 standard drinks or more if you are male?) and the frequency (how many days have you drunk 3 standard drinks or more if you are female, or 4 standard drinks or more if you are male, on the same drinking occasion?) of HED; and two questions measured the occurrence (have you ever consumed alcohol to the point of becoming intoxicated?) and the frequency of drunkenness (how many days have you been drunk from drinking alcohol?).

Alcohol use perceived norms

Following previous studies (Borsari & Carey, 2003; Neighbors et al., 2008), a questionnaire with mirrored questions (relative to those questions measuring alcohol use) measured perceived drinking behaviors in male and female classmates. First, students reported the perceived quantity of male and female classmates with alcohol use during the last 30 days. Then, students reported the perceived amount and perceived frequency of alcohol use (in the last 30 days) of the typical male classmate (TMC) and the typical female classmate (TFC). TMC and TFC was defined as the one who drinks alcohol as most males or females do, respectively.

Specifically, three questions asked the number of classmates who drank at least one SD (Think of all the classmates in your course, how many of them, do you think, have drunk, on the same occasion, a standard drink or more?), the number of SD consumed by the TMC and the TFC (how many standard drinks, do you think, the TMC and the TFC consumed on each occasion of drinking?) and the amount of days the TMC and the TFC have drunk (i.e., frequency; how many days, do you think, the TMC and the TFC have drunk a standard drink or more?). Four separate questions measured the occurrence (think of all the classmates in your course, how many of them, do you think, have drunk 3 or more standard drinks – if they are female – or 4 standard drinks or more – if they are male – on the same occasion?) and the frequency (how many days, do you think, the TMC has drunk 4 standard drinks or more and the TFC 3 standard drinks or more on the same occasion of drinking?) of HED; in addition, we measured the occurrence (think of all the classmates in your course, how many of them, do you think, have drunk alcohol until they got drunk?) and the frequency of drunkenness (how many days, do you think, the TMC and the TFC have drunk alcohol until they got drunk?).

Data Analysis

Separate factorial Analyses of Variance (ANOVAs) were conducted on pre-test a) number of drinks per drinking occasion, b) number of days in which alcohol was consumed and c) frequency of HED. The comparative factors were Missing case (yes or no) and Type of school management (Public or Private). The aim was to ascertain if there were significant differences, in the target variables, between

those participants who provided data for both pre- and post-tests assessment and those who did not complete the post-test survey. These preliminary analyses indicated that there were no significant baseline, pre-test, differences in number of drinks per drinking occasion, number of days in which alcohol was consumed or frequency of HED, between those who completed the two surveys and those who dropped out from the study. The interaction between dropping out membership (i.e., yes, no) and attendance to public or private school was not significant, for any of the variables analyzed.

Descriptive analyses (i.e., central tendency, deviation indices, frequency, percentage) were conducted, for the overall sample and separately for males and females, to describe alcohol use and the baseline (i.e., pre-test) perception of alcohol use. Each participant was asked for this perception in the TMC and the TFC. These questions were averaged for this descriptive statistical analysis.

To examine the effectiveness of the intervention to reduce alcohol use, we compared drinking behaviors before and after the intervention. Last-month prevalence of alcohol-drinking behaviors (%) at the pre- and post-test measurements was separately compared in public-and private schools. Specifically, we employed a test of differences between proportions (two-sided and one sided for the pre- and post-test comparisons, respectively) to analyze differences in the prevalence of students reporting drinking a full SD in the previous month, the prevalence of HED and the prevalence of drunkenness.

The main dependent variables (i.e., number of drinks per drinking occasion, number of days in which alcohol was consumed and frequency of HED, at the pre- and post-test) were separately analyzed via repeated measures ANOVAs. Type of administration and treatment were the between-group factors, whereas the pre- and post-test assessments were the within-group measures. Missing data due to incomplete surveys was minimal and was not replaced. Each analysis involved those participants that responded the items under analysis. An alpha of .05 was employed, and the locus of the significant interactions yielded by the ANOVAs was analyzed via Tukey's HSD post-hoc tests.

Results

Descriptive analyses

Descriptive data for the pre- and post-test prevalence of alcohol drinking, HED and drunkenness (and for number of SD per drinking occasion), in the overall sample and separately for male and females, is presented in Table 1. The latter also informs (see lower section) on perception of alcohol-drinking behaviors at the pre-test in the control and experimental groups of each type of school.

