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Effectiveness of D.A.R.E/Keepin' it REAL bullying prevention program among Brazilian students

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Abstract

Introduction: Given the growing scientific evidence on the detrimental effects of bullying, several prevention programs have been implemented internationally to prevent this behavior among students. Brazil's Educational Program for Drug and Violence Resistance (PROERD) is an adaptation of US' DARE/Keepin' it REAL program, being the most widespread school-based prevention program in the country. However, it has been offered without any effectiveness evaluation. As such, this study evaluates the effectiveness of PROERD in reducing bullying perpetration and victimization among students.

Methods: Two cluster randomized controlled trials were carried out with 4030 students (1727 5th graders and 2303 7th graders) in 30 public schools in São Paulo, Brazil. The intervention group attended 10 PROERD classes taught by trained police officers whereas the control group underwent no intervention. Data were collected by self-administered questionnaires using smartphones at two moments (baseline preintervention and 9-month follow-up). Multilevel analysis included two paradigms, complete cases (CC) and intention-to-treat (ITT), using Full Information Maximum Likelihood (FIML) and Multiple Imputation (MI).

Results and conclusion: Results show no statistical difference between groups, indicating lack of evidence on PROERD's effectiveness in preventing bullying behaviors. The insufficient number of classes on bullying prevention and the lack of cultural adaptation may explain these unexpected results. New in-depth evaluation studies concerning the program's components and process are needed.

KEYWORDS
adolescents, children, perpetration, school, victimization, violence

1 | INTRODUCTION

Studies show that exposure to school violence is detrimental to children and adolescents' learning and cognitive development and can have long-lasting effects on their physical and mental health (Takizawa et al., 2014). Among the types of violence enacted, bullying has garnered great concern due to its association with severe disabling mental illness (Moore et al., 2017; Strohacker et al., 2019), eating disorders (Lie et al., 2019), suicidal ideation, and suicide attempts (Strohacker et al., 2019), being a possible direct cause of these events. Given the serious long-term effects of bullying and its relation to school tragedies such as suicides and school shootings (Pontes & Pontes, 2019), bullying prevention became both a challenge and a priority to the educational system. Governments worldwide should foster the development and implementation of bullying prevention programs (Sivaraman et al., 2019).

In Brazil, the most widely implemented school-based drug and violence prevention program is the Programa Educacional de Resistência às Drogas e à Violência (Educational Program for Drug and Violence Resistance—PROERD) (Pereira et al., 2016), based on the North American program DARE (Drug Abuse Resistance Education) created by the Los Angeles Police. In 2009, DARE replaced their previous curriculum, which had iatrogenic effects, for an adapted version of the Keepin' it Real

(KiR) program named DARE-Keepin' it REAL (DARE-KiR) (Day, Miller-day, et al., 2017a). In 2014, the military police responsible for PROERD adopted the DARE-KiR curriculum and named it "PROERD–Caindo na Real."

Several studies have investigated the effects of KiR on alcohol and substance use, finding mostly favorable outcomes (Gosin et al., 2003; Hecht et al., 2003, 2008; S. S. Kulis et al., 2017; Warren et al., 2006). KiR's effects on violence, however, have yet to be extensively investigated even though the program's developers have publicized that the skills developed within KiR can prevent or reduce risky behaviors such as bullying (Real Prevention, 2020).

In the past decade, police officers have widely implemented DARE-KiR in US schools as a drug prevention program, but to the best of our knowledge, no randomized controlled trial has evaluated the program's effects. A single study assessed the effectiveness of DARE-KiR using a quasi-experimental design to evaluate secondary outcomes in elementary students. Its results showed promising effects of the program on students' peer pressure resistance, strength in explaining why they refused offered cigarettes, and skills and knowledge in responsible decision-making (Day, Miller-Day, et al., 2017b). We have previously evaluated the effectiveness of PROERD in preventing drug use among students, using the same sample as this study. Besides finding no effects of the program on drug use prevention, we observed that 7th graders who underwent the intervention and engaged in binge drinking at baseline had a higher chance of continuing this consumption behavior than students from the control group (Sanchez et al., 2021). All other published studies analyzed different versions of the KiR curriculum and not the one adapted and disseminated by US police officers (DARE-KiR), which is the version that has been implemented in Brazil. Even these other KiR versions, however, presented few and unfavorable violence prevention outcomes. Previous studies concluded that the program was ineffective in reducing theft, fighting, and weapon carrying among students (S. S. Kulis et al., 2019; Nieri et al., 2014).