Table 1

Alcohol-drinking behaviors (total sample and by sex, upper section); and descriptive social norms of alcohol use and excessive alcohol use at the pretest (lower section)

	Pre-test			Post-Test		
	Total (n = 92)	Women (n = 58)	Men (n = 34)	Total (n = 69)	Women (n = 47)	Men (n = 22)
AU last 30 days	35.0%	32.8%	38.2%	36.2%	37.0%	34.8%
HED	19.6%	19%	20.6%	21.43%	21.3%	21.7%
Drunkenness	13.0%	13.8%	11.8%	8.57%	12.8%	0%
SU by drinking occasion	M=2.27, SD=1.70	M=2.13, SD=1.84	M=2.46, SD=1.51	M=2.52, SD=1.37	M=2.58, SD=1.51	M=2.38, SD=1.07
	Private Experimental Group	Private Control Group	Public Experimental Group	Public Control Group		
	M±SD	M±SD	M±SD	M±SD		
SD – TMC	1.50±1.32	2.31±1.54	3.22±4.00	4.29±3.43		
SD – TFC	1.06±1.06	1.56±1.26	2.60±3.08	3.04±2.72		
FU – TMC	1.41±1.69	1.90±2.10	2.38±3.00	4.00±3.70		
FU – TFC	1.12±1.50	1.61±2.29	2.33±2.77	2.77±2.52		
HED – TMC	.62±1.20	.94±1.12	3.78±4.06	3.71±3.99		
HED – TFC	.56±1.75	.65±.88	2.79±2.19	1.85±1.46		

Notes. T1: first data collection; T3: third data collection; AU: alcohol use; HED: Heavy episodic drinking; SU: Standard units; SD: Standard drinks of alcohol per occasion; FU: Frequency of alcohol use; TMC: typical male classmate; TFC: typical female classmate.

Prevalence of alcohol drinking as a function of treatment and school administration

As shown in Table 2, the pre-test prevalence of alcohol-drinking behaviors was statistically similar between experimental and control groups, in both type of schools. Yet, after the intervention the prevalence of alcohol drinking in the last 30 days was notably lower in the experimental than in the control groups. This difference was borderline significant for public schools (55.56 vs 23.81%, control vs. experimental group, respectively; $p=0.051$) but not in private schools (44.44 vs 23.08%, $p =0.09$). The prevalence of HED after the intervention was significantly lower in the public-experimental group, than in the public-control group (14.28 vs 44.44%, respectively; $p=0.04$). Drunkenness was not significantly affected by the treatment in either type of schools.

Table 2

Prevalence (%) of Alcohol-drinking behaviors (last 30 days) in high-school students attending private or public high-schools from Córdoba, Argentina

Prevalence of Alcohol-drinking behaviors (%)		Private Schools		Public Schools		Sig.
		Control	Exp.	Control	Exp.	
Drinking 1 SD	Pre-test	16.12	18.75	71.42	45.16	ns; ns
	Post-test	44.44	23.08	55.56	23.81	.09; .05
HED	Pre-test	6.45	0	28.57	22.58	ns; ns
	Post-test	14.81	15.38	44.44	14.28	ns; .04
Drunkenness	Pre-test	3.13	0	14.28	19.35	ns; ns
	Post-test	7.40	7.69	22.22	9.52	ns; ns