Other research has shown that school-based drug use prevention programs effectively prevented school violence (Botvin et al., 2006) while violence prevention programs have been effectively preventing the use of both alcohol and other drugs (Cox et al., 2016; Hahn et al., 2007). This exchange occurs because drug use and violence share similar protective (school and social bonds, parental monitoring, etc,) and risk (anger, depression, and aggressive peers) factors (Foshee et al., 2011). When investigating interventions with adolescents, Skeen et al. (2019) found that interpersonal skills, emotional regulation, and alcohol and drug education were components with a significant positive effect on preventing bullying, substance use, and mental health problems.

Despite lacking scientific evidence regarding its effectiveness, in 2019 PROERD was elevated to a public policy in the state of São Paulo (State Law 17,171/2019), becoming the only program to be implemented as a public policy for bullying prevention in Brazil.

Since interventions can produce different results depending on the cultural context in which they are implemented, possibly promoting ineffective or even harmful effects (Moos, 2005), the effects of DARE-KiR on bullying in Brazil must be investigated. We thus evaluated the effectiveness of the PROERD—"Caindo na Real" school prevention program in reducing the prevalence of bullying victimization and perpetration among 5th and 7th grade students.

2 | METHODS

As PROERD features two different curricula for different grades (5th and 7th grade), its effectiveness was evaluated by two parallel cluster randomized controlled trials (cRCT), with two arms each, conducted with 1727 5th graders and 2303 7th graders from 30 public schools in São Paulo, Brazil, during 2019. The intervention group (7th and 5th grade curriculum) attended 10 PROERD classes taught by trained police officers whereas the control group underwent no intervention.

Baseline assessment was carried out before program implementation during February and March 2019 and follow-up data was collected 9 months later in November and December 2019. The school year in Brazil lasts from February to December. Data were collected simultaneously in the control and intervention schools.

This study was registered in the Brazilian Clinical Trials Registry (REBEC) under protocol No. 6q23nk and the study protocol was approved by the Research Ethics Committee. School directors signed an informed consent form to participate in the study before randomization. Students also signed a consent form, but after randomization.

2.1 | Sampling

In total, 1727 5th graders and 2303 7th graders from 30 public schools in São Paulo, Brazil, participated in the study. All 5th and 7th graders of each selected school contributed to the study and all students present at the time participated in data collection.

Since PROERD features two different curricula designed for different grades (7th and 5th grade), two different sample sizes were calculated to evaluate its effect. The required sample size estimated for the 5th grade was 1820 participants (70 per group) for a power of 80%, a 5% significance level, 0.3 effect size, and 0.02 interclass correlation (AHN et al., 2014). The

parameters used were based on the bullying instrument (Guilheri, 2016) and on results from a previous randomized controlled trial (Sanchez et al., 2017).

Based on Donner & Klar (Donner & Klar, 2010), the minimum sample size required for the 7th grade was estimated as 1608 participants (67 per group) for a power of 80%, a 5% significance level, a 7% difference of proportions, and 0.02 interclass correlation. The parameters used were based on a study by the KiR USA (S. Kulis et al., 2007; F. F. Marsiglia et al., 2011).

Both the intervention and control groups were homogenous regarding gender, age, and ABEP-based socioeconomic classification. At baseline, 53.93% of 5th graders in the intervention group and 48.60% in the control group were boys; for 7th graders, 51.75% of students in the intervention group and 51.31% in the control group were boys. The mean age of participants was the same for both control and intervention groups (10-year-old for 5th graders and 12-year-old for 7th graders) (Tables 1 and 2).

TABLE 1 Distribution of 5th grade students in baseline according to sociodemographic, bullying, and allocation group in the cluster randomized controlled trial of PROERD program

	Total (N = 1727)		Intervention (N = 801)		Control (N = 926)	
	N	%	N	%	N	%
5th grade students						
Gender						
Male	882	51.07	432	53.93	450	48.60
Female	845	48.93	369	46.07	476	51.40
Avarage age	10.12 ± 0.65		10.10 ± 0.68		10.14 ± 0.61	
SES[a]						
A	117	9.00	49	7.94	68	9.96
B	447	34.38	224	36.30	223	32.65
C	642	49.69	309	50.08	337	49.34
D–E	90	6.92	35	5.67	55	8.05
Bullying (mean ± SD)						
Victimization	1703	1.46 ± 1.71	788	1.35 ± 1.67	915	1.55 ± 1.74
Perpetration	1690	0.37 ± 0.87	781	0.35 ± 0.86	909	0.38 ± 0.88
Bullying victimization						
Verbal	620	36.30	268	33.97	352	38.30
Social exclusion	360	21.09	162	20.53	198	21.57
Physical	247	14.47	108	13.69	139	15.14
Rumor spreading	500	29.31	200	25.35	300	32.72
Taking money/belongings	483	28.35	206	26.14	277	30.24
Threatening	138	8.10	61	7.74	77	8.41
Racial	141	8.28	63	7.99	78	8.52
Bullying perpetration						
Verbal	214	12.57	93	11.82	121	13.22
Social exclusion	99	5.82	50	6.36	49	5.36
Physical	152	8.95	70	8.92	82	8.97
Rumor spreading	70	4.13	28	3.57	42	4.61
Taking money/belongings	50	2.95	20	2.55	30	3.29
Threatening	18	1.06	4	0.51	14	1.54
Racial	32	1.89	17	2.18	15	1.65

[a]Socioeconomic classification according to ABEP, information collected in follow-up.

2.2 | Randomization

Two random drawings were performed by an external collaborator who was not involved in data collection. First, a list of eligible schools was made by consulting the National Institute for Educational Studies and Research "Anísio Teixeira" (INEP), which includes information on all schools from São Paulo, according to the following inclusion criteria: a (a) public school with (b) both grades of interest (5th and 7th) that (c) had not applied the PROERD program to its students in the past 3 years. The eligibility list consisted of 59 schools, of which 30 were chosen as the main target and, in case of any nonacceptance, the other 29 could be picked as potential subtstitutes. The institutions were randomly assigned to each group (intervention or control) using Efron's biased coin, which allows for a balanced sample (1:1 allocation ratio), implemented by the PASS software version 22. In the intervention schools, all 5th and 7th graders participated in PROERD. All invited

TABLE 2 Distribution of 7th grade students in baseline according to sociodemographic, bullying, and allocation group in the cluster randomized controlled trial of PROERD program

	Total (N = 2303)		Intervention (N = 1200)		Control (N = 1103)	
	N	%	N	%	N	%
7th grade students						
Gender						
Male	1187	51.54	621	51.75	566	51.31
Female	1116	48.46	579	48.25	537	48.69
Avarage age	12.28 ± 0.72		12.28 ± 0.74		12.27 ± 0.71	
SES[a]						
A	130	5.71	74	6.25	56	5.12
B	773	33.93	416	35.14	357	32.63
C	1222	53.64	629	53.12	593	54.20
D–E	153	6.72	65	5.49	88	8.04
Bullying score (mean ± SD)						
Victimization	2289	0.59 ± 1.17	1191	0.56 ± 1.15	1098	0.62 ± 1.18
Perpetration	2286	0.17 ± 0.65	1190	0.16 ± 0.64	1096	0.19 ± 0.66
Bullying victimization						
Verbal	511	22.29	255	21.36	256	23.32
Social exclusion	191	8.33	97	8.12	94	8.56
Physical	70	3.06	33	2.77	37	3.37
Rumor spreading	238	10.39	122	10.23	116	10.56
Taking money/belongings	164	7.16	71	5.96	93	8.47
Threatening	58	2.53	31	2.60	27	2.46
Racial	119	5.20	65	5.46	54	4.92
Bullying perpetration						
Verbal	187	8.18	88	7.39	99	9.02
Social exclusion	52	2.27	30	2.52	22	2.01
Physical	58	2.54	23	1.93	35	3.19
Rumor spreading	36	1.57	14	1.18	22	2.01
Taking money/belongings	20	0.87	8	0.67	12	1.09
Threatening	20	0.87	11	0.92	9	0.82
Racial	24	1.05	16	1.34	8	0.73