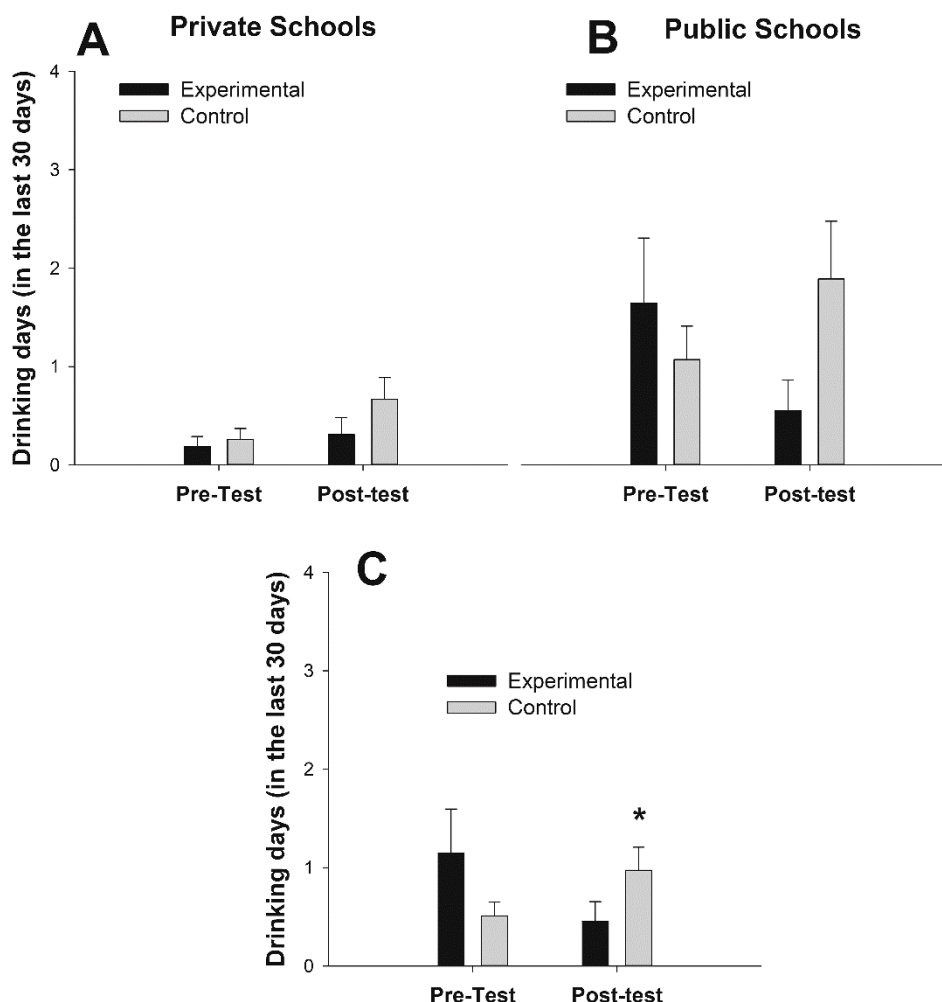
Notes. The students were assessed for the extension of these alcohol-drinking behaviors and for their beliefs on the extension of these behaviors (pre-test), and then exposed (or not, Control groups) to a normative feedback session aimed at reducing cognitive discrepancies between those measures. Thirty-days after this intervention the students were again assessed for their prevalence of alcohol-drinking behaviors. Data are expressed as percentages. The last column indicates significant differences between experimental and control groups of private (first word/number) or public schools (second word/number), as indicated by a test of difference between proportions. Ns: non-significant; HED: Heavy episodic drinking; Sig: significant.

Alcohol-drinking behaviors as a function of treatment and school administration

The ANOVA on number of days in which alcohol was consumed (in the last 30 days, descriptive data in Figure 1) yielded a significant main effect of type of administration ($F_{1,65} = 7.99, p < .01, \eta^2 p = 0.11$; significantly greater number of drinking days in public than private schools) and a significant interaction between treatment and measurement ($F_{1,65} = 5.04, p < .05, \eta^2 p = 0.07$). The post-hoc tests indicated significant pre- to post-test increase in the number of drinking days in the participants assigned to control group, a pattern not observed after the experimental treatment. This effect seemed to be restricted to students enrolled in public schools, yet the three-way interaction did not achieve significance.

Figure 1

Number of days (in the last 30 days) in which alcohol was consumed, at baseline (i.e., pre-test) and at a post-test measurement, in 3rd year high school students