[a]Socioeconomic classification according to ABEP, information collected in baseline.

schools agreed to participate in the study, but unlike the information recorded on the INEP list, two of these schools had only 7th grade classes in 2019. Consequently, the 5th grade classes sample included 28 schools whereas the 7th grade classes sample had 30 schools.

2.3 | Intervention

PROERD—"Caindo na Real" is a Brazilian Portuguese adaptation of the USA KiR substance use prevention school program (F. Marsiglia & Hecht, 2005). KiR consists of 10 weekly 50-min classes taught by trained police officers and guided by a student and a teacher with a handbook. The 5th grade curriculum offers a specific class on bullying featuring five situations to illustrate the issue and teach students how to report bullying safely. The 7th year curriculum offers no such class but discusses situations of bullying and violence under other subjects, such as the class on "conflicts" and "scenarios for abstaining." The teacher's handbook provides information about the procedures, objectives, required materials, activities to be performed, and tips for each lesson. The police instructors responsible for the program receive a 40-h training offered by the Military Police under the guidance of US developers (D.A.R.E. America).

2.4 | Instruments and measures

A self-reported audio-guided questionnaire was applied to students in the classroom when teachers were absent and anonymously completed on smartphones provided by the researchers. These devices use audio and images, which facilitate understanding the questions and allow students with low reading and writing proficiency—a highly prevalent issue in Brazilian public schools (OECD, 2019)—to participate. The phones can also send the collected data directly to an online database without need for typing the responses, thus avoiding errors.

Bullying was assessed using the original translated version of the OBVQ-R (Solberg & Olweus, 2003) for the 7th grade and the adapted version for the 5th grade. The questionnaire consists of two global questions on how often students have been bullied and have taken part in bullying others and seven specific questions on bully/victim situations which identify different types of bullying (verbal, physical, or relational), such as: "I was called names…"/"I called (an)other student(s) names"; "I was hit, kicked…"/"I hit, kicked, pushed, and shoved others." It is a widely used questionnaire (Guilheri, 2016; Kyriakides et al., 2006; Lee & Cornell, 2009) and was validated for Brazilian Portuguese by Guilheri (2016). Response alternatives for both global and specific questions are: "I haven't bullied/been bullied…," "only once or twice," "two or three times a month," "about once a week," and "several times a week." Students are considered a victim or bully if they answer "two or three times a month" or higher. A pilot study identified some difficulties during data collection among 5th graders, who had not yet mastered reading and had trouble understanding different answers/categories per item. As such, the number of answer categories per questions was adapted by replacing the 5-point scale for binary answers ("yes" or "no") and including a question on whether each specific bullying situation happened recently and also last year.

Fifth graders were considered victims or bullies if they answered "yes" on each category (victim or perpetrator) for both "recently" and "past year," which show recurrence of the event. Solberg & Olweus' (Solberg & Olweus, 2003) original scale was applied to the 7th grade without modification, adopting the cut-off point of three or more times for each event in the past month for victims and bullies.

2.5 | Statistical analysis

Data first underwent descriptive analysis, with categorical variables being summarized by number and percentage and quantitative variables by means and standard deviation. All descriptive analyses were run on STATA 16 software.

Two different paradigms were used to analyze the effects of PROERD on bullying victimization and perpetration: complete case (CC) and intention-to-treat (ITT) analysis. CC analysis considers only observation with complete baseline and follow-up data; therefore, cases with missing values were excluded. For ITT, two statistical methods were employed to account for missing data. The effect was estimated among all participants, disregarding the extent to which they met treatment requirements or their presence/absence at follow-up. Conditional transition analyses were also performed, allowing the effect of the program to be estimated for each adolescent profile according to the participant's report of victimization or perpetration at baseline. All analyses were adjusted for gender, age, socioeconomic status (SES), and baseline bullying victimization or perpetration. CC analysis also evaluated the possible effect of the program on the seven types of bullying assessed in this study and the possible moderating effect of gender on the program (Supporting Information: Appendices 1 and 2).

Attrition analysis compared students whose data from the two collection moments matched those of students who answered only the baseline questionnaire (Supporting Information: Appendices 3 and 4).

2.6 | Missing data

ITT analysis employed two methods to account for missing data: Full Information Maximum Likelihood (FIML) and Multiple Imputation (MI). MI generated 50 imputed datasets with missing values replaced by input values by a sequential imputation approach (L. Muthén & Muthén, 2010) and appropriately combined results obtained from each of them. The imputation model included covariant variables. FIML considers that each parameter is estimated directly for each individual based on the observed variables in the data set, using all available data without first filling in missing data values. MI and FIML assume that the mechanism for data loss is random (Missing at Random—MAR) when the probability of missing data in a variable is related to some other variable measured in the model but not to the value of the variable with missing values itself (Enders, 2001). Using MI and FIML, the effect of the program can be estimated for all participants regardless of losses to follow-up, following the ITT paradigm guidelines.

2.7 | Multilevel structure

All inferential analyses were performed in the Mplus program version 8.4 (L. K. Muthén & Muthén, 2017), where the estimator used maximum likelihood with robust standard errors (MLR). MLR accounts for nonindependence of observations (i.e., adolescents nested in schools). Subsequently, as proposed by Asparouhov (2005), the standard error was computed considering the multilevel structure by a command in Mplus called (TYPE = Complex) using a sandwich estimator (Asparouhov, 2006). Since bullying was measured as a count variable, negative binomial regression with log as the link function was used to analyze the effects. Significance level was set at 5%.

3 | RESULTS

Of the 2174 5th graders enrolled in the 72 classes from the 28 randomized schools, 1727 completed the baseline questionnaire and 1334 completed the follow-up questionnaire 9 months later (77.24%). In the 7th grade, of the 2890 students enrolled in the 90 classes from the 30 randomized schools, 2303 answered the baseline questionnaire and 1739 answered the follow-up questionnaire 9 months later (75.51%) (Figure 1).

Tables 1 and 2 summarize the characteristics of 5th and 7th graders who participated in the cRCT baseline assessment of the PROERD program. Bullying mean scores were higher among 5th grade students (1.46 ± 1.71) than among 7th graders (0.59 ± 1.17). Verbal bullying was the most prevalent for both grades and for both victimization (36.30% in 5th grade; 22.29% in 7th grade) and perpetration (12.57% in 5th grade; 8.18% in 7th grade).

Table 3 presents the distribution and change over time of bullying perpetration and victimization in each group (intervention and control) for both grades. Bullying perpetration and victimization decreased significantly over time for both 5th grade groups but increased in 7th grade.

Table 4 shows the effects of PROERD based on three analytical paradigms (CC, FMIL, MI) among 5th and 7th graders. As observed, we found no statistical difference between groups, which indicates a lack of evidence regarding the program's bullying behavior prevention. Moreover, results show no evidence of effectiveness of PROERD on preventing the seven types of bullying assessed here (Supporting Information: Appendix 1). As for the effect moderated by gender, the analysis found no statiscally significant results (Supporting Information: Appendix 2).

Attrition analysis found no significant difference between the adolescents who answered the questionnaire at baseline and follow-up and those lost to the 9-month follow-up regarding the bullying outcomes, the randomization groups (i.e., intervention and control), and gender. The values differend only regarding age: those lost to follow-up were mostly older students. These findings were consistent between the 5th and 7th grades (Supporting Information: Appendices 3 and 4).