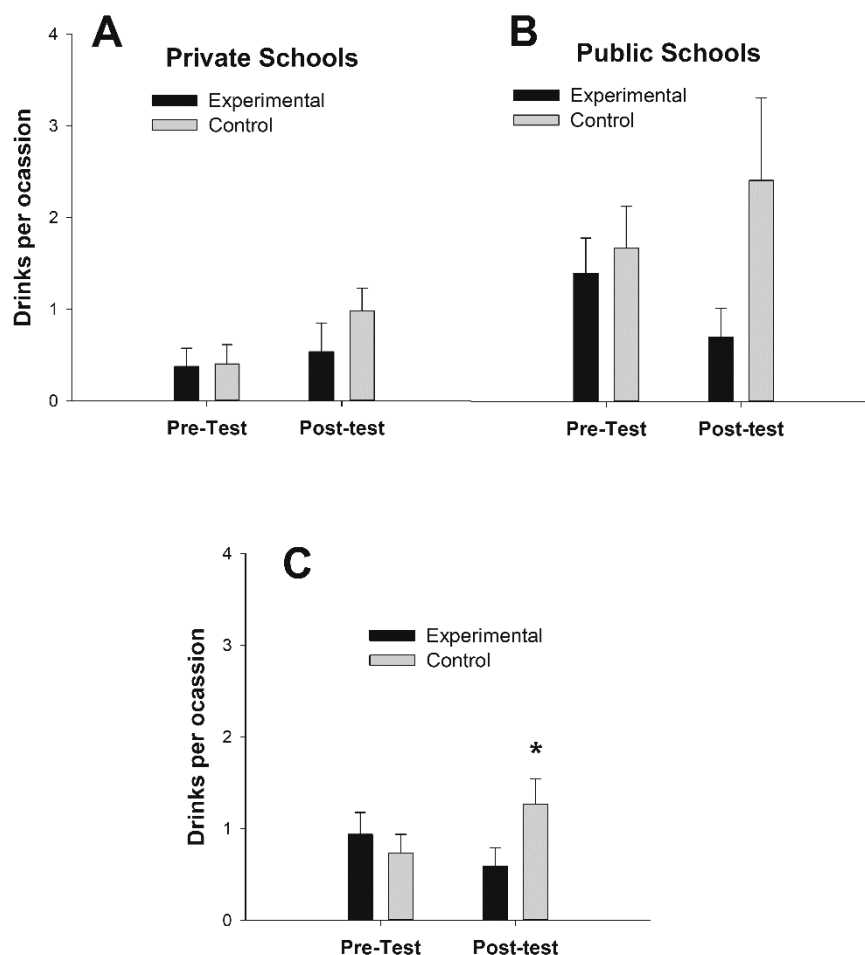


Notes. A-B. The pupils were enrolled in public or private schools and were exposed (or not; experimental and control groups, respectively) to a social-norms based intervention program to prevent alcohol use. *C.* Same data as in A-B but collapsed across type of school (i.e., private, public). The statistical analysis indicated a significantly greater number of drinking in public than private schools and a significant pre- to post-test increase in the number of drinking days in the participants assigned to the control group. The latter pattern, which was not observed in the experimental group, is indicated with an asterisk (*). Data are expressed as mean \pm SEM.

The ANOVA for the number of drinks per occasion (see Figure 2) revealed significant main effects of Treatment, Type of administration and Measurement ($F_{1,66} = 4.98, p < .05, \eta^2 p = 0.07$; $F_{1,66} = 5.22, p < .05, \eta^2 p = 0.07$ and $F_{1,66} = 5.08, p < .05, \eta^2 p = 0.07$, respectively). The number of drinks per occasion was significantly lower in private than in public schools, in participants assigned to the experimental treatment than in those assigned to the control group and was also significantly lower in the pre- vs. the post-test measurement. The interaction between Treatment and Measurement approached but did not achieve significance, $F_{1,66} = 2.20, p = .080, \eta^2 p = 0.05$. Guided by our a priori hypotheses we conducted planned comparisons for the pre- and post-measurements, one for each treatment group. These comparisons indicated that, relative to the pre-test, the control group significantly increased the number of drinks consumed per occasion in the post-test ($F_{1,66} = 5.20, p < .01$), yet the number of drinks consumed by the experimental group exposed to the intervention remained stable across these measurements ($p > .70$).

Figure 2

Number of drinks per drinking occasion, at baseline (i.e., pre-test) and at a post-test measurement, in 3rd year high school students