4 | DISCUSSION

This cluster randomized controlled trial evaluated the effectiveness of the PROERD school prevention program, widely disseminated in Brazilian schools via two curricula: 5th grade and 7th grade, both adapted from the US DARE-Keepin' it REAL program. The program showed no effectiveness in reducing bullying perpetration and victimization regardless of the analysis paradigm used.

We advanced knowledge of bullying prevention by conducting the first effectiveness study of the Brazilian adapted version of DARE-Keepin' it REAL (PROERD–"Caindo na Real"). PROERD is the school prevention program most widespread in Brazilian schools and it has been applied without any effectiveness evaluation (Pereira et al., 2016). No studies on the effects of the original KiR curriculum on bullying could be found in the international literature either. Thus, this is also the first study to evaluate KiR'S effects on bullying perpetration and victimization. When neutral or negative effects are
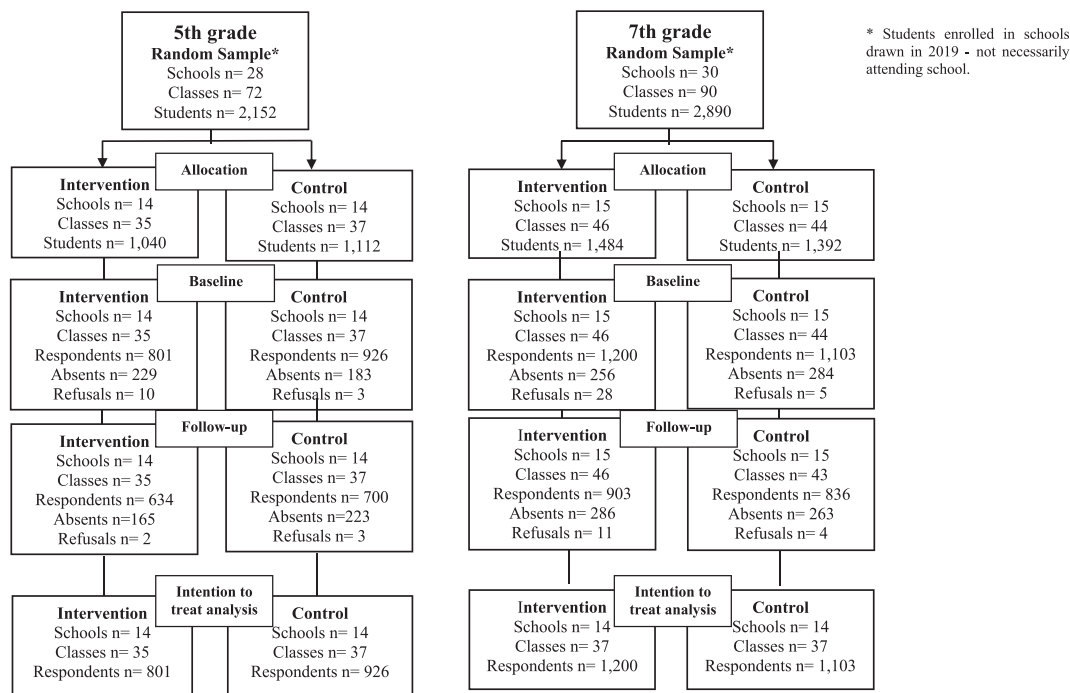
FIGURE 1 Flowchart of the randomized controlled trial to assess the effect of the drug use prevention program PROERD, among 5th and 7th grade students

found for successful programs, one commonly hypothesizes implementation, fidelity, and/or lack of cultural adaptation issues. But despite the favorable effects of KiR in reducing alcohol and substance use (Gosin et al., 2003; S. Kulis et al., 2007; Warren et al., 2006), no scientific evidence supports KiR or DARE-KiR as bullying prevention programs. As such, regardless of other important points about the program, our central hypothesis to explain these null effects is that KiR was not, in fact, designed to prevent bullying, despite being disseminated in Brazilian schools for such purpose.

Although KiR has never been tested for bullying, two studies investigated its effects on school violence using smaller samples. S. S. Kulis et al. (2019) tested the KiR curriculum among 676 students (mean age 12.2) in Guatemala. Despite finding positive results for drug use, the authors found no significant effects of the program on theft, physical violence, or school fights. Nieri et al. (2014) evaluated the KiR effects on theft, fighting, and weapon use among 581 5th graders, finding no statistically significant impact of the program on these behaviors. According to the authors, although the program does not directly propose preventing such problems, its components could affect other risk behaviors since different youth behavioral issues have similar etiologies (S. S. Kulis et al., 2019; Nieri et al., 2014).

Having established this, we raise two important aspects about the intervention that could help explain its null effects. The first is that PROERD—"Caindo na Real" was implemented in Brazilian schools without the necessary cultural adaptation. The DARE-KiR material was simply translated into Brazilian Portuguese and the videos dubbed. Most studies on the effects of the KiR program on substance use show that its success depends on cultural adaptation, finding that the original curriculum has a minor or no effect compared to the culturally adapted text. Even within the United States, different curricula are adapted for specific populations, such as urban Indigenous, Latino, or rural students (Kulis et al., 2005, 2017; F. F. Marsiglia et al., 2019), indicating the developers' concern with existing cultural differences. Ttofi and Farrington (2011) carried out a meta-analysis of 44 different bullying intervention studies and reported that programs from Nordic countries, such as Norway and Finland, were the most successful. Programs developed in North America had much lower success rates. These findings point to the sensitivity of bullying to sociocultural and ecological factors (Huang et al., 2013). Countries differ in their ability, engagement, and awareness in addressing bullying, underlining the importance of evidence-based and culturally adapted interventions.

The second aspect concerns the intensity of intervention. Bullying is a complex behavior, and prevention strategies could be more effective when accompanied by environmental changes that include students and their families, the school staff, and other key members of the school community (Jimerson et al., 2009). PROERD offers a single specific class on bullying for the 5th grade but the theme reappears in other lessons; for the 7th grade, however, bullying is only mentioned in some learning situations.

Importantly, most studies evaluated the KiR program applied by previously trained teachers from schools already familiarized with the KiR curriculum (Hecht et al., 2018; S. S. Kulis et al., 2019; Marsiglia et al., 2011, 2015, 2019). In the present study, PROERD was applied by police officers previously trained to become an instructor. As explained above, since 2014 the Brazilian military police have adopted the DARE-KiR curriculum in their prevention program. As such, besides being the first randomized controlled trial to evaluate DARE-KiR's effects on bullying, our study is also the first in the literature to assess the program as applied by police officers.

TABLE 3 Observed distribution of bullying among 5th and 7th grade students by group according to the time of evaluation of the PROERD cluster randomized controlled trial

Bullying score	Intervention (14 schools)								Control (14 schools)							
	Baseline		9 months		Change				Baseline		9 months		Change			
	Mean	CI 95%	Mean	CI 95%	Diff	CI 95%		p Value	Mean	CI 95%	Mean	CI 95%	Diff	CI 95%		p Value
5th grade																
Perpetration	0.35	[0.29; 0.42]	0.28	[0.23; 0.34]	−0.07	[−0.14; 0.01]		.070	0.38	[0.32; 0.44]	0.29	[0.24; 0.35]	−0.10	[−0.17; −0.03]		.003
Victimization	1.35	[1.24; 1.47]	1.09	[0.98; 1.21]	−0.26	[−0.38; −0.13]		<.001	1.55	[1.44; 1.66]	1.09	[0.98; 1.21]	−0.41	[−0.54; −0.29]		<.001
7th grade	Intervention (15 schools)								Control (15 schools)							
Perpetration	0.16	[0.12; 0.20]	0.24	[0.19; 0.28]	0.09	[0.03; 0.14]		.001	0.19	[0.15; 0.23]	0.22	[0.17; 0.27]	0.05	[0.01; 0.09]		.032
Victimization	0.56	[0.50; 0.63]	0.81	[0.72; 0.90]	0.26	[0.17; 0.34]		<.001	0.62	[0.55; 0.69]	0.77	[0.69; 0.86]	0.14	[0.05; 0.23]		.002

Note: Analysis of complete cases (CC) to compare groups at each time (5th grade: $N = 1314$, 28 schools; 7th grade: $N = 1731$, 30 schools).