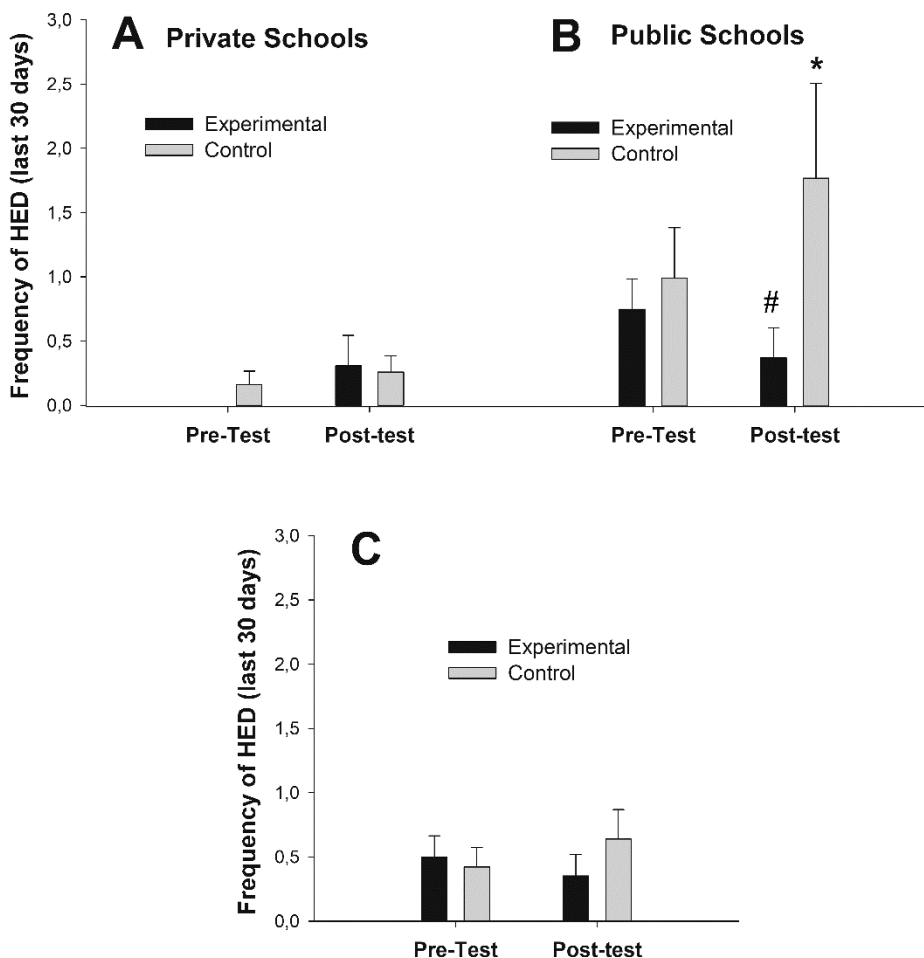


Notes. **A-B.** The pupils were enrolled in public or private schools and were exposed (or not; experimental and control groups, respectively) to a social-norms based intervention program to prevent alcohol use behaviors. **C.** Same data as in A-B but collapsed across type of school (i.e., private, public). The statistical analysis indicated that the number of drinks per occasion was significantly lower in private than in public schools and that, relative to the pre-test and as denoted by the asterisk sign (*), the control group significantly increased the number of drinks consumed per occasion in the post-test. Data are expressed as mean \pm SEM.

The analysis of the frequency of HED (data shown in Figure 3) revealed significant main effects of Type of administration and Measurement ($F_{1,66} = 8.07, p < .01, \eta^2 p = 0.11$; $F_{1,66} = 6.06, p < .05, \eta^2 p = 0.09$) and a significant Treatment x Measurement interaction ($F_{1,66} = 4.05, p < .05, \eta^2 p = 0.06$). The Type of administration x Treatment x Measurement interaction was also significant ($F_{1,66} = 9.76, p < .005, \eta^2 p = 0.13$). As confirmed by the post-hoc tests, the frequency of HED across pre- and post-tests measurements was similar in students enrolled in the privately-administered schools regardless exposure to the normative intervention. In contrast, those students enrolled in public schools and assigned to the control condition exhibited a significant two-fold increase in the frequency of HED. The frequency of HED in participants from public schools that were exposed to the intervention remained stable across the measurements. Moreover, the post-hoc tests for the post-test measurement revealed that pupils enrolled in public schools and exposed to the intervention exhibited significantly less frequency of HED than those in the public-control condition.

Figure 3

Frequency of heavy episodic drinking (HED), at baseline (i.e., pre-test) and at a post-test measurement, in 3rd year high school students



Notes. **A-B.** The pupils were enrolled in public or private schools and were exposed (or not; experimental and control groups, respectively) to a social-norms based intervention program to prevent alcohol use behaviors. **C.** Same data as in A-B but collapsed across type of school (i.e., private, public). The statistical analyses indicated that those students enrolled in public schools and assigned to the control condition exhibited a significant increase in the frequency of HED at the post-test, compared to the pre-test; and that at the post-test the pupils enrolled in public schools and exposed to the intervention exhibited significantly less frequency of HED than those in the public-control condition. These significant differences are denoted by the asterisk (*) and pound (#) signs, respectively. Data are expressed as mean \pm SEM.