TABLE 4 Analysis of the program's effect on bullying perpetration and victimization among 5th and 7th grade students participating on evaluation of the PROERD cluster randomized controlled trial, according to three paradigms: Complete cases (CC), full information maximum likelihood (FIML) and multiple imputation (MI)

	Bullying score	N	Intervention effect	CI 95%	p Value
5th grade			Coefficient		
Complete cases (CC)	Perpetration	1271	1.02	[0.76; 1.36]	0.897
	Victimization	1278	1.07	[0.91; 1.25]	0.441
Full information maximum likelihood (FIML)	Perpetration	1727	1.02	[0.77; 1.36]	0.878
	Victimization	1727	1.05	[0.89; 1.25]	0.549
Multiple imputation (MI)	Perpetration	1727	0.98	[0.74; 1.30]	0.900
	Victimization	1727	1.05	[0.89; 1.23]	0.572
7th grade					
Complete cases (CC)	Perpetration	2303	1.27	[0.83; 1.95]	0.277
	Victimization	2303	1.09	[0.90; 1.32]	0.361
Full information maximum likelihood (FIML)	Perpetration	2303	1.22	[0.79; 1.87]	0.366
	Victimization	2303	1.08	[0.89; 1.30]	0.434
Multiple imputation (MI)	Perpetration	2303	1.21	[0.85; 1.73]	0.299
	Victimization	2303	1.08	[0.91; 1.28]	0.410

Note: Analyzes adjusted by sex, age, socioeconomic status, and bullying status in the initial time.

As for study limitations, our main concern was follow-up loss, that is, the adolescents who missed the 9-month follow-up. Moreover, many students were absent from the classroom during baseline data collection compared to the number of students in the INEP list. However, this loss was expected since it has occurred in similar studies conducted in Brazilian public schools (Sanchez et al., 2017, 2018). Approximately 20% of registered students are regularly absent from public schools (Penna, 2010). Losses during follow-up are also a common limitation in longitudinal studies (Ariza et al., 2013; Newton et al., 2010; Sanchez et al., 2017) and we employed advanced statistical methods to try to estimate the values lost over time. Since the sample universe was selected from schools that did not apply the PROERD program in the 3 years before the study, data cannot be generalized for they may not represent all schools in São Paulo. We must also consider that the schools selected to participate in this study were located in peripheral urban low-income areas that are more exposed to violence (Daniel et al., 2009), which may hinder the program's effectiveness. Consequently, the program may present other effects when applied to other regions or schools in the city with a different youth profile. This is a general limitation of school RCTs.

Given the urgent need to prevent bullying in schools and since PROERD is the school bullying prevention program most disseminated in Brazil, municipal and state governments should be concerned about this study's results. A single class on bullying prevention offered in the 5th grade and some situations involving bullying in the 7th grade curriculum seem insufficient to prevent a complex and chronic behavior even if other components of the program could indirectly act to reduce the bullying issues. We recommend adopting an evidence-based bullying prevention program instead of the DARE-KiR program. Due to the sensitivity of bullying behavior to cultural factors, cultural adaptation should be considered an essential step in implementing a bullying prevention program.

CONFLICT OF INTEREST
The authors declare no confict of interest.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request. Due to the sensitive nature of the questions asked in this study, survey respondents were assured raw data would remain confidential and would not be shared.

ETHICS STATEMENT

All procedures in the present study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was registered in the Brazilian Ministry of Health Register of Clinical Trials (REBEC), under protocol number 6q23nk. The study protocol was approved by the Universidade Federal de São Paulo's Research Ethics Committee (n:1327/2018).

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SUPPORTING INFORMATION

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