Discussion

The high prevalence of underage drinking makes it imperative to deploy strategies to delay the age of alcohol use onset or, for those that already began this behavior, prevent the escalation towards HED and drunkenness (Vera et al., 2019). The preventive approach based on social norms is promising (Bewick et al., 2013), well perceived by adolescents (Stock et al., 2020), logistically simple and relatively low-cost (Stock et al., 2016). The present study examined the effectiveness of a social norm intervention, targeting 3rd year high-school adolescents from Argentina, to reduce alcohol drinking. To our knowledge, this is the first study in South America that reports the results of such an intervention. The main results were that brief feedback sessions, which were then refreshed via posters and engagement activities, seemed sufficient to modulate the prevalence or frequency of several alcohol-drinking behaviors. These effects, congruent with those found after the application of homologous interventions in economically affluent countries (Gersh et al., 2019; Stock et al., 2016; Vallentin-Holbech et al., 2018)

were more noticeable in public schools than in those under a private administration. We will now discuss the results in more detail.

Prevalence (%) of HED exhibited, in the control conditions, a substantial increment between the pre- and the post-measures (i.e., 6.45 vs 14.8 % and 28.57 vs. 44.44 % in the private and public administrations, respectively). A potential explanation entails the possibility that the mere exposure to the alcohol questionnaire (with the subsequent discussion of the items among students) may have led to an increase in HED rates. Although this result was not expected, it was not a surprising finding. Notably, drinking onset among Argentinean adolescents usually occurs around 14 and many of these individuals make a rapid escalation from first drink to more problematic patterns of consumption, such as HED (Pilatti et al., 2014; Pilatti et al., 2017).

Our expectation of the intervention working as a figurative break for the increase of alcohol use behaviors was, to a certain extent, fulfilled. The public-experimental condition showed a significantly lower prevalence of HED at the post-test than the public-control condition and also exhibited a remarkable resilience to the, already noted, increase in prevalence of HED observed in the control sample. Further, the students from the public condition exposed to the normative feedback materials kept their number of HED days (in the last 30 days) below 0.5 whereas their control peers exhibited a significant increase at the post-test, nearing 2 days with HED in that time frame. The apparent success of the intervention treatment was also observed in a significantly lower number of drinks per occasion and in the number of drinking days, in the experimental than in the control groups.

Overall, the effectiveness of the intervention was somewhat lower in the private than in the public schools. The reasons underlying this phenomenon are not clear, yet they could relate to the substantially higher prevalence or occurrence of alcohol-related behaviors in the public schools, a pattern consistent with prior findings from the US (O'Malley et al., 2006). The number drinking days, the frequency of HED and the number of drinks per occasion was higher in public than in private schools. It has been suggested (Neighbors et al., 2011) that the interventions based on social norms are more effective in groups with relative high levels of baseline execution of the target behavior. Such high levels may make those drinking behaviors, or the negative consequences associated with their execution, more salient and thus more amenable to be modified by interventions. It is also possible, however, that the better performance of public schools is actually an artifact derived from the experimental mortality exhibited in those schools (Jurs & Glass, 1971). Conceivable, the students that left the study could have been those with worse alcohol outcomes, thus their departure from favored the size of treatment effects in the public schools.

The excitement brought by the significant effects of the intervention is met by important limitations. First, we used a convenience sampling, which prevents extrapolating the results to the Argentinian population as a whole. The number of educational establishments was also low, raising the possibility of conflating treatment with institution-level effects. The missing cases not only diminished the potency of the design but, as acknowledged, entail the possibility that those from the experimental group who deserted were those more resistant to the intervention, thus affecting the pattern of results.

Despite these drawbacks, the results are relevant for several countries of the southern cone of Latin America, which are culturally similar to Argentina and exhibit a substantial prevalence of underage drinking. Data from Chile, for instance, indicates a significant increase in binge drinking in the last 20 years, with those in the age range 14-24 being largely responsible for this increase (Senda, 2017). In Uruguay, two thirds (59.9 %) of high school students had their first drink by age 15 or younger, and by ages 17 or more lifetime prevalence of alcohol use was near 95 % (Observatorio Uruguayo de Drogas, 2022). In summary, the present report indicates that intervention programs based on social norms may be a valid, and cost-effective, alternative to reduce the extent of alcohol-related behaviors in high-school students of Argentina, and probably in other cultures sharing the "wet" characteristics of this country (Graham et al., 2008; Piumatti et al., 2021).

